

(2008)

SYLLABUS OF SUBJECTS

**Graduate School of Advanced Technology and Science
The University of Tokushima**

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Chapter 1

MASTER'S DEGREE

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Intelligent Structures and Mechanics Systems Engineering — Civil and Environmental Engineering

SYLLABUS OF SUBJECTS

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Introduction to Intellectual Property

2 units

Tohru Sakai · PART-TIME LECTURER / (財)工業所有権協カセンター, Juichiroh Osame · PART-TIME LECTURER

Akio Fujii · PART-TIME LECTURER / INTELLECTUAL PROPERTY OFFICE, Yasushi Toyosu · PART-TIME LECTURER, Kuniaki Kubota · PART-TIME LECTURER

Target) Understanding the basic systems and importance of protection and practical use of intellectual property based on some examples.

Outline) It is necessary for a working staff in a company, a university, etc., in a future. It is introduced the importance to protect and practical use of intellectual property at governments, industrial circles, universities and institutes in Japan using potential on scientific techniques. This lecture is treated the basic systems of protection and practical use of intellectual property particularly based on strategy and invasion of patent in an organization such as company, university, etc.

Style) Lecture

Keyword) Intellectual property, Patent Law, Protect and Use of Intellectual Property

Relational Lecture) “Introduction to Intellectual Property”(0.5)

Requirement) No requirement

Notice) It is necessary to be present at two concentrated lecture.

Goal)

1. Understanding concept of intellectual property right.
2. Understand the Patent Act, the Trademark Act, the Design Act and the Copyright Act.
3. Understanding on basic practical use of intellectual property.

Schedule) 1. Concept of intellectual property(Sakai) 2. Outline of intellectual property(Patent and Trademark)(Sakai) 3. Outline of intellectual property(Design and Copyright)(Sakai) 4. Patent, invention and invasion of patent (Sakai) 5. Management of intellectual property and use (Sakai) 6. A way of research and development and intellectual property in a future(Sakai) 7. The midterm examination and

its comment for Target and 8. History of system of intellectual property (Osame) 9. International trend of system of intellectual property (Osame) 10. Acquisition method of intellectual property right (Fujii) 11. Use of intellectual property (Watanabe) 12. Strategy of intellectual property on development of techniques (Y.Higuchi) 13. Effective intellectual property in development of techniques (Kubota) 14. Special lecture on a use of intellectual property by a chief executive officer(1) 15. Special lecture on a use of intellectual property by a chief executive officer(2)

Evaluation Criteria) Passing mark is over 60% on the examinations and the reports for each reaching level, respectively.

Textbook) To be used textbooks made by lecturers.

Reference) Nobuhiro Nakayama: Titeki Shoyuken, Nikkan Kohgyo Shinbunsha

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169432>

Student) For the course students and other graduate school students.

Contact)

⇒ Sakai (+81-3-5600-2631,)

⇒ Mizuguchi (A501, +81-88-656-7349, mizuguch@ce.tokushima-u.ac.jp) (Office Hour: Monday, 11:00-12:30, 17:00-18:00)

Management Theory of New Business

2 units

Vice chairperson of School Affairs Committee, Faculty of Engineering

First-line men with experience of practical business · PART-TIME LECTURER

Target) New business is the word which means the business to make the most of technical knowledge, technology, the new idea and which is developed creatively, and that main bearer is the enterprise called a venture. There is a purpose of this class in providing the knowledge which is necessary, and know-how and a spirit so that a taking lecture student may establish a venture business.

Outline) The regeneration of the Japanese society with the vitality is being asked. Government enforced "a university venture 3 years 1000 companies plan" over Heisei 14-the 16th year. Though that goal was almost attained, it is very important to promote entrepreneur education continuously from now on. Tokushima Prefecture supports this class based on the recognition done like this, and it is established.

Requirement) The person whom the one with the classroom is constructed by the class start time in the person who doesn't learn the unit of "Introduction to new business" in the college, and a group are organized, and it is limited to the person with the intention to make a business plan, and taking lecture is recognized.

Notice) Being late and a whisper in class should be prohibited strictly. Be careful over and again because it should dispose of exit and future taking lecture may not be recognized when it is wicked.

Goal) Learning of the necessary knowledge to establish venture business, and the ability which can make a business plan.

Schedule) 1. Guidance 2. What is the new business? 3. Keynote lecture 4. Theory of a stand-alone version venture success 5. The law knowledge which is necessary for entrepreneur 6. Fund-raising and capital policy 7. Indirect finance 8. Direct finance 9. The basis of the company management 10. The elementary knowledge of the business accounting 11. The point of the business plan preparation 12. Management strategy and marketing 13. Product development and intellectual property 14. Business plan preparation practice 15. Examination 16. Business plan announcement meeting

Evaluation Criteria) It is evaluated by the presentation (40%) of the written examination (60%) and the business plan. And, the presentation of the written examination and the business plan is decided to be recognized only for the taking lecture student who attended it for 2/3 and more of the classes that it is opened.

Textbook) The summary is distributed every time.

Reference) Several are introduced in the school hours.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169469>

Student) he person who hasn't learned the unit of the new business outline that it is opened with this learning in all the students enrolled in the graduate school yet is made the target. The number of completion people may be restricted in the method such as a lottery in case of a taking lecture applicant many. As for the details, an applicant for taking lecture is to follow those directions because the notice which showed attention in taking lecture is done.

Contact)

⇒ Vice chairperson of School Affairs Committee, Faculty of Engineering

Note) The man of business that it is active in the forefront every time, and an adviser are invited as an instructor, and working knowledge is provided for theory plus practice in this class from the specialist's position. This class is the thing which is useful enough even if it is taken to the person who aims at a general enterprise and a laboratory, the employment to the self-governing body and so on.

Management of Technology

2 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) About the production management of the automobile industry, it is understood variously from the point of view such as "research and development", "production management", "purchasing" and "quality control" "marketing" and "cross-cultural management".

Outline) It learns about the production management. This time, "the automobile industry" specially takes up the production management of "Honda Motor Co.,Ltd. (following Honda)" even of that in the case, and the class to appreciate that importance with ranking of technology in management is taken.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business".

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of management is learned.
2. Ranking of the technology in management and that importance are appreciated.
3. It learns how to solve the various problems which always occur in the spot of the management through the case study and the business game.

Schedule) 1. Guidance 2. Lecture "What in Management of Technology?" 3. Case report "Research and development of Honda" 4. Case study "Plan an overseas factory." "A new car development order" 5. Lecture "Production management and purchasing" 6. Lecture "Quality control" 7. Case report "The production management of Honda"; "The supply chain management of Honda" 8. Case study "Plan an overseas factory." 9. Case report "The quality control of Honda" 10. Case study "Don't make material defects flare up again." 11. Lecture "Marketing strategy" 12. Lecture "Cross-cultural management" 13. Case report "Around the products project of Honda - the two-wheeled vehicle" 14. Case report "The path of internationalization of Honda" 15. Case report "The personnel management of Honda" 16. Summary and questions and answers

Evaluation Criteria) It is evaluated in the remark (20%) in class and the middle, end of a term report (80% in total).

Textbook) It doesn't specially use. The summary and so on is distributed every time.

Reference) Several are introduced in class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169348>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the doctor former term course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Note) This class invites seven Honda alumnuni who did work in "research and development", "production management", "purchasing", "quality control", "marketing", "cross-cultural management", and so on as an instructor, and it is the class to do case report. Even if it is seen nationwide, the trial done like this is very rare, and it is a precious class. And, an applicant for taking lecture is to attend it in the guidance to hold it in advance. A schedule is indicated separately.

Presentation Method (M)

2 units

Target) Poster and oral presentations, and journal publications are common means of appealing the research work in various scientific and technological disciplines. It's undoubtedly important for activating the research work. The lecture is intending for students to learn most efficient way to appeal their findings and discussions in scientific community.

Outline) Credits are acknowledged to the students who are supervised to give conference speech by themselves and do actually the lectures.

Goal) The lecture is aiming at having knowledge and experience of the presentaion in international conferences.

Evaluation Criteria) Students' achievement is evaluated by portfolios submitted showing the progress in preparation of international conferences as well as by presentation records.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169510>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Internship (M)

2 units

Target) This program is provided to increase knowledge and experience in the actual industrial technology in various fields. Through the practical experience, the program will allow students to become discerning and well-balanced researchers or engineers with deeper understanding of technological societies.

Outline) Credits are acknowledged to students who experienced the internship in companies and/or government offices. Their fulfilment is evaluated by activity reports during internship.

Goal)

1. Grasping internal systems of a company, management, action and strategy to achieve the company's goal. (2)
2. Understanding human relationship and communicative manner in a working society and a company.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by supervisors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169345>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Venture Business (M)

2 units

Target) Aims of the lecture are doing collaborative works with private enterprises and establishing venture businesses through such works.

Outline) The lecture is aiming at founding a venture business company as well as establishing collaborative research works with private enterprises. It's worth to apply their accomplishment to an actual society beyond the range of a laboratory work.

Goal) Objective of the lecture is to have experience and knowledge of collaborative works with private enterprises and to mature the works to venture businesses.

Evaluation Criteria) Credits are acknowledged in case of doing collaborative works with enterprises and/or maturing them to venture businesses. Handouts, reports, and presentation materials, etc. are evaluated to approve credits.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169332>

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Long-term Internship (M)

6 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This program is provided long-term internship in the actual industrial companies and so on, doing a joint study between companies and university on practical problems proposed by the company and practical experience of management of technologies. Through the long-term internship, the program will allow students to become a engineer with a core role in researches and companies

Outline) Credits are acknowledged to students who experienced the internship in companies or government offices of 270 hours during three months or more and presentation to executive officer of the company. Their fulfillment is evaluated by activity reports during internship and appraisal and interviewed report from a mentor.

Goal) Grasping abilities for practical engineers by studying activities in company and so on.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by mentors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169440>

Student) Able to be taken by only specified class(es)

Contact)

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⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

⇒ Morimoto (A407, +81-88-656-7619, emi.morimoto@kg.tokushima-u.ac.jp) (Office Hour: 月～木(10時～15時))

Note) Students who resister the coop-education program for "Pai-shape" engineers with sense for management of technology, are able to have a grant-in-aid for travel and so on. Ask committee members of long-term internship in your course or coordinators of this program.

Advanced Lecture in Theory of Business Models

2 units

Tatsuya Deguchi · PART-TIME LECTURER, Kenichi Yasumuro · PART-TIME LECTURER, Katsuo Touma · PART-TIME LECTURER

Takahide Yamaguchi · PART-TIME LECTURER, Shingou Nishii · PART-TIME LECTURER

Target) There is a purpose of this class in providing the knowledge which is necessary, and know-how so that students may achieve a business model in establishing enterprises based on the lecture of "Management Theory of New Business", and in making students understood the profit generating stream by studying on the frame work of companies in several business fields.

Outline) Business Model is a remarkable term in modern economic and organizational theories in these days but describes a broad range of definitions. In this lecture, Business Model is defined as "System which converts technology and know how into profit for the purpose of customers' satisfaction" and aims at providing the ability for the design of profitable system, by learning cost issues in establishing business strategies of companies.

Requirement) Finish " Introduction to new business " or " Advanced Lecture in management Theory of new business "

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of business model design is learned.
2. Understanding of the concept of business model by case study analysis are appreciated.
3. It learns forming ability of business plan through the case study on business models.

Schedule) 1. Guidance 2. Keynote lecture "Business Model Thinking" 3. Questions and answers, Discussions 4. Lecture "Theory of Business Models" 5. Lecture "Design principles of Business Models" 6. Lecture "Evaluation of Business Models" 7. Case Study "Business Model in a R&D company" 8. Case Study "Business Model in a manufacturing industrial company" 9. Case Study "Business Model in a company of service industry " 10. Case Study "Business Model in a company of information industry " 11. Business plan practice, Present situation analysis and alternatives. 12. Business plan practice, Concept ad design of business. 13. Business plan practice, Financial analysis . 14. Business plan practice, Concluding and submitting 15. Presentation(1) of Business plan practice. 16. Presentation(2) of Business plan practice, Comments and summary.

Evaluation Criteria) Participation in class(20%) Group work and its report(80%)

Textbook) Ken-ichi Amuro and Study Group of Business model "Case Book: Business Model Thinking" Bunshindo

Reference) Several are introduced in class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169656>

Student) The person who finished "Introduction to new business" or " Advanced Lecture in management Theory of new business " in all the students enrolled in the course. And, the number of taking lecture

people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Contact)

⇒ Tatsuya Deguchi (Wakayama University)
 ⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示版を参照のこと)

Note) This class is supported by Tokushima Prefecture Government

Applied Fluid Dynamics

2 units

Takeshi Okabe · PROFESSOR / ENVIRONMENTAL CONSERVATION ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
 Kunihiko Ishihara · PROFESSOR / MECHANICAL SYSTEMS, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This subject is concerned with flood flow, sediment transport and riverbed variation. The aim of this subject is to understand fundamentals of those phenomena as well as numerical solution methods for the basic equations.

Outline) First, characteristics of flood flow, sediment transport and riverbed variation are interpreted and the basic equations of those phenomena are deduced and presented. Next, fundamentals of numerical solution methods for partial differential equations are lectured to be put into practical usage for numerical simulation of various kinds of flood flow and riverbed variation. Finally, some simple problems are given to practice computer programming by FORTRAN.

Style) Lecture and exercise

Keyword) flood flow, sediment transport, riverbed variation, numerical model

Relational Lecture) “Advanced Disaster Reduction Engineering”(0.7, ⇒p.9), “Advanced Water Resources Engineering”(0.7, ⇒p.9)

Requirement) Fundamental knowledge of hydraulics, river engineering and numerical analysis is necessary.

Notice) not specified.

Goal) fundamentals of flood flow, sediment transport and riverbed variation are understood and numerical techniques for those problems are acquired at practical level.

Schedule) 1. guidance (river problems and numerical analysis) 2. basic equations of river flow 3. critical condition of sediment motion 4. formulas of bed load 5. formulas of suspended load 6. basic equations of riverbed variation 7. test(1) 8. outline of numerical solution of differential equations 9. numerical models for river flow (1) 10. numerical models for river flow (2) 11. numerical models for riverbed variation (1) 12. numerical models for riverbed variation (2) 13. problem setting and orientation for programming 14. practice of programming (1) 15. practice of programming (2) 16. test(2), presentation

Evaluation Criteria) marks of tests (1) and (2) are summed with the weights of 6 and 4, respectively, and the passing mark is 60%.

Textbook) Japan Sabo-Gakkai, Numerical solution of riverbed variation in mountain rivers, Sankaido Publ..

Reference) not specified.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169320>

Student) only for specified course

Contact)

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Advanced Structural Dynamics

2 units

Fumiaki Nagao · PROFESSOR / STRUCTURAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
 Minoru Noda · ASSOCIATE PROFESSOR / STRUCTURAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) To understand the dynamic response and control of structures

Outline) In the first half of the semester, following the 'Introduction on Structural Dynamics' learned in under graduate course, methodologies to construct the physical and mathematical models of structural oscillations are reviewed and meanings of their mathematical solutions are examined again in physical standpoint. In the latter half, random vibration theories based on the statistics and probability and passive and active structural oscillation control are introduced. For the purpose to deepen the understanding, many exercises are prepared.

Style) Lecture and exercise

Keyword) Analysis of Dynamic Response, Analysis of Random Vibrations, Control of Dynamic Response

Fundamental Lecture) “Structural Dynamics and Exercise”(1.0)

Relational Lecture) “Advanced Structural Design”(0.5, ⇒p.12)

Goal) To understand the dynamic response and control of structures

Schedule) 1. Formation of Equations of Motion 1 2. Formation of Equations of Motion 2 3. Analysis of Dynamic Response 1 4. Analysis of Dynamic Response 2 5. Analysis of Dynamic Response 3 6. Analysis of Dynamic Response 4 7. Analysis of Random Vibrations 1 8. Analysis of Random Vibrations 2 9. Analysis of Random Vibrations 3 10. Analysis of Random Vibrations 4 11. Analysis of Random Vibrations 5 12. Control of Dynamic Response 1 13. Control of Dynamic Response 2 14. Control of Dynamic Response 3 15. Control of Dynamic Response 4

Evaluation Criteria) evaluated by attitude in class (80%) and reports (20%)

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169399>

Contact)

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⇒ Noda (A514, +81-88-656-7323, tarda@ce.tokushima-u.ac.jp) (Office Hour: 年度ごとに学科の掲示を参照すること)

Advanced Fracture and Structural Mechanics

2 units

Yoshifumi Nariyuki · PROFESSOR / STRUCTURAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) To understand method of matrix displacement analysis of plane framed structures which is widely used as a suitable method for computer programming.

Outline) First, method of matrix displacement analysis of plane framed structures is explained. Next, some problems are given for exercises in analysis of them. Finally, term examination is set. This class is a seminar type using textbook written in English.

Style) Lecture

Keyword) Framed structure, Matrix displacement method, Plane frame, Elastic analysis, 英文

Fundamental Lecture) “Structural Mechanics and Exercise 1”(1.0), “Structural Mechanics and Exercise 2”(1.0), “Structural Mechanics and Exercise 3”(0.8), “Structural Analysis and Exercise”(0.8)

Relational Lecture) “Advanced building construction”(0.5, ⇒p.13), “Advanced Civil and Environmental Engineering Seminar”(0.5, ⇒p.14)

Requirement) Students are required to have a good understanding of undergraduate-level structure mechanics.

Notice) Students have to prepare for each lesson.

Goal) To understand method of matrix displacement analysis of plane frames

Schedule) 1. Guidance/A few historical remarks(pp.1-10) 2. Basic considerations of structural analysis 1(pp.11-16) 3. Basic considerations of structural analysis 2/Determinate and indeterminate structures(pp.16-21) 4. Methods of analysis (pp.21-26) 5. Displacement method/Stiffness matrix of a bar element subjected to axial force(pp.26-33) 6. Bar structure stiffness matrix(pp.33-39) 7. Some properties of stiffness matrices/Stiffness matrix of a bar element subjected to torsion(pp.39-44) 8. Stiffness matrix of a beam element (pp.44-47) 9. Assembly of the structure stiffness matrix by the direct stiffness method 1(pp.47-54) 10. Assembly of the structure stiffness matrix by the direct stiffness method 2(pp.54-59) 11. Symmetrical geometry(pp.59-64) 12. Further remarks on prescribed displacements(pp.64-70) 13. Problem exercises(pp.71-72) 14. Problem exercises(pp.72-73) 15. Term examination 16. Restoration of answer papers and comments

Evaluation Criteria) Term examination and report are marked out of 60 and 40 respectively and those marks are summed up. The passing mark is 60.

Textbook) Matrix and finite element displacement analysis of structures, D.J.DAWE, Clarendon press, Oxford, 1984

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169474>

Student) Able to be taken by only specified class(es)

Contact)

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Advanced Properties of Material

2 units

Hiroyuki Mizuguchi · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) Understanding on the relationship between micro-structures and macro-properties of construction materials particularly concrete and some of construction materials in a concept of sustainable materials cycling society.

Outline) It is necessary understanding a proper material for a construction method to satisfy the required performances in each civil work. For this reason, it is very important to understand the relationship between micro-structures and macro-mechanical and chemical properties of construction material particularly concrete. And, it is introduced a concept on construction material in sustainable material cycling society.

Style) Lecture

Keyword) Construction Material, Concrete, Sustainable Cycling Society

Relational Lecture) “Advanced reinforced concrete engineering”(0.5, ⇒p.11)

Requirement) No requirement.

Goal)

1. Understanding on the relationship between micro-structures and macro-properties of construction materials particularly concrete.
2. Understanding on a concept of construction materials in sustainable cycling society.

Schedule) 1. Guidance on lecture 2. Admixture(No.1) 3. Admixture(No.2) 4. Fresh Concrete(No.1) 5. Fresh Concrete(No.2) 6. Fresh Concrete(No.3) 7. Highly Fluidized Concrete(No.1) 8. Highly Fluidized Concrete(No.2) 9. Mass Concrete(No.1) 10. Mass Concrete(No.2) 11. Eco-Concrete(No.1) 12. Eco-Concrete(No.2) 13. Concept of Construction Material in Sustainable Material Cycling Society(No.1) 14. Concept of Construction Material in Sustainable Material Cycling Society(No.2) 15. Concept of Construction Material in Sustainable Material Cycling Society(No.3) 16. Comments for Reports on Concrete

Evaluation Criteria) Evaluate by reports for each subject.

Textbook) Handout of photo copying materials for each subject

Reference)

- ◇ Standard Specification for Concrete JACE.
- ◇ Handbook on Concrete, Asakura Book Co Ltd.
- ◇ Etc.

Webpage) <http://www.ce.tokushima-u.ac.jp/ksys/mizuguchi>.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169385>

Student) Able to be taken by student of other faculty and university

Contact)

⇒ Mizuguchi (A501, +81-88-656-7349, mizuguch@ce.tokushima-u.ac.jp) (Office Hour: Monday, 11:00-12:30, 17:00-18:00)

Project Management

2 units

Susumu Namerikawa · ASSOCIATE PROFESSOR / STRUCTURAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) The purpose of this lecture is to understand PMBOK (Project Management Body of Knowledge), which is global standard in project management.

Outline) This lecture is outlined as follows: A) Current of global standard pivoted on U.S. in project management. B) PMBOK (Project Management Body of Knowledge), which is global standard in project management.

Style) Lecture

Keyword) PMBOK

Fundamental Lecture) “Construction Management”(0.2)

Goal) Understanding of project management body of knowledge

Schedule) 1. Guidance 2. Project and Project Management 3. Initiating Processes 4. Project Charter 5. Scope and WBS 6. Resource Planning and Estimate 7. Control of Project Planning 1 8. Control of Project Planning 2 9. Develop Project Planning 1 10. Develop Project Planning 2 11. Develop Project Team 12. Performance Measurement Baseline 13. Change Control 14. Closing Processes 15. Professional Responsibility 16. Semester Examination

Evaluation Criteria) Achievement level of the target is evaluated by the semester examination. Score of 60points or over is required to clear the target.

Textbook) Textbook is introduced in the class. Related documents is distributed to students.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169513>

Student) Able to be taken by student of other department

Contact)

⇒ Namerikawa (A412, +81-88-656-9877, namerikawa@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示を参照すること)

Quantum mechanics and advanced lecture in quantum physics

2 units

Yoshitaka Michihiro · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces the quantum mechanics.

Outline) Basics of quantum mechanics are introduced.

Style) Lecture

Keyword) Quantum Mechanics

Goal) To understand the outline of quantum mechanics.

Schedule) 1. Introduction 2. Variational method 3. Lagrangian 4. Hamiltonian 5. Poisson's bracket expression 6. Quantization 7. Operator 8. Wavefunction 9. Expectation value 10. Schrödinger equation 11. Example (1) the square well potential 12. Example (2) the linear harmonic oscillator 13. Angular momentum 14. Example (3) hydrogen atom 15. Heisenberg equation 16. Field quantization

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169505>

Contact)

⇒ Yoshitaka Michihiro (A203)

Solid State Ionics

2 units

Koichi Nakamura · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces topics in solid state ionics, conduction mechanism in ionic conductors and techniques to study solid state ionics.

Outline) Basic experimental and theoretical approaches to understand solid state ionics are introduced and discussed in terms of “ion dynamic”.

Keyword) Ionic conductor, Ionic diffusion, Secondary battery

Goal)

1. To understand basic physical and chemical properties of ionic conductors.
2. To understand basic technique to study ionic conductors.

Schedule) 1. Introduction to solid state ionics 2. Band theory and conduction mechanism 3. Defect in ionic crystal 4. Diffusion in solid 5. Diffusion mechanism in solid 6. Solid electrolyte 7. Mixed conductor 8. Electrical conductivity 9. Application - Ion secondary battery - 10. Application - Fuel cell - 11. Electrical conductivity measurement 12. Nuclear Magnetic Resonance 13. Ultrasonic measurement 14. Recent topics on solid state ionics 15. Future in solid state ionics 16. Test

Evaluation Criteria) 期末試験で評価する.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169375>

Contact)

⇒ Nakamura (A216, +81-88-656-7577, koichi@pm.tokushima-u.ac.jp)

Methods for analysis of mathematical phenomena

2 units

Hitoshi Imai · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Cheng-Hai Jin · PROFESSOR / INTERNATIONAL STUDENT CENTER

Target) To learn the to analyze the mathematical phenomena.

Outline) Methods used in analysis of mathematical phenomena are introduced. Especially, those in numerical analysis are focused on.

Style) Lecture

Keyword) Mathematics, Numerical, Analysis

Fundamental Lecture) “Numerical Analysis”(1.0)

Relational Lecture) “Advanced Computational Science”(0.5, ⇒p.52)

Requirement) Only the premise that have studied basic mathematics.

Goal) The adequacy of the two-dimensional boundary value problem governed by the Poisson equation can be understood by the finite difference method, etc.

Schedule) 1. Introduction to computer 2. Common sense in numerical computation 3. High-speed computation (Parallel computing) 4. Finite difference method I 5. Finite difference method II 6. Finite difference method III 7. Finite difference method IV 8. Finite element method I 9. Finite element method II 10. Finite element method III 11. Finite element method IV 12. Boundary element method I 13. Boundary element method II 14. Boundary element method III 15. Iterative method

Evaluation Criteria) Evaluation by the report.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169405>

Contact)

⇒ Imai(A220, +81-88-656-7541, The inquiry by means of the cellular phone or E-mail is not acceptable) (Office Hour: Office hours: Thursday 14:00-15:00)

Differential Equations

2 units

Nobuyoshi Fukagai · ASSOCIATE PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) Introduction to mathematical theory of differential equations.

Outline) Boundary value problems of second order linear differential equations.

Style) Lecture

Keyword) 微分方程式の境界値問題, Sturm-Liouville 問題

Goal) To be familiar with Sturm-Liouville type equations.

Schedule) 1. Introduction 2. Helmholtz's equation 3. Eigenvalues and eigenfunctions 4. Green's function 5. Residue analysis 6. Expansion of Green's function 7. Fourier series 8. Existence theorem 9. Sturm-Liouville problems 10. Characteristic function 11. Solvability of boundary value problems 12. Basic estimates 13. Distribution of eigenvalues 14. Eigenfunction expansion 15. Review

Reference) 望月清・トルシン 『数理物理の微分方程式』 培風館

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169497>

Student) Able to be taken by student of other department

Contact)

⇒ 工学部数学教室 (A棟219室)

Advanced Computational Science

2 units

Toshiki Takeuchi · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class provides the basic technology for numerical calculation for the differential equation.

Outline) The numerical calculation methods for the differential equation are introduced.

Style) Lecture

Keyword) Numerical analysis, Numerical computation, Differential equation

Fundamental Lecture) “Numerical Analysis”(1.0), “Basic Mathematics/微分積分学 I”(1.0), “Basic Mathematics/微分積分学 II”(1.0)

Relational Lecture) “Methods for analysis of mathematical phenomena”(1.0), “Numerical Analysis”(1.0)

Requirement) Students have to understand basic mathematics of undergraduate-level.

Goal) To understand principle of numerical calculation methods.

Schedule) 1. Introduction to numerical simulation 2. Mathematical model 3. Lagrange interpolation 4. Spline interpolation 5. Least squares method 6. Finite difference method 7. Arbitrary precision formula 8. Application to ordinary differential equation 9. Application to partial differential equation 10. Gauss-Seidel method 11. Successive Over-Relaxation method 12. Explicit method 13. Implicit method 14. Crank-Nicolson method 15. Numerical instabilities

Evaluation Criteria) Assignments count 100%

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169356>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Takeuchi (A206, +81-88-656-7544, takeuchi@pm.tokushima-u.ac.jp) (Office Hour: 木曜日 14:00-15:00)

Topics of Analysis for Mathematical Science

2 units

Atsuhito Kohda · ASSOCIATE PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) Mathematical theory and technique for analysis of engineering phenomena

Outline) Mathematical theory to analyze problems in engineering and its application, mainly theory and technique of differential equations

Style) Lecture

Relational Lecture) “Advanced applied analysis”(0.2, ⇒p.8), “Differential Equations”(0.2, ⇒p.8)

Requirement) If you like undergraduate-level mathematics, it will be sufficient.

Goal) To be familiar with mathematical theory, that helps engineering study.

Schedule) 1. Theory of sets and maps 2. Cardinal numbers and bijection 3. Equivalence relations and cryptography 4. Linear space and tensor 5. Vector analysis and differential form 6. Cauchy's theorem and vector analysis 7. Differential form and Cauchy's theorem 8. Projective plane 9. Quadratic curves and projective plane 10. All quadratic curves are circles? 11. The index of vector fields 12. Applications of the index:fundamental theorem of algebra 13. Vector fields on the unit sphere 14. Why there is the north pole on the earth 15. Mathematics and computers 16. Summary

Webpage) <http://math1.pm.tokushima-u.ac.jp/lecture/>

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169402>

Contact)

⇒ Kohda (A211, +81-88-656-7546, kohda@pm.tokushima-u.ac.jp) (Office Hour: 月曜 12:00~ 13:00)

Advanced applied analysis

2 units

Kuniya Okamoto · ASSOCIATE PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) To learn the functional analytic methods which are basic tools for mathematical sciences.

Outline) This subject provides basic theory of functional analysis which is considered as linear algebra in infinite-dimensional spaces. Functional analytic approaches to phenomena described by differential equations are introduced.

Style) Lecture

Relational Lecture) “Topics of Analysis for Mathematical Science”(0.5, ⇒p.8)

Goal) To apply the theory of modern analysis and recognize its significant role.

Schedule) 1. Introduction (What is functional analysis?) 2. Linear operators on finite-dimensional linear spaces 3. Eigenvalue problems 4. Matrix exponentials 5. Hilbert spaces, Banach spaces 6. Function

spaces 7. Linear operators in infinite-dimensional linear spaces 8. Spectral resolutions 9. Fourier transforms 10. Operational calculus 11. Integral transforms, Resolvent operators 12. Strongly continuous semigroups 13. Abstract Cauchy problems 14. Applications to partial differential equations 15. Summary

Evaluation Criteria) Evaluation by the report.

Webpage) <http://math9.pm.tokushima-u.ac.jp/lecture/>

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169317>

Contact)

⇒ 岡本(A212室, TEL/FAX: 656-9441, E-mail: okamoto@pm.tokushima-u.ac.jp)

Advanced Water Resources Engineering

4 units

Jing-Cai Jiang · ASSISTANT PROFESSOR / GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Takao TAMURA · ASSISTANT PROFESSOR / ENVIRONMENTAL CONSERVATION ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) 1. The first objective of this subject is to learn models and theories on rainwater and solute runoff system in river basin. 2. The second objective of this subject is to make students aware of the slope stability methods and to develop an understanding of the procedures and processes involved in the design of engineered slopes and slope stabilization works.

Outline) In the first part of this subject, models and theories on rainwater and solute runoff system in river basin are introduced. The Muskingum method is a commonly used lumped flood routing method for handling a variable discharge-storage relationship. The kinematic wave model is the simplest distributed model defined by the continuity equation for an unsteady flow and the momentum equation assuming the friction and gravity forces balance each other. A report of solving problems related to lecture items is imposed. Topics of the second part covered include slope stability analysis methods, types of shear strengths for both engineered and natural slopes, selection of strength parameters, types of slope stabilization works and their design, and seismic instability of slopes. This subject is related on engineering.

Style) Lecture

Keyword) Linear and non-linear lumped flood routing method, Kinematics distributed flood routing method, stability analysis, shear strengths, slope stabilization

Relational Lecture) “Applied Fluid Dynamics”(0.5, ⇒p.6), “Advanced Disaster Reduction Engineering”(0.5, ⇒p.9), “Advanced Geomechanics”(0.5, ⇒p.9), “Advanced Soil Mechanics”(0.5, ⇒p.10), “Advanced Foundation Engineering”(0.5, ⇒p.11)

Requirement) not specified

Goal)

1. Understand the theory of both linear and non-linear lumped and kinematics distributed flood routing models.
2. Understand the evaluation technique and study results on the water conservation function and the water quality conservation function of forests.
3. On the completion of this subject, students should have a knowledge of slope engineering practices in static and seismic stability analyses, determination of shear strengths, and design of slope remedial works, understand the measurement and selection of the peak, fully softened, and residual shear strengths for use in stability analyses, and understand the design outline of slope stabilization works.

Schedule) 1. Unit Hydrograph 2. Response Function 3. Unit Hydrograph Derivation 4. Lumped Flow Routing 5. Runge-Kutta Method 6. Muskingum Method 7. Linear Reservoir Model 8. Classification of Distributed Routing Models 9. Kinematic Wave Celerity 10. Analytical Solution of Kinematic Wave 11. Finite-Difference Approximations 12. Numerical Solution of Kinematic Wave 13. Muskingum-Cunge Method 14. Conservation function of forest 15. Water quality conservation function of forest 16. New development of water conservation function of forest 17. Examples and causes of slope failure 18. Static slope stability methods (Part 1) 19. Static slope stability methods (Part 2) 20. Static slope stability methods (Part 3) 21. Total stress analysis and effective stress analysis 22. Types of shear strengths for engineered and natural slopes 23. Experimental in-situ determination of shear strengths 24. Experimental laboratory determination of shear strengths 25. Determination of shear strengths by back analysis (Part 1) 26. Determination of shear strengths by back analysis (Part 2) 27. Slope stabilization (unloading and drainage) 28. Slope stabilization (anchors and piles) 29. Slope stabilization (soil reinforcement) 30. Slope stabilization (surface slope protection and vegetation) 31. New development of slope engineering 32. Examination

Evaluation Criteria) Reports and tests.

Textbook) Reading and discussing materials are distributed.

Reference) Soil Strength and Slope Stability by Michael J. Duncan and Stephen G. Wright (John Wiley & Sons)

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169520>

Contact)

- ⇒ Jiang (A402, +81-88-656-7346, jiang@ce.tokushima-u.ac.jp) (Office Hour: 年度ごとに学科の掲示を参照すること)
⇒ TAMURA (A414, +81-88-656-9407, tamura@ce.tokushima-u.ac.jp) (Office Hour: 年度ごとに学科の掲示を参照すること)

Advanced Disaster Reduction Engineering

2 units

Susumu Nakano · ASSOCIATE PROFESSOR / ENVIRONMENTAL CONSERVATION ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) The purpose of this subject is to understand the present conditions in natural disaster reduction and to learn theory and technology about disaster reduction measures.

Outline) First, the present conditions for natural disaster reduction in Japan are presented. Next, effective methods to promote voluntary activities for disaster reduction are presented with practices.

Style) Lecture and exercise

Keyword) regional disaster reduction, voluntary activities of disaster reduction

Relational Lecture) “災害リスク論”(1.0), “Advanced Earthquake Engineering”(0.5, ⇒p.11), “Applied Fluid Dynamics”(0.5, ⇒p.6)

Requirement) not specified

Notice) not specified

Goal)

1. To understand the present conditions in regional disaster reduction
2. To learn the bases of theory and technology for voluntary activities of disaster reduction

Schedule) 1. Guidance, Outline of this subject 2. Strategy for natural disaster reduction 3. Strategy for earthquake disaster reduction 4. Voluntary activities of disaster reduction 5. Risk management for natural disaster in a company, report(1) 6. Damage assumption for the Nankai earthquake 7. Practice of disaster imaging (1) 8. Practice of disaster imaging (2) 9. Practice of disaster imaging (3) 10. Disaster imaging game “Crossroad” 11. Practice with the DIG game “Crossroad” 12. How to make a map for natural disaster reduction 13. Practice of making a map for natural disaster reduction (1) 14. Practice of making a map for natural disaster reduction (2) 15. Education for disaster reduction, Report(2)

Evaluation Criteria) marks of report (1) and (2) are summed with the weights of 4 and 6, respectively, and the passing mark is 60%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Webpage) <http://hyd.ce.tokushima-u.ac.jp/suiko/index.htm>

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169431>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Nakano (A310, +81-88-656-7330, nakano@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示版を参照のこと。)

Advanced Geomechanics

2 units

Takuo Yamagami · PROFESSOR / GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) The purpose of this lecture is to let the students understand the three major solution procedures for problems in geomechanics, that is Limit Equilibrium Method, Limit Analysis Method and Slip Line Method, and their applications to practical situations such as slope stability, earth pressure and bearing capacity problems.

Outline) Beginning with fundamentals of effective stress analysis and total stress analysis, the lecture is given of limit equilibrium stability analysis method considering progressive failure, limit analysis method, slip line method, and their applications.

Style) Lecture

Keyword) Limit equilibrium method, Limit analysis, Slip line method

Fundamental Lecture) “Geomechanics”(1.0), “Soil Mechanics 2”(1.0), “Geotechnical Engineering”(1.0)

Relational Lecture) “Advanced Soil Mechanics”(0.5, =>p.10), “Advanced Foundation Engineering”(0.5, =>p.11)

Requirement) Students are required to have a good knowledge of undergraduate-level soil mechanics.

Goal)

1. To understand shear failure of soils
2. To understand effective stress analysis and total stress analysis
3. To understand stability analysis of slopes considering progressive failure
4. To understand analysis procedure for stability problems

Schedule) 1. Introduction 2. Effective stress analysis (part 1) 3. Effective stress analysis (part 2) 4. Total stress analysis 5. Limit equilibrium method (part 1) 6. Limit equilibrium method (part 2) 7. Progressive failure analysis of slope stability (part 1) 8. Progressive failure analysis of slope stability (part 2) 9. Progressive failure analysis of slope stability (part 3) 10. Limit analysis (part 1) 11. Limit analysis (part 2) 12. Limit analysis (part 3) 13. Slip line method (part 1) 14. Slip line method (part 2) 15. Summary 16. Semester examination

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169392>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Yamagami (A401, +81-88-656-7345, takuo@ce.tokushima-u.ac.jp) (Office Hour: 年度ごとに学科の掲示を参照すること。)

Advanced Environmental Ecology

4 units

Mahito Kamada · ASSOCIATE PROFESSOR / ENVIRONMENTAL CONSERVATION ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) The purpose is to develop the knowledge and skill for conservation and restoration of ecosystems.

Outline) Current situation of ecosystems and technical problems for conservation and restoration are explained. The way of ecosystem management is emphasized to improve ecosystem. All students must give a presentation to introduce their own activities.

Style) Lecture

Keyword) Ecosystem management, Environmental conservation, Nature restoration

Goal) Every student has basic knowledge and skill to improve ecosystem function in the actual society.

Schedule) 1. Guidance 2. Interdisciplinary aspects for ecosystem management 1 3. Interdisciplinary aspects for ecosystem management 2 4. Current situation and problems in ecosystem management 1 5. Current situation and problems in ecosystem management 2 6. Current situation and problems in ecosystem management 3 7. Current situation and problems in ecosystem management 4 8. View points to know the structure and function of ecosystems 1 9. View points to know the structure and function of ecosystems 2 10. View points to know the structure and function of ecosystems 3 11. View points to know the structure and function of ecosystems 4 12. Toward an adequate management of ecosystems 1 13. Toward an adequate management of ecosystems 2 14. Toward an adequate management of ecosystems 3 15. General discussion / Report

Evaluation Criteria) Result is evaluated by contents of the reports, which are set after every related lectures. Over 60% marks is necessary to pass.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169335>

Student) Able to be taken by student of other department and faculty

Contact)

⇒ Kamada (A306, +81-88-656-9134, kamada@ce.tokushima-u.ac.jp) (Office Hour: 年度ごとに学科の掲示を参照すること。)

Advanced Soil Mechanics

2 units

Hisashi Suzuki · ASSOCIATE PROFESSOR / GEOTECHNICAL AND GEOENVIRONMENTAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) The purpose of this lecture is to learn the critical state mechanics which is formed a theoretical base of a modern soil mechanics for clay and sand.

Outline) The purpose of Advanced Soil Mechanics is to learn the critical state mechanics which is formed a theoretical base of a modern soil mechanics for clay and sand. Firstly, the results of typical experiments related to shear properties of a saturated clay are shown and a constitutive law existing at stress-strain relationship of clays are explained. Secondly, the relationship is expanded to the theory of sand and the differences between clay and sand are made clear easily. The elasto-plastic theory for soil is explained using the cam clay model and its applications to numerical analysis are explained showing new research results. Finally, the critical soil mechanics is learned through this lecture.

Style) Lecture

Keyword) critical soil mechanics, cam clay model, flow rule, constitutive law for soils

Goal) Values of stress-strains and pore pressures for saturated soils in various states can be calculated by using critical state soil mechanics theory.

Schedule) 1. cam clay model 2. shear properties of saturated clay 3. existence of critical state line 4. Drained and Undrained tests of normally consolidated clay 5. 3 dimensional expression of critical state line 6. existence of Roscoe Surface 7. shape of Roscoe Surface 8. behavior of overconsolidated clay 9. yield surface of Hvorslev Surface 10. the 2 and 3 dimensional complete state boundary surface 11. mechanical behavior of sands 12. equivalent consolidated pressure 13. elasto-plastic theory of saturated clay 14. cam clay model 15. state boundary equation for cam clay model 16. term-end test

Evaluation Criteria) Degree of achievement for the aim is examined by the semester test and the passing mark is more than 60%.

Textbook) Some prints are distributed in lectures.

Webpage) <http://www.ce.tokushima-u.ac.jp/www/jiban/jiban.html>

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169466>

Contact)

⇒ Suzuki(A403, 088-656-7347, suzuki@ce.tokushima-u.ac.jp)

City and Transport System Planning

4 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Masahiro Miyake · PART-TIME LECTURER / 武庫川学院

Target) Advanced course on concept and case study of social and public policies on urban, regional and transport planning. Study on contents and usage of measures on such planning fields.

Outline) Lectures on Systems approaches on city planning and transport planning, theories and usage of planning models and planning methods. A unit is consisted of three hours lecture and an hour training.

Style) Lecture and exercise

Keyword) City Planning, Transport Planning, Consensus Building

Fundamental Lecture) “Urban & Transport Planning”(1.0), “Project Evaluation Methods for Infrastructure Planning”(1.0)

Relational Lecture) “都市・地域計画論”(0.5), “Infrastructure Planning”(0.5)

Goal)

1. Understanding of problems and recent strategies on city and transport planning
2. Understanding of consensus building method for developing city and transport strategies

Schedule) 1. Problems of City and Transport Systems 1 2. Problems of City and Transport Systems 2 3. Recent Planning Strategies of City and Transport System 1 4. Recent Planning Strategies of City and Transport System 2 5. Recent Planning Strategies of City and Transport System 3 6. Recent Planning Strategies of City and Transport System 4 7. Debate by groups on transport strategies 8. Method of Decision Making and Social Consensus Building 9. Negotiation theory and Consensus Building 10. Negotiation Simulation 1 11. Negotiation Simulation 2 12. Project Cycle Management Participatory Planning Method 1 13. Project Cycle Management Participatory Planning Method 2 14. Project Cycle Management Participatory Planning Method 3 15. Debate by groups on Consensus Building

Evaluation Criteria) Achievement level of the each target is evaluated by the submitted essays and reports. Score of 60points or over is required to clear the target. Students are required to clear the both of targets. Total score is average of the scores of two targets.

Textbook) Textbook is introduced in the class. Related documents is distributed to students.

Reference) Rojer Fisher and William Uly: Getting to yes, Houghton Mifflin,1981

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169463>

Student) Able to be taken by student of other department

Contact)

⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

Advanced Foundation Engineering

4 units

Akitoshi Mochizuki · PROFESSOR / GEOTECHNICAL AND GEOENVIRONMENTAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Katsutoshi Ueno · ASSOCIATE PROFESSOR / GEOTECHNICAL AND GEOENVIRONMENTAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) The purpose of this lecture is to understand the method to analyze failure and deformation of soil structures. In this lecture, deformation and failure characteristics of soil and their modeling methods are explained first. In particular, shear testing apparatus, shear deformation and strength characteristics, are explained in detail. Then computer implementation of the model for deformation and failure characteristics of soil is explained in detail. Topics of this lecture are as follows: 1. Shear testing apparatus and test methods, 2. Basic shear deformation characteristics of soil and its application, 3. Introduction to finite element method, 4. Failure criteria and elast-plastic model of soil.

Outline) Purpose of this lecture is to let the students understand how to solve deformation and failure problems of foundation structures. Beginning with shear testing, the lecture is given shear deformation and strength characteristics of soil and their modeling for numerical methods, implementation of the numerical models into finite element method. Keywords are: 1 shear testing apparatus and methods, 2 Basic shear characteristics of soil and its application, 3 Fundamentals of finite element method, 4 failure criteria and elast-plastic constitutive model of soil.

Style) Lecture

Keyword) Finite Element Method, Elast-Plastic Constitutive Equation

Requirement) nothing

Notice) This class will be

Goal)

1. To understand fundamentals of soil characteristics and its testing method
2. Modeling mechanical characteristics and installing to FEM, and analysis deformation and failure phenomenon of foundation structures

Schedule) 1. Shear test apparatus and method (Direct shear test) 1 2. Shear test apparatus and method (Direct shear test) 2 3. Shear test apparatus and method (conventional and true triaxial compression test) 1 4. Shear test apparatus and method (conventional and true triaxial compression test) 2 5. Fundamentals of shear deformation characteristic of soil 1 6. Fundamentals of shear deformation characteristic of soil 2 7. Failure criteria 1 8. Failure criteria 2 9. Stress-strain relationships of soil 1 10. Stress-strain relationships of soil 2 11. Modeling of stress-strain relationship of soil 1 12. Modeling of stress-strain relationship of soil 2 13. Constitutive equation of soil and its application 1 14. Constitutive equation of soil and its application 2 15. Basic of FEM and its programming 1 16. Basic of FEM and its programming 2 17. Features of geotechnical FEM 1 18. Features of geotechnical FEM 2 19. Implementation of constitutive model of soil 1 20. Implementation of constitutive model of soil 2 21. Introduction of failure criteria 1 22. Introduction of failure criteria 2 23. Introduction of stress dependency 1 24. Introduction of stress dependency 2 25. boundary condition 26. Loading of initial stress 27. Examples of analysis 1 28. Examples of analysis 2 29. exercises in analysis 1 30. exercises in analysis 2 31. exercises in analysis 3 32. report on object 2

Textbook) 別途指示する.

Reference) 別途指示する.

Webpage) <http://kiso.ce.tokushima-u.ac.jp/~ueno/index.html>

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169349>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Mochizuki (A405, +81-88-656-9721, motizuki@ce.tokushima-u.ac.jp)

⇒ Ueno (A504, +81-88-656-7342, ueno@ce.tokushima-u.ac.jp) (Office Hour: 学科の掲示を参照のこと)

Advanced Earthquake Engineering

2 units

Atsushi Mikami · ASSOCIATE PROFESSOR / GEOTECHNICAL AND GEOENVIRONMENTAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) To provide students with fundamental knowledge of (1) basic spectral analysis and (2) basic wave propagation theory which are required in seismic analysis of structures

Outline) In the first half of the class, fundamental knowledge of seismic spectral analysis is provided. In the second half, the method of site response analysis including basic wave propagation theory, dynamic soil properties and an equivalent linear analysis, is explained.

Style) Lecture

Keyword) spectral analysis, wave propagation theory

Relational Lecture) “Advanced Structural Dynamics”(0.5, ⇒p.6)

Requirement) Fundamental knowledge of dynamics of structures

Goal) To understand fundamental knowledge of seismic spectral analysis and wave propagation theory

Schedule) 1. Fourier transform 2. Introduction to Fourier transform 3. Fourier transform 4. Fast Fourier transform 5. Power spectrum and cross spectrum 6. Smoothing technique 7. Coherence 8. Transfer function 9. Shear wave propagation 10. Reflection and transmission of waves 11. Shear wave propagation in multi-layer 12. Strain dependency of shear modulus and damping 13. Equivalent linear method 14. Ground response analysis by SHAKE 15. Exam 16. Remarks

Evaluation Criteria) Exam (60%) and reports (40%)

Textbook) Introduction to seismic spectral analysis

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169428>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Mikami (A308, +81-88-656-9193, amikami@ce.tokushima-u.ac.jp) (Office Hour: 8:40-10:10, 18:00-19:30)

Advanced reinforced concrete engineering

4 units

Chikanori Hashimoto · PROFESSOR / STRUCTURAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Takao Ueda · ASSOCIATE PROFESSOR / STRUCTURAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) The objective of this subject is to understand the recent technology on methods of structural analysis of reinforced concrete structures and the recent technology on maintenance of reinforced concrete structures.

Outline) It is important that understanding the new type structures, the design method and the analytical method of concrete structures to realize a durable, safe and low-priced concrete structure. In this lecture, the realizing method of high performance concrete structures and the application of finite element method for concrete structures is explained, including the new type structures, application of new materials for concrete structures, PRC structures, the durability design and the life cycle design. A lecture items is as follows. 1. Deterioration mechanism RC structures. 2. Evaluation of durability of RC structures. 3. Repair method of RC structures. 4. Programming of bending analysis for RC and PRC structures using the fiber model. 5. Basic concept of durability design. 6. Basic concept of life cycle design. 7. Engineering ethics for civil engineers.

Style) Lecture and exercise, Practice

Keyword) Programming of bending analysis, New materials and new construction methods, Field visit, Deterioration mechanism, Evaluation of durability, Repair method, Life cycle design

Requirement) It is necessary for students to learn the basic attainments on the concrete technology and reinforced concrete mechanics.

Notice) Each subject is lectured for 180 minutes such as two times as the lecture's time of usually other subject. So be careful.

Goal)

1. The purpose is to understand the recent technology on methods of structural analysis of reinforced concrete structures and the recent technology on materials and construction methods concerned with reinforced concrete structures.
2. The purpose is to understand the recent technology on maintenance of concrete structures.

Schedule) 1. Guidance and Programming of bending analysis for RC and PRC structures using the fiber model (1). 2. Programming of bending analysis for RC and PRC structures using the fiber model (2). 3. Recent technology on application of the new materials for reinforced concrete structures(1). 4. Recent technology on application of the new materials for reinforced concrete structures(2). 5. Recent technology on the new construction methods for reinforced concrete structures(1). 6. Recent technology on the new construction methods for reinforced concrete structures(2). 7. Field visit. 8. Engineering ethics in practice the case study approach on construction of concrete structures. 9. Deterioration mechanism of reinforced concrete structures (1). 10. Deterioration mechanism of reinforced concrete structures (2). 11. Evaluation of durability of reinforced concrete structures (1). 12. Evaluation of durability of reinforced concrete structures (2). 13. Repair method of reinforced concrete structures (1). 14. Repair method of reinforced concrete structures (2). 15. Life cycle design of reinforced concrete structures. 16. Preliminary

Evaluation Criteria) Evaluate by reports for each subject.

Textbook)

- ◇ Handout of photo copying materials for each subject (Hashimoto).
- ◇ Infrastructure Maintenance Engineering, University of Tokyo Press (Ueda)

Reference) Standard Specifications for Concrete Structures, "Maintenance"

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169448>

Advanced Lecture in Technical English

4 units
Teacher of course

Target) The purpose of this subject is to develop the ability of reading comprehension of English technical papers of each special field.

Outline) First, a technical paper of each special field is selected by students according to their teacher's instruction. Next, understanding of selected paper and translation of it into Japanese are made. Finally, translation reports are submitted and presented to their respective teachers. Number of papers selected in each semester is one.

Style) Portfolio

Keyword) Technical English, Reading comprehension, Translation into Japanese

Fundamental Lecture) "Introduction to Technical English"(0.5)

Relational Lecture) "Advanced Civil and Environmental Engineering Seminar"(0.5, ⇒p.14)

Requirement) Students are required to have fundamental knowledge of English.

Goal) To translate English technical papers of each special field into Japanese.

Schedule) 1. Guidance 2. Selection of a technical English paper in the first semester. 3. Reading comprehension and translation into Japanese. 4. Submission of translation report 1. 5. Oral examination 1. 6. Selection of a technical English paper in the second semester. 7. Reading comprehension and translation into Japanese. 8. Submission of translation report 2. 9. Oral examination 2.

Evaluation Criteria) Both of the reports(No.1 & No.2) are marked out of 50 and those marks are summed up. The passing mark is 60.

Textbook) Tech Talk Pre-Intermediate (Oxford University Press)

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169347>

Student) Able to be taken by only specified class.

Contact)

⇒ Kamada (A306, +81-88-656-9134, kamada@ce.tokushima-u.ac.jp) (Office Hour: Friday11:55~ 12:50)

Technical English Conversation

2 units
Angus McDonald·ALEXANDER·PART-TIME LECTURER/マクイングリッシュスクール

Target) The purpose of this subject is to develop technical English conversation ability of students who aim to be an international engineers.

Outline) Lecture and exercise on technical English conversation are given by a foreign teacher. In addition, preparation for TOEIC is partially included in this class.

Style) 英語 (Speaking 中心)

Keyword) Technical English, English conversation, TOEIC

Fundamental Lecture) "Introduction to Technical English"(0.8)

Relational Lecture) "Advanced Civil and Environmental Engineering Seminar"(0.5, ⇒p.14)

Requirement) Not specified.

Goal) To be fairly good at speaking English as a future engineer.

Schedule) 1. Introduction and pre-course test. 2. First meeting and spelling 3. Saying what you want. 4. E-mail addresses and telephone messages 5. Describing controls, facilities and tests 6. Describing features, materials, shapes 7. Explaining what things do and dimensions. 8. Tools and equipment 9. Warning signs 10. Locating things 11. Suggesting solutions 12. Work tasks 13. Explaining functions 14. Reporting damage 15. Describing a project 16. Test

Evaluation Criteria) Based on attendance and test score.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169346>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Mikami (A308, +81-88-656-9193, amikami@ce.tokushima-u.ac.jp) (Office Hour: Friday 9:30~ 11:00)

Note) English-Japanese and Japanese-English dictionaries should be brought without fail.

Advanced Structural Design

2 units
Fumiaki Nagao · PROFESSOR / STRUCTURAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Minoru Noda · ASSOCIATE PROFESSOR / STRUCTURAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) The purpose of this class is to evaluate the safety of structures based on the probabilistic models for static and dynamic loads and resistance variables and structural reliability theories

Outline) The probabilistic models for static and dynamic loads and resistance variables, some structural reliability theories and outlines of recent topics to structural design are explained.

Style) Lecture

Keyword) safety of structures, probabilistic models for loads, structural reliability theories

Relational Lecture) "Advanced Structural Dynamics"(0.5, ⇒p.6)

Goal) To understand the safety of structures

Schedule) 1. probabilistic models for static and dynamic loads and resistance variables 1 2. probabilistic models for static and dynamic loads and resistance variables 2 3. probabilistic models for static and dynamic loads and resistance variables 3 4. probabilistic models for static and dynamic loads and resistance variables 4 5. probabilistic models for static and dynamic loads and resistance variables 5 6. limit state of structures 1 7. limit state of structures 2 8. evaluation of structural safety 1 9. evaluation of structural safety 2 10. evaluation of structural safety 3 11. evaluation of structural safety 4 12. evaluation of structural safety 5 13. recent topics to structural design 1 14. recent topics to structural design 2 15. recent topics to structural design 3

Evaluation Criteria) evaluated by attitude in class (80%) and reports (20%)

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169364>

Contact)

⇒ Nagao (A515, +81-88-656-9443, fumi@ce.tokushima-u.ac.jp) (Office Hour: 年度ごとに学科の掲示を参照すること)

⇒ Noda (A514, +81-88-656-7323, tarda@ce.tokushima-u.ac.jp) (Office Hour: 年度ごとに学科の掲示を参照すること)

Urban and Regional Planning

2 units
Akio Kondo · PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) The concept and technique to describe not only the vision but also design in the future urban and regional plan are lectured.

Outline) The technique of urban and regional planning is explained using various materials in practical planning. The debate is introduced to develop the ability in design of planning for students.

Style) Lecture and exercise

Keyword) Urban and Regional Planning, Proposition of Vision, Planning Design

Fundamental Lecture) “Advanced Environmental Systems Engineering”(0.2, ⇒p.30)

Relational Lecture) “Information Engineering of Regional Environment”(0.8, ⇒p.14)

Requirement) 特になし

Notice) 特になし

Goal) To understand the concept and technique to describe the future urban and regional plan.

Schedule) 1. Guidance and purpose of this subject 2. Examples of urban planning 3. Examples of regional planning 4. Planning and law 1 5. Planning and law 2 6. Economic analysis in planning 1 7. Economic analysis in planning 2 8. Systems analysis in planning 1 9. Systems analysis in planning 2 10. Explanation of Exercise 11. Exercise of planning 1 12. Exercise of planning 2 13. Presentation of planning 14. Discussion about the future of region 15. Discussion about the vision of region

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Webpage) <http://www.eco.tokushima-u.ac.jp/w3/kondo/top/index.htm>

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169464>

Student) Able to be taken by only specified class(es)

Contact)
⇒ Kondo (ECO602, +81-88-656-7339, kondo@eco.tokushima-u.ac.jp) (Office Hour: 月曜日9-10校時)

Note) 特になし

Principle of Environmental Risk

2 units

Ryoichi Yamanaka · ASSOCIATE PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Yasunori Kozuki · PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To understand knowledge concerning the Environmental Risk and to develop abilities to solve problems regarding risk communication.

Outline) To explain the definition and kinds of environment risk, risk evaluation and risk management. To develop a ability for risk communication

Style) Lecture and exercise

Keyword) environmental risk, risk communication

Fundamental Lecture) “Advanced Environmental Systems Engineering”(1.0, ⇒p.30)

Relational Lecture) “mitigation engineering”(0.5, ⇒p.14), “Advanced Environmental Ecology”(0.5, ⇒p.10)

Goal) To be able to examine technique to mitigate and prevent the environmental risk

Schedule) 1. Guidance and purpose of this lecture 2. Introduction of the environmental risk 3. Ecological risk(1):Introduction 4. Ecological risk(2):Ecological risk assessment 5. Ecological risk(3): Examples 6. Ecological risk(4): debate 7. Environmental risks of chemicals(1):Introduction 8. Environmental risks of chemicals(2):Examples 9. Environmental risks of chemicals(3): debate 10. Law and economics for the environmental risk management 11. Discussion about the environmental risk communication(1): Examples 12. Discussion about the environmental risk communication(2): debate 13. examination 14. The environmental risk in the future(1) 15. Meeting for the results of trials regarding pro-environmental behavior 16. The environmental risk in the future(2)

Evaluation Criteria) Evaluate learning results by reports, debates and examination

Textbook) environment engineering, pp.81-86

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169337>

Contact)

⇒ Yamanaka (総合研究実験棟(エコ棟)504号室, +81-88-656-7334, yamanaka@eco.tokushima-u.ac.jp)
(Office Hour: Tuesday 14:35-17:50)

Note) 特になし

Advanced building construction

2 units

Shoji Miyamoto · PART-TIME LECTURER

Target) The purpose of this subject is to learn the bases of structure design calculation and seismic safety evaluation of a building construction.

Outline) In this subject, invited extraordinary lecturer, who is a first class authorized practical architect and builder, introduces design calculation and seismic safety evaluation of a building construction.

Style) Lecture

Keyword) design calculation, seismic safety evaluation

Fundamental Lecture) “Introduction of Architecture”(0.5), “Architectural Environmental Engineering”(0.5), “Architectural Planning”(0.5)

Relational Lecture) “Advanced Fracture and Structural Mechanics”(0.5, ⇒p.6)

Requirement) Student are required to have a good understanding of undergraduate-level structure mechanics.

Goal) To understand the bases of design calculation and seismic safety evaluation of a building

Schedule) 1. Guidance/Introduction 2. Basis of design calculation (part 1) 3. Basis of design calculation (part 2) 4. Basis of design calculation (part 3) 5. Basis of design calculation (part 4) 6. Basis of design calculation (part 5) 7. Basis of design calculation (part 6) 8. Basis of design calculation (part 7) 9. Basis of seismic safety evaluation (part 1) 10. Basis of seismic safety evaluation (part 2) 11. Basis of seismic safety evaluation (part 3) 12. Basis of seismic safety evaluation (part 4) 13. Basis of seismic safety evaluation (part 5) 14. Basis of seismic safety evaluation (part 6) 15. Basis of seismic safety evaluation (part 7) 16. Assignment of term paper

Evaluation Criteria) Assignments count 100%

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169369>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Miyamoto(s.miyamoto@viola.ocn.ne.jp)

⇒ Sato(A511, sato@ce.tokushima-u.ac.jp)

⇒ Nariyuki (A510, +81-88-656-7326, nariyuki@ce.tokushima-u.ac.jp) (Office Hour: Monday 16:20-17:50)

Principles of Disaster Risk

2 units

Yasunori Kozuki · PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Ryoichi Yamanaka · ASSOCIATE PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To understand concept of risk, risk management, damage reducing measure ability to natural disaster

Outline) To understand historical earthquakes and tsunamis, characteristics of earthquake and tsunami, prediction of damage, to cultivate presentation skill and debate ability.

Keyword) Earthquakes and Tsunamis, Disaster Prevention Assessment, Risk Management

Relational Lecture) “Principle of Environmental Risk”(0.5, ⇒p.54)

Goal) Training-up of technical knowledge to the natural disaster, the basic knowledge which can correspond to the risk management and the crisis management

Schedule) 1. Historical Earthquakes in Japan 2. Historical Tsunamis in Japan 3. Characteristics of Earthquake 4. Characteristics of Tsunami 5. Generation Characteristics of Nankai Earthquake 6. Generation Characteristics of Nankai Earthquake and Tsunami 7. Disaster Prevention for Earthquakes and Tsunamis 8. Disaster Prevention Assessment for Earthquakes and Tsunamis 9. What is Risk Management? 10. Practice of Risk Management for Earthquakes and Tsunamis(1) 11. Practice of Risk Management for Earthquakes and Tsunamis(2) 12. Presentation of Tsunami Risk Assessment

Evaluation Criteria› Assignments Count 100%

Textbook› To be introduced in the class

Reference› To be introduced in the class

Contents› <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169378>

Student› To be limited to students of course

Contact

⇒ Kozuki (Eco505, +81-88-656-7335, kozuki@eco.tokushima-u.ac.jp) (Office Hour: 火曜日, 14:35 から 16:05, 18:00 から 19:30)

mitigation engineering

2 units

Hideki Ueshima · PROFESSOR / GRADUATE SCHOOL OF ENGINEERING

Target› To understand the background and the significance of mitigation and to acquire fundamental principles of mitigation technique.

Outline› To explain western environmental ideas, progress of coastal development and concept, history, technology and examples of mitigation

Style› Lecture

Keyword› District Improvement Plan for Disaster Mitigation, coastal environment, ecosystem, environmental restoration

Fundamental Lecture› “Principle of Environmental Risk”(1.0, ⇒p.54), “Principles of Disaster Risk”(1.0, ⇒p.13), “Urban and Regional Planning”(1.0, ⇒p.12)

Relational Lecture› “Advanced Environmental Ecology”(0.5, ⇒p.10), “Advanced Environmental Systems Engineering”(0.5, ⇒p.30)

Goal› To acquire ideas and fundamental of mitigation

Schedule› 1. Guidance of this subject 2. Background and history of the mitigation 3. Coastal development(1) 4. Coastal development(2) 5. Deterioration of coastal environment 6. Restoration for coastal environment 7. Mitigation for coastal environment(1) 8. Mitigation for coastal environment(2) 9. Mitigation technology(1) 10. Mitigation technology(2) 11. Mitigation technology(3) 12. Example of mitigation in Western Europe 13. Example of mitigation in Japan(1) 14. Example of mitigation in Japan(2) 15. Discussion

Evaluation Criteria› Assignments count 100%

Textbook› To be introduced in the class

Reference› To be introduced in the class

Contents› <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169522>

Contact

⇒ Ueshima (National Institute of Advanced Industrial Science and Technology, +81-823-72-1901, h-ueshima@aist.go.jp)

Information Engineering of Regional Environment

2 units

Yoshinobu Hirose · ASSOCIATE PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target› The information of regional environment, technique in survey, information management and computer aid systems are explained. The method and technique using for application of environmental information to development of regional policies are lectured.

Outline› The information of regional environment, technique in survey, information management and computer aid systems are explained using the various kinds of materials and examples in practical planning.

Style› Lecture and exercise

Keyword› Information of Regional Environment, Technique in Survey, Computer Aid Systems

Relational Lecture› “Urban and Regional Planning”(0.8, ⇒p.12), “Advanced Environmental Systems Engineering”(0.2, ⇒p.30)

Requirement› 特になし

Notice› 特になし

Goal› To obtain the knowledge of the information of regional environment, technique in survey, information management and computer aid systems, and apply them to design of regional plan and political simulation.

Schedule› 1. Guidance and purpose of this subject 2. Examples of information of regional environment 3. Variety of information of regional environment 4. Technique in survey of information 5. Technique in production of information 6. Technique in management of information 7. Computer aid systems 1 8. Computer aid systems 2 9. Application of information to regional planning 10. Exercise of application of information 1 11. Exercise of application of information 2 12. Exercise of application of information 3 13. Presentation of results of exercise 14. Discussion about the information in the future 15. Discussion about the technique in the future

Evaluation Criteria› Assignments count 100%.

Textbook› To be introduced in the class.

Reference› To be introduced in the class.

Webpage› <http://www.eco.tokushima-u.ac.jp/w3/kondo/top/index.htm>

Contents› <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169430>

Student› Able to be taken by only specified class(es)

Contact

⇒ Kondo (ECO602, +81-88-656-7339, kondo@eco.tokushima-u.ac.jp) (Office Hour: 月曜日9-10校時)

Note› 特になし.

Advanced Civil and Environmental Engineering Seminar

4 units

Teacher of course

Target› The first purpose of this subject is to obtain the fundamental knowledge regarding research theme and develop the abilities to find and solve problems and present the results of research. The second one is to improve the ability to communicate in English by taking TOEIC.

Outline› Papers regarding research theme are read. The reports on contents of those papers are submitted to your own teachers. The contents of those reports are presented at seminars. In addition, taking TOEIC is required.

Style› Portfolio

Keyword› Civil and Environmental Engineering, Paper, Seminar, TOEIC

Relational Lecture› “Technical English Conversation”(0.5, ⇒p.12), “Advanced Lecture in Technical English”(0.5, ⇒p.12)

Notice› Students should follow their own teacher's advices on how to find papers to be read and schedule for seminars and promptly inform their own teachers of scores on TOEIC every time without fail.

Goal

1. To obtain the fundamental knowledge regarding research theme and the presentation ability.
2. To get a larger score on TOEIC than criteria set separately by specified course.

Schedule› 1. Guidance 2. Seminar on research theme 3. TOEIC

Evaluation Criteria› Attainment level of goal 1 is evaluated by presentations and submitted materials in seminars and passing mark is 60%. Attainment level of goal 2 is evaluated from the score on TOEIC and passing mark is 60%. To get credits of this subject, it is necessary to pass both criteria. Grade is finally calculated by summing both marks with the weights of 60% and 40%, respectively.

Textbook› To be introduced in the class.

Reference› To be introduced in the class.

Contents› <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169368>

Student› Able to be taken by only specified class(es)

Contact

⇒ Mizuguchi (A501, +81-88-656-7349, mizuguch@ce.tokushima-u.ac.jp) (Office Hour: Monday 11:00 ~ 12:30)

⇒ Kamada (A306, +81-88-656-9134, kamada@ce.tokushima-u.ac.jp) (Office Hour: Friday 11:55~ 12:50)

⇒ Nariyuki (A510, +81-88-656-7326, nariyuki@ce.tokushima-u.ac.jp) (Office Hour: Monday 16:20-17:50)

Advanced Civil and Environmental Engineering Exercise

4 units
Teacher of course

Target) The purpose of this subject is to obtain deeper knowledge of related phenomena and develop the abilities to find and solve problems and creativity through some exercises toward each Master's thesis.

Outline) Exercises for discovering and solving various problems related to research theme are performed.

Style) Portfolio

Keyword) Exercise, Discovery of problem, Solution of problem, Civil and Environmental Engineering

Goal) To understand how to discover and solve problems regarding research theme.

Schedule) 1. Guidance 2. Discovery of problems 3. Investigation on the method for solving problems 4. Report

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169365>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Kamada (A306, +81-88-656-9134, kamada@ce.tokushima-u.ac.jp) (Office Hour: Monday 11:00~ 12:30)

Advanced Civil and Environmental Engineering Laboratory

4 units
Teacher of course

Target) The purpose of this subject is to obtain deeper knowledge of related phenomena and develop the abilities to find and solve problems and creativity through some experiments and investigations toward each Master's thesis.

Outline) Experiments and investigations are performed toward Master's thesis.

Style) Portfolio

Keyword) Experiment, Investigation, Master's thesis

Goal) To understand how to discover and solve problems regarding research theme.

Schedule) 1. Guidance 2. Discovery of problems 3. Designs of experiments and Investigations 4. Experiments and Investigations 5. Report (Master's thesis)

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169367>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Kamada (A306, +81-88-656-9134, kamada@ce.tokushima-u.ac.jp) (Office Hour: 年度ごとに学科の掲示を参照すること。)

Advanced Internship on Civil and Environmental Engineering

4 units
Teacher of course

Target) To make clear images on future jobs from wider aspects and increase knowledge and technical skill to the levels applicable in actual scenes.

Outline) Actual works at out of the university such as research institutes, governmental office, private enterprise, etc. are experienced.

Style) Portfolio

Keyword) Internship, Extension, Special knowledge, Special technique

Notice) Propriety and place of practice must be decided after a consultation with a supervisor.

Goal) To master practical knowledge and technical skill.

Schedule) 1. Guidance 2. Consultation with supervisor about practice 3. Practical Exercise 4. Report 5. Presentation

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169366>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Kamada (A306, +81-88-656-9134, kamada@ce.tokushima-u.ac.jp) (Office Hour: Friday 11:55~ 12:50)

Intelligent Structures and Mechanics Systems Engineering — Mechanical Engineering

SYLLABUS OF SUBJECTS

● Integrated Subjects

Introduction to Intellectual Property ... Sakai · Osame · Fujii · Toyosu · Kubota	16
Management Theory of New Business ... Vice chairperson of School Affairs Committee , Faculty of Engineering · First-line men with experience of practical business	17
Management of Technology ... Yamanaka	17
Presentation Method (M)	17
Internship (M)	18
Venture Business (M)	18
Long-term Internship (M) ... Yamanaka	18
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Introduction to Intellectual Property

2 units

Tohru Sakai · PART-TIME LECTURER / (助) 工業所有権部センター, Juichiroh Osame · PART-TIME LECTURER
Akio Fujii · PART-TIME LECTURER / INTELLECTUAL PROPERTY OFFICE, Yasushi Toyosu · PART-TIME LECTURER, Kuniaki Kubota · PART-TIME LECTURER

Target) Understanding the basic systems and importance of protection and practical use of intellectual property based on some examples.

Outline) It is necessary for a working staff in a company, a university, etc., in a future. It is introduced the importance to protect and practical use of intellectual property at governments, industrial circles, universities and institutes in Japan using potential on scientific techniques. This lecture is treated the basic systems of protection and practical use of intellectual property particularly based on strategy and invasion of patent in an organization such as company, university, etc.

Style) Lecture

Keyword) Intellectual property, Patent Law, Protect and Use of Intellectual Property

Relational Lecture) “Introduction to Intellectual Property”(0.5)

Requirement) No requirement

Notice) It is necessary to be present at two concentrated lecture.

Goal)

1. Understanding concept of intellectual property right.
2. Understand the Patent Act, the Trademark Act, the Design Act and the Copyright Act.
3. Understanding on basic practical use of intellectual property.

Schedule) **1.** Concept of intellectual property(Sakai) **2.** Outline of intellectual property(Patent and Trademark)(Sakai) **3.** Outline of intellectual property(Design and Copyright)(Sakai) **4.** Patent, invention and invasion of patent (Sakai) **5.** Management of intellectual property and use (Sakai) **6.** A way of research and development and intellectual property in a future(Sakai) **7.** The midterm examination and its comment for Target and **8.** History of system of intellectual property (Osame) **9.** International trend of system of intellectual property (Osame) **10.** Acquisition method of intellectual property right(Fujii) **11.** Use of intellectual property(Watanabe) **12.** Strategy of intellectual property on development of techniques(Y.Higuchi) **13.** Effective intellectual property in development of techniques (Kubota) **14.** Special lecture on a use of intellectual property by a chief executive officer(1) **15.** Special lecture on a use of intellectual property by a chief executive officer(2)

Evaluation Criteria) Passing mark is over 60% on the examinations and the reports for each reaching level, respectively.

Textbook) To be used textbooks made by lecturers.

Reference) Nobuhiro Nakayama:Titeki Shoyuken, Nikkan Kohgyo Shinbunsha

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169432>

Student) For the course students and other graduate school students.

Contact)

⇒ Sakai (+81-3-5600-2631,)

⇒ Mizuguchi (A501, +81-88-656-7349, mizuguch@ce.tokushima-u.ac.jp) (Office Hour: Monday,11:00-12:30, 17:00-18:00)

Management Theory of New Business

2 units

Vice chairperson of School Affairs Committee , Faculty of Engineering
First-line men with experience of practical business · PART-TIME LECTURER

Target) New business is the word which means the business to make the most of technical knowledge, technology, the new idea and which is developed creatively, and that main bearer is the enterprise called a venture. There is a purpose of this class in providing the knowledge which is necessary, and know-how and a spirit so that a taking lecture student may establish a venture business.

Outline) The regeneration of the Japanese society with the vitality is being asked. Government enforced "a university venture 3 years 1000 companies plan" over Heisei 14-the 16th year. Though that goal was almost attained, it is very important to promote entrepreneur education continuously from now on. Tokushima Prefecture supports this class based on the recognition done like this, and it is established.

Requirement) The person whom the one with the classroom is constructed by the class start time in the person who doesn't learn the unit of "Introduction to new business" in the college, and a group are organized, and it is limited to the person with the intention to make a business plan, and taking lecture is recognized.

Notice) Being late and a whisper in class should be prohibited strictly. Be careful over and again because it should dispose of exit and future taking lecture may not be recognized when it is wicked.

Goal) Learning of the necessary knowledge to establish venture business, and the ability which can make a business plan.

Schedule) 1. Guidance 2. What is the new business? 3. Keynote lecture 4. Theory of a stand-alone version venture success 5. The law knowledge which is necessary for entrepreneur 6. Fund-raising and capital policy 7. Indirect finance 8. Direct finance 9. The basis of the company management 10. The elementary knowledge of the business accounting 11. The point of the business plan preparation 12. Management strategy and marketing 13. Product development and intellectual property 14. Business plan preparation practice 15. Examination 16. Business plan announcement meeting

Evaluation Criteria) It is evaluated by the presentation (40%) of the written examination (60%) and the business plan. And, the presentation of the written examination and the business plan is decided to be recognized only for the taking lecture student who attended it for 2/3 and more of the classes that it is opened.

Textbook) The summary is distributed every time.

Reference) Several are introduced in the school hours.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169469>

Student) he person who hasn't learned the unit of the new business outline that it is opened with this learning in all the students enrolled in the graduate school yet is made the target. The number of completion people may be restricted in the method such as a lottery in case of a taking lecture applicant many. As for the details, an applicant for taking lecture is to follow those directions because the notice which showed attention in taking lecture is done.

Contact)

⇒ Vice chairperson of School Affairs Committee , Faculty of Engineering

Note) The man of business that it is active in the forefront every time, and an adviser are invited as an instructor, and working knowledge is provided for theory plus practice in this class from the specialist's position. This class is the thing which is useful enough even if it is taken to the person who aims at a general enterprise and a laboratory, the employment to the self-governing body and so on.

Management of Technology

2 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) About the production management of the automobile industry, it is understood variously from the point of view such as "research and development", "production management", "purchasing" and "quality control" "marketing" and "cross-cultural management".

Outline) It learns about the production management. This time, "the automobile industry" specially takes up the production management of "Honda Motor Co.,Ltd. (following Honda)" even of that in the case, and the class to appreciate that importance with ranking of technology in management is taken.

Requirement) Finish " Introduction to new business " or " Advanced Lecture in management Theory of new business " .

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of management is learned.
2. Ranking of the technology in management and that importance are appreciated.
3. It learns how to solve the various problems which always occur in the spot of the management through the case study and the business game.

Schedule) 1. Guidance 2. Lecture "What in Management of Technology?" 3. Case report "Research and development of Honda" 4. Case study "Plan an overseas factory." "A new car development order" 5. Lecture " Production management and purchasing" 6. Lecture "Quality control" 7. Case report "The production management of Honda","The supply chain management of Honda" 8. Case study "Plan an overseas factory." 9. Case report "The quality control of Honda" 10. Case study "Don't make material defects flare up again." 11. Lecture "Marketing strategy" 12. Lecture "Cross-cultural management" 13. Case report "Around the products project of Honda - the two-wheeled vehicle " 14. Case report "The path of internationalization of Honda" 15. Case report "The personnel management of Honda" 16. Summary and questions and answers

Evaluation Criteria) It is evaluated in the remark (20%) in class and the middle, end of a term report (80% in total).

Textbook) It doesn't specially use. The summary and so on is distributed every time.

Reference) Several are introduced in class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169348>

Student) The person who finished "Introduction to new business" or " Advanced Lecture in management Theory of new business " in all the students enrolled in the doctor former term course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Note) This class invites seven Honda alumnuni who did work in "research and development", "production management", "purchasing", "quality control", "marketing" , "cross-cultural management", and so on as an instructor, and it is the class to do case report. Even if it is seen nationwide, the trial done like this is very rare, and it is a precious class. And, an applicant for taking lecture is to attend it in the guidance to hold it in advance. A schedule is indicated separately.

Presentation Method (M)

2 units

Target) Poster and oral presentations, and journal publications are common means of appealing the research work in various scientific and technological disciplines. It's undoubtedly important for activating the research work. The lecture is intending for students to learn most efficient way to appeal their findings and discussions in scientific community.

Outline) Credits are acknowledged to the students who are supervised to give conference speech by themselves and do actually the lectures.

Goal) The lecture is aiming at having knowledge and experience of the presentaion in international conferences.

Evaluation Criteria) Students' achievement is evaluated by portfolios submitted showing the progress in preparation of international conferences as well as by presentation records.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169510>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Internship (M)

2 units

Target) This program is provided to increase knowledge and experience in the actual industrial technology in various fields. Through the practical experience, the program will allow students to become discerning and well-balanced researchers or engineers with deeper understanding of technological societies.

Outline) Credits are acknowledged to students who experienced the internship in companies and/or government offices. Their fulfillment is evaluated by activity reports during internship.

Goal)

1. Grasping internal systems of a company, management, action and strategy to achieve the company's goal. (2)
2. Understanding human relationship and communicative manner in a working society and a company.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by supervisors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169345>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Venture Business (M)

2 units

Target) Aims of the lecture are doing collaborative works with private enterprises and establishing venture businesses through such works.

Outline) The lecture is aiming at founding a venture business company as well as establishing collaborative research works with private enterprises. It's worth to apply their accomplishment to an actual society beyond the range of a laboratory work.

Goal) Objective of the lecture is to have experience and knowledge of collaborative works with private enterprises and to mature the works to venture businesses.

Evaluation Criteria) Credits are acknowledged in case of doing collaborative works with enterprises and/or maturing them to venture businesses. Handouts, reports, and presentation materials, etc. are evaluated to approve credits.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169332>

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Long-term Internship (M)

6 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This program is provided long-term internship in the actual industrial companies and so on, doing a joint study between companies and university on practical problems proposed by the company and practical experience of management of technologies. Through the long-term internship, the program will allow students to become an engineer with a core role in researches and companies

Outline) Credits are acknowledged to students who experienced the internship in companies or government offices of 270 hours during three months or more and presentation to executive officer of the company. Their fulfillment is evaluated by activity reports during internship and appraisal and interviewed report from a mentor.

Goal) Grasping abilities for practical engineers by studying activities in company and so on.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by mentors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169440>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Nishida (K409, +81-88-656-7630, nishida@kg.tokushima-u.ac.jp)

⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

⇒ Morimoto (A407, +81-88-656-7619, emi.morimoto@kg.tokushima-u.ac.jp) (Office Hour: 月～木(10時～15時))

Note) Students who register the coop-education program for "Pai-shape" engineers with sense for management of technology, are able to have a grant-in-aid for travel and so on. Ask committee members of long-term internship in your course or coordinators of this program.

Advanced Lecture in Theory of Business Models

2 units

Tatsuya Deguchi · PART-TIME LECTURER, Kenichi Yasumuro · PART-TIME LECTURER, Katsuo Touma · PART-TIME LECTURER
Takahide Yamaguchi · PART-TIME LECTURER, Shingou Nishii · PART-TIME LECTURER

Target) There is a purpose of this class in providing the knowledge which is necessary, and know-how so that students may achieve a business model in establishing enterprises based on the lecture of "Management Theory of New Business", and in making students understood the profit generating stream by studying on the frame work of companies in several business fields.

Outline) Business Model is a remarkable term in modern economic and organizational theories in these days but describes a broad range of definitions. In this lecture, Business Model is defined as "System which converts technology and know how into profit for the purpose of customers' satisfaction" and aims at providing the ability for the design of profitable system, by learning cost issues in establishing business strategies of companies.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business"

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of business model design is learned.
2. Understanding of the concept of business model by case study analysis are appreciated.
3. It learns forming ability of business plan through the case study on business models.

Schedule) 1. Guidance 2. Keynote lecture "Business Model Thinking" 3. Questions and answers, Discussions 4. Lecture "Theory of Business Models" 5. Lecture "Design principles of Business Models" 6. Lecture "Evaluation of Business Models" 7. Case Study "Business Model in a R&D company" 8. Case Study "Business Model in a manufacturing industrial company" 9. Case Study "Business Model in a company of service industry" 10. Case Study "Business Model in a company of information industry" 11. Business plan practice, Present situation analysis and alternatives. 12. Business plan practice, Concept ad design of business. 13. Business plan practice, Financial analysis . 14. Business plan practice, Concluding and submitting 15. Presentation(1) of Business plan practice. 16. Presentation(2) of Business plan practice, Comments and summary.

Evaluation Criteria) Participation in class(20%) Group work and its report(80%)

Textbook) Ken-ichi Amuro and Study Group of Business model "Case Book: Business Model Thinking" Bunshindo

Reference) Several are introduced in class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169656>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Contact)

⇒ Tatsuya Deguchi (Wakayama University)

⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

Note) This class is supported by Tokushima Prefecture Government

Applied Fluid Dynamics

2 units

Takeshi Okabe · PROFESSOR / ENVIRONMENTAL CONSERVATION ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Kunihiko Ishihara · PROFESSOR / MECHANICAL SYSTEMS, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This theme is concerned with Flow-induced vibration and noise. The aim of this theme is to understand the generation mechanism and to learn the prediction and countermeasure techniques

Outline) In application of fluid dynamics, there are two aspects such as the performance and safety of turbomachines. This theme discusses how the fluid dynamics is applied to the safety design about several examples described below. 1. Vibration of turbomachine blade, 2. Flow-induced vibration of structures in a piping system. 3. Vibration of heat exchanger tube bundles, 4. Aeroacoustics, 5. Self-sustained tone, etc. The aim of this theme is to understand their generation mechanisms and to train the ability of obtaining the countermeasure's plan

Keyword) Aeroacoustics, Flow-induced vibration, Self-sustained tone, Noise

Relational Lecture) "Energy Conversion System"(0.5, ⇒p.23), "Advanced Applied Dynamics of Machine"(0.5, ⇒p.19)

Requirement) Fundamental knowledge of fluid dynamics and vibration engineering is necessary

Notice) not specified

Goal) training of researcher and engineer in an enterprise

Schedule) 1. Guidance(Flow-induced vibration and noise) 2. Fundamental knowledge of acoustics(1)(Nature of sound) 3. Fundamental knowledge of acoustics(2)(Distant attenuation of sound) 4. Fundamental knowledge of acoustics(3)(Diffraction of sound) 5. Intermediate test(1) and samarise 6. Aeroacoustics(1) (Present state of investigation of aeroacoustics) 7. Aeroacoustics(2) (Kind of aeroacoustics and basic equation) 8. Aeroacoustics(3) (Prediction method of sound from cylindrical body) 9. Aeroacoustics(4) (Prediction method of sound from plate) 10. Intermediate test(2) and samarise 11. Flow-induced vibration(1) (Examples of trouble) 12. Flow-induced vibration(2) (Cause of vibration of cylindrical structure) 13. Flow-induced vibration(3) (Shirking of self excited vibration) 14. Flow-induced vibration(4) (Steady drag force and random vibration) 15. Flow-induced vibration(5) (Vibration of tube array) 16. Final test

Evaluation Criteria) average of tests (1)~ (3) and reports are summed with the weights of 7 and 3, respectively, and the passing mark is 60%.

Textbook) prints

Reference) not specified

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169319>

Student) Able to be taken by only specified class(es)

Contact)
⇒ Ishihara (M518, +81-88-656-7366, ishihara@me.tokushima-u.ac.jp) (Office Hour: 木曜日
・17:00~ 18:00)

Advanced Applied Dynamics of Machine

2 units

Junichi Hino · PROFESSOR / INTELLIGENT MACHINES, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) The basic technologies which evaluate and control dynamic behavior of mechanical systems and their applied technologies are made to master.

Outline) The theoretical and experimental modal analysis methods to grasp dynamic properties of structures and derive mathematical models are studied. In recent vibration analysis, the vibration analysis procedures with computers are of increasing importance. The algorithms to solve eigenvalue problems and numerical Integration methods of ordinary differential equations are introduced. Subsequently, active and passive vibration control methods of mechanical systems are studied are lectured.

Style) Lecture

Keyword) Vibration Analysis, Modal Analysis, Vibration Control

Requirement) Students are required to have a good understanding of undergraduate-level applied mechanics and related subjects.

Goal)

1. To understand dynamic design method
2. To understand modal analysis
3. To acquire computer vibration analysis procedure
4. To understand vibration control method

Schedule) 1. Modeling and formulation of mechanical systems 1 2. Modeling and formulation of mechanical systems 2 3. Eigenvalue problem and solution 1 4. Eigenvalue problem and solution 2 5. Computational analysis of mechanical systems 1 6. Computational analysis of mechanical systems 2 7. Experimental modal analysis 1 (vibration test) 8. Experimental modal analysis 2 (identification method) 9. Experimental modal analysis 3 (identification method) 10. Active and passive control methods 11. Vibration control with a dynamic absorber 12. Vibration control and state equation 13. Vibration control, pole placement method 14. Vibration control, optimal control 1 15. Vibration control, optimal control 2 16. Examination

Evaluation Criteria) Assignments count 50% and examinations count 50%

Textbook)

- ◇ Printed synopses are used.
- ◇ To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169398>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Hino (M422, +81-88-656-7384, hino@me.tokushima-u.ac.jp) (Office Hour: mon. 17:00 - 18:00)

Advanced Fracture and Structural Mechanics

2 units

Ri-ichi Murakami · PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Daisuke Yonekura · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) Because the machine and structure should be safety, it is important to evaluate the stress distribution in front of the defect like crack which is in the component of machine. In Fracture Mechanics, the stress distribution is expressed by stress intensity factor, K. Also, the fracture of component depends on fracture toughness of material. In this lecture, it is explained that for the defect like crack, how the stress intensity factor is expressed. It is then mentioned that how the fracture is toughness evaluated. The students should submit the reports each exercises. Finally, the knowledge of safety design and fracture prevention for machine and structure can be mastered.

Outline) The purpose of fracture mechanics is the evaluation of the strength and fracture of machine and structure and then is the guarantee of safety of machine and structure. We should study the mechanical behavior of crack, the stress distribution in front of crack, the fracture analysis by fracture mechanics and the nonlinear mechanical behavior of elastic-plastic state. It is explained the theory of safety design and prevention of fracture for machine and structure.

Keyword) fracture, safety design, crack, machine/structure, stress intensity factor

Relational Lecture) "Solid Mechanics"(0.5, ⇒p.21), "Material Engineering"(0.5, ⇒p.22), "Physical properties of materials"(0.5, ⇒p.20)

Goal)

1. Concept of Fracture Mechanics
2. Application to fracture analysis of stress intensity factor
3. Concept of Fracture Toughness
4. Concept of J Integral

Schedule) 1. Introduction of linear fracture mechanics 2. Stress intensity factor 3. Fracture toughness and fracture analysis 4. Safety design of machine by fracture mechanics 5. Elastic-plastic deformation in front of crack tip 6. Linear and nonlinear fracture mechanics 7. Midterm examination 8. Concept of J integral 9. Evaluation method of J integral 10. Fracture toughness by J integral 11. Condition of fracture initiation 12. Stable and unstable fracture 13. Application of nonlinear fracture mechanics 14. Fracture analysis by nonlinear fracture mechanics 15. Summary 16. Final examination

Evaluation Criteria) Over 60% of group discussion, reports and examination

Textbook) Prints

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169473>

Contact)

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Physical properties of materials

2 units

Tatsuya Okada · ASSOCIATE PROFESSOR / MECHANICAL SCIENCE, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Hideo Nishino · ASSOCIATE PROFESSOR / MECHANICAL SCIENCE, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) Electron microscopy, the most effective observation method of crystallographic defects which dominate mechanical properties of materials, is briefly described. Ultrasonic propagation phenomena depending on the elastic properties of materials and their applications are also described.

Outline) Mechanical properties of crystalline materials are dominated by microscopic lattice defects. In the first half of this lecture, transmission electron microscopy, a powerful experimental method for direct observation of microscopic defects in materials, is discussed. Emphasis is put on the understanding of crystal orientation determination from electron diffraction patterns, based on the idea of reciprocal lattice. In the last half of this lecture, basic properties of wave propagation for ultrasonic material characterizations are discussed. The aim of the lecture is to give ultrasonic propagation phenomena. Several theoretical deductions of the wave equation from the continuity equation, the Navier-Stokes equation, the equation of state and the energy conservation law, respectively, and wave simulations are also shown in the lecture.

Style) Lecture

Keyword) transmission electron microscopy

Fundamental Lecture) "Material Engineering"(1.0, =>p.22)

Goal)

1. To understand the Ewald sphere construction for the analysis of electron diffraction patterns.
2. To understand the wave equation for 3-dimensional anisotropic solid material and computer simulation for wave-propagation.

Schedule) 1. Crystal and space lattice 2. Direction and plane in lattice 3. Bragg's law 4. Ewald sphere construction 5. Reciprocal lattice of simple space lattice 6. Structure factor 7. Electron diffraction pattern from single crystal 8. Introduction of wave propagations and NDI techniques with ultrasounds 9. Displacement, stress and strain of 3-dimensional anisotropic solid material 10. Mathematical deduction of wave equation for 3-dimensional anisotropic solid material 11. Physical meanings of wave equation 12. Finite differential simulation of wave equation 13. Boundary descriptions for wave equation 14. Physics for ultrasonic guided waves 15. Mathematics for SH mode guided waves 16. examination

Evaluation Criteria) Assignment 50%, Examination 50%

Reference) 坂著「結晶電子顕微鏡学」(内田老鶴圃)

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169386>

Contact)

- => Okada (M616, +81-88-656-7362, t-okada@me.tokushima-u.ac.jp)
- => Nishino (M618, +81-88-656-7357, nishino@me.tokushima-u.ac.jp)

Project Management

2 units

Susumu Namerikawa · ASSOCIATE PROFESSOR / STRUCTURAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) The purpose of this lecture is to understand PMBOK (Project Management Body of Knowledge), which is global standard in project management.

Outline) This lecture is outlined as follows: A)Current of global standardize pivoted on U.S. in project management. B)PMBOK (Project Management Body of Knowledge), which is global standard in project management.

Style) Lecture

Keyword) PMBOK

Fundamental Lecture) "Construction Business Management"(0.2)

Goal) Understanding of project management body of knowledge

Schedule) 1. Guidance 2. Project and Project Management 3. Initiating Processes 4. Project Charter 5. Scope and WBS 6. Resource Planning and Estimate 7. Control of Project Planning 1 8. Control of Project Planning 2 9. Develop Project Planning 1 10. Develop Project Planning 2 11. Develop Project Team 12. Performance Measurement Baseline 13. Change Control 14. Closing Processes 15. Professional Responsibility 16. Semester Examination

Evaluation Criteria) Achievement level of the target is evaluated by the semester examination. Score of 60points or over is required to clear the target.

Textbook) Textbook is introduced in the class. Related documents is distributed to students.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169512>

Student) Able to be taken by student of other department

Contact)

- => Namerikawa (A412, +81-88-656-9877, namerikawa@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示を参照すること)

Advanced Lecture on Semiconductor Nanotechnology

2 units

Toshiro Isu · PROFESSOR / INSTITUTE OF TECHNOLOGY AND SCIENCE, Takahiro Kitada · ASSOCIATE PROFESSOR / INSTITUTE OF TECHNOLOGY AND SCIENCE

Target) This class introduces basic principles of the semiconductor nanotechnology and their application to the quantum devices.

Outline) Basics of semiconductor physics and quantum mechanics are introduced to understand material properties of quantum confined nanostructures. Recent progress in fabrication techniques and device applications of semiconductor nanostructures (quantum wells, wires and dots) will be reviewed.

Style) Lecture

Keyword) Quantum confined nanostructures, Semiconductor nanoscience, Electron devices, Photonic devices

Requirement) None.

Notice) None.

Goal) To understand basic properties of semiconductor nanostructures and quantum devices.

Schedule) 1. Introduction to semiconductor nanostructures 2. Electronic states in quantum confined structures 3. Electrical properties of superlattices 4. Fabrication technique of quantum wires and wells 5. Characterization of heterointerfaces 6. Characterization of nanostructures 7. High-speed electron devices 8. Optical properties of quantum wells 9. Semiconductor laser diodes 10. Quantum effect devices 11. Fabrication technique of quantum dots 12. Quantum dot devices 13. Device application of quantum nano structures 14. Recent topics of semiconductor nanotechnology (1) 15. Recent topics of semiconductor nanotechnology (2)

Evaluation Criteria) Assignments count 100%

Textbook) None.

Reference) Will be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169477>

Student) Any students can attend the class.

Contact)

- => Isu (A224, +81-88-656-7670, t.isu@frc.tokushima-u.ac.jp) (Office Hour: Tue -Thu 10:00-14:00)
- => Kitada (A224, +81-88-656-7671, kitada@frc.tokushima-u.ac.jp) (Office Hour: Mon. 10:00-14:00)

Quantum mechanics and advanced lecture in quantum physics

2 units

Yoshitaka Michihiro · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces the quantum mechanics.

Outline) Basics of quantum mechanics are introduced.

Style) Lecture

Keyword) Quantum Mechanics

Goal) To understand the outline of quantum mechanics.

Schedule) 1. Introduction 2. Variational method 3. Lagrangian 4. Hamiltonian 5. Poisson's bracket expression 6. Quantization 7. Operator 8. Wavefunction 9. Expectation value 10. Schrödinger equation 11. Example (1) the square well potential 12. Example (2) the linear harmonic oscillator 13. Angular momentum 14. Example (3) hydrogen atom 15. Heisenberg equation 16. Field quantization

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169504>

Contact)

⇒ Yoshitaka Michihiro (A203)

Superconductivity and superconducting materials

2 units

Yutaka Kishimoto · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) To understand basics and recent developments in superconductivity.**Outline)** This class reviews quantum mechanics and introduces superconductivity and recent superconducting materials.**Style)** Lecture**Keyword)** superconductivity, Cooper pair, superconducting energy gap, density of states, anisotropic superconductivity**Goal)** To understand the outline (1 - 11) and recent advanced topics (12 - 15) of superconductivity.**Schedule)** **1.** Introduction to superconductivity **2.** Review of quantum mechanics (1), Schrödinger equation and wave function **3.** Review of quantum mechanics (2), operators and expected values **4.** Review of quantum mechanics (3), perturbation theory **5.** Free electron model of metals **6.** Phenomenological theory of superconductivity **7.** To understand Meissner effect on the basis of quantum mechanics **8.** Formation of Cooper pair **9.** Formation of superconducting energy gap **10.** Density of states, and energy gap at finite temperatures **11.** Introduction to Nuclear Magnetic Resonance method **12.** Frontier of superconductivity (1), strong coupling superconductor **13.** Frontier of superconductivity (2), heavy Fermion superconductor **14.** Frontier of superconductivity (3), copper oxide high Tc superconductor **15.** Summary**Evaluation Criteria)** Reports on several subjects in the class.**Textbook)** To be introduced in the class**Reference)** To be introduced in the class.**Contents)** <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169441>**Contact)**

⇒ Kishimoto (A202, +81-88-656-7548, yutaka@pm.tokushima-u.ac.jp) (Office Hour: 金曜日 16:00-17:30)

Advanced Computational Science

2 units

Toshiki Takeuchi · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class provides the basic technology for numerical calculation for the differential equation.**Outline)** The numerical calculation methods for the differential equation are introduced.**Style)** Lecture**Keyword)** Numerical analysis, Numerical computation, Differential equation**Fundamental Lecture)** “Numerical Analysis”(1.0), “Basic Mathematics/微分積分学 I”(1.0), “Basic Mathematics/微分積分学 II”(1.0)**Relational Lecture)** “Methods for analysis of mathematical phenomena”(1.0), “Numerical Analysis”(1.0)**Requirement)** Students have to understand basic mathematics of undergraduate-level.**Goal)** To understand principle of numerical calculation methods.**Schedule)** **1.** Introduction to numerical simulation **2.** Mathematical model **3.** Lagrange interpolation **4.** Spline interpolation **5.** Least squares method **6.** Finite difference method **7.** Arbitrary precision formula **8.** Application to ordinary differential equation **9.** Application to partial differential equation **10.** Gauss-Seidel method **11.** Successive Over-Relaxation method **12.** Explicit method **13.** Implicit method **14.** Crank-Nicolson method **15.** Numerical instabilities**Evaluation Criteria)** Assignments count 100%**Contents)** <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169355>**Student)** Able to be taken by only specified class(es)**Contact)**

⇒ Takeuchi (A206, +81-88-656-7544, takeuchi@pm.tokushima-u.ac.jp) (Office Hour: 木曜日 14:00-15:00)

Methods for analysis of mathematical phenomena

2 units

Hitoshi Imai · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Cheng-Hai Jin · PROFESSOR / INTERNATIONAL STUDENT CENTER

Target) To learn the to analyze the mathematical phenomena.**Outline)** Methods used in analysis of mathematical phenomena are introduced. Especially, those in numerical analysis are focused on.**Style)** Lecture**Keyword)** Mathematics, Numerical, Analysis**Relational Lecture)** “Advanced Computational Science”(0.5, ⇒p.52)**Requirement)** Only the premise that have studied basic mathematics.**Goal)** The adequacy of the two-dimensional boundary value problem governed by the Poisson equation can be understood by the finite difference method, etc.**Schedule)** **1.** Introduction to computer **2.** Common sense in numerical computation **3.** High-speed computation (Parallel computing) **4.** Finite difference method I **5.** Finite difference method II **6.** Finite difference method III **7.** Finite difference method IV **8.** Finite element method I **9.** Finite element method II **10.** Finite element method III **11.** Finite element method IV **12.** Boundary element method I **13.** Boundary element method II **14.** Boundary element method III **15.** Iterative method**Evaluation Criteria)** Evaluation by the report.**Contents)** <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169404>**Contact)**

⇒ Imai(A220, +81-88-656-7541, The inquiry by means of the cellular phone or E-mail is not acceptable) (Office Hour: Office hours: Thursday 14:00-15:00)

Solid State Ionics

2 units

Koichi Nakamura · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces topics in solid state ionics, conduction mechanism in ionic conductors and techniques to study solid state ionics.**Outline)** Basic experimental and theoretical approaches to understand solid state ionics are introduced and discussed in terms of “ion dynamic”.**Keyword)** Ionic conductor, Ionic diffusion, Secondary battery**Goal)**

1. To understand basic physical and chemical properties of ionic conductors.
2. To understand basic technique to study ionic conductors.

Schedule) **1.** Introduction to solid state ionics **2.** Band theory and conduction mechanism **3.** Defect in Ionic crystal **4.** Diffusion in solid **5.** Diffusion mechanism in solid **6.** Solid electrolyte **7.** Mixed conductor **8.** Electrical conductivity **9.** Application - Ion secondary battery - **10.** Application - Fuel cell - **11.** Electrical conductivity measurement **12.** Nuclear Magnetic Resonance **13.** Ultrasonic measurement **14.** Recent topics on solid state ionics **15.** Future in solid state ionics **16.** Test**Evaluation Criteria)** 期末試験で評価する。**Reference)** To be introduced in the class.**Contents)** <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169374>**Contact)**

⇒ Nakamura (A216, +81-88-656-7577, koichi@pm.tokushima-u.ac.jp)

Solid Mechanics

2 units

Katsutoshi Yamada · PROFESSOR / MECHANICAL SCIENCE, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Atsuya Oishi · ASSOCIATE PROFESSOR / MECHANICAL SCIENCE, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) The purpose of this subject is to give the basic of solid mechanics and finite element method, which is important for design of strength of machines and structures.**Outline)** In the first half of this lecture, first the basic of elasticity is given and then method of analysis is discussed mainly for the two dimensional problems. In the last half of this lecture, the basic and application of FEM are explained.**Style)** Lecture and exercise**Keyword)** Elasticity, Finite Element Method

Fundamental Lecture) “Mechanics”(1.0), “Numerical Analysis”(1.0), “Computational Mechanics”(1.0)

Relational Lecture) “Advanced Computational Science”(0.5, ⇒p.52), “Methods for analysis of mathematical phenomena”(0.5, ⇒p.21)

Goal)

1. The understandings of the basic and the method of analysis for elasticity(Program 1-8)
2. The understandings of the basic and formulation of finite element method(Program 9-11)
3. The understandings of the basic for FEM programming(Program 12-15)

Schedule) 1. Analysis of stress 2. Analysis of strain 3. Constitutive equations 4. Governing equations of elasticity 5. Principles of energy and variational methods 6. Two dimensional problems 7. Thermal stress 8. Vibration of Elastic Solids and Intermediate test 9. Formulation of FEM 10. Simulations and visualization of FEM 11. Basic of computational science 12. Algorithm of mesh generation 13. Method of solving for linear equations (direct method) 14. Method of solving for linear equations (iteration method) 15. Programming of FEM 16. Final test

Evaluation Criteria) Intermediate test 100%, final test 100%, each more than60% pass

Reference)

- ◇ Theory of Elasticity 3rd, S.P.Timoshenko and J.N.Goodier, McGraw-Hill, 1970.
- ◇ The finite Element Method 3rd, O.C.Zienkiewicz, McGraw-Hill, 1977.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169376>

Student) only corresponding students for the course

Contact)

- ⇒ Yamada (M621, +81-88-656-7364, yamada@me.tokushima-u.ac.jp) (Office Hour: Friday 17:00-18:00)
- ⇒ Oishi (M622, +81-88-656-7365, oishi@me.tokushima-u.ac.jp)

Material Engineering

2 units

Kenichi Yoshida · PROFESSOR / MECHANICAL SCIENCE, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Hitoshi Takagi · PROFESSOR / INTELLIGENT MACHINES, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class acquires the knowledge on solidification and growth, transformation, heat treatment, thermomechanical treatment in materials, material structure control and composite materials

Outline) Recent research development is remarkable in the material field. Solidification and growth of materials, transformation, heat treatment and thermomechanical treatment will be introduced from the point of engineering view based on material science. Also up-to-date topics will be lectured on material structure control and composite materials. Practices and reports will be imposed in each chapter to evaluate results of students. This subject is related to industrial problems.

Style) Lecture

Keyword) the study of failure, material structure control, environment-friendly composites

Relational Lecture) “Physical properties of materials”(0.3, ⇒p.20), “Theory of Plasticity and Application to Metal Forming Processes”(0.5, ⇒p.24)

Requirement) Students are required to be interested in materials and have the good understanding of material science in an undergraduate course.

Goal)

1. To understand the structural control of materials
2. To understand the mechanics of composites and the benign technology for environment

Schedule) 1. Introduction to the study of failure 2. Material engineering and ethics for engineers 3. Innovation of material processing toward environmentally benign society 4. Barrier-free processing and treatment of impurity elements 5. Construction of deformation process suppressing deteriorating effects of impurities in steel material 6. High-strain rate flexible forming of aluminum and magnesium alloys 7. Material structure control due to the thermomechanical treatment of steel materials 8. Up-to-date material structure control technology 9. Concept of composite materials 10. Characteristics of composite materials 11. Functions of composite materials 12. Rule of mixture (modulus of elasticity) 13. Rule of mixture (stress) 14. Environmental problem and recycle of composite material 15. Environment-friendly green composites 16. Regular test

Evaluation Criteria) Regular test result 100%

Textbook)

- ◇ Not used (Yoshida).
- ◇ Will be introduced in the class (Takagi).

Reference) Will be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169382>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Yoshida (M619, +81-88-656-7358, yoshida@me.tokushima-u.ac.jp) (Office Hour: Thursday and Friday, 17:00 to 18:00)
- ⇒ Takagi (M620, +81-88-656-7359, takagi@me.tokushima-u.ac.jp) (Office Hour: Friday 17:00-18:00)

Fluids Energy Conversion Engineering

2 units

Junichiro Fukutomi · PROFESSOR / MECHANICAL SYSTEMS, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Masashi Ichimiya · ASSOCIATE PROFESSOR / MECHANICAL SYSTEMS, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces united interpretation and manipulation for principles which dominates characteristics of turbomachinery which transforms dynamical energy in fluids to mechanical work. This class also aims to understand dynamics of viscous fluid which is fundamental to utilize fluid energy.

Outline) 1.Theoretical and experimental analysis method is introduced on flow condition of turbomachinery and its characteristic. 2.Dynamics of viscous fluid which is fundamental to utilize fluid energy is introduced. Lecture heads are as follows. (1) Outline of fluid energy conversion, (2) Internal flow and performance of centrifugal turbomachinery, (3) Internal flow and performance of axial turbomachinery, (4) Anomalous phenomena of the turbomachinery, (5) Nature of viscous fluid, (6) Equations of motion for viscous fluid

Style) Lecture

Keyword) Viscous fluid, Equation of motion, Energy conversion, Turbomachinery

Fundamental Lecture) “Fluid Dynamics”(1.0), “Fluid Dynamics”(1.0), “Fluid Machinery”(1.0)

Goal) To understand the principle which dominate the characteristic of turbomachinery and dynamics of viscous fluid

Schedule) 1. Nature of viscous fluid 2. Motion of viscous fluid 3. Difference between viscous and inviscid fluids, cylinder in inviscid fluid 4. Difference between viscous and inviscid fluids, cylinder in viscous fluid 5. Similarity between viscous and inviscid fluids 6. Derivation of equations of motion for viscous fluid 7. Interpretation of equations of motion for viscous fluid 8. Summary and examination for viscous fluid 9. Hydrodynamics of centrifugal and diagonal turbomachinery 10. Hydrodynamics of axial turbomachinery 11. Characteristics of turbocharger for automobile 12. Numerical simulation of internal flow 13. Turbomachinery and noise 14. Anomalous phenomena of turbomachinery 15. One-dimensional flow of compressible fluid 16. Examination for turbomachinery

Evaluation Criteria) Examination for viscous fluid counts 50 points and examination for turbomachinery counts 50 points.

Textbook) Not used

Reference) Will be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169524>

Student) Able to be taken by student of other department

Contact)

- ⇒ Fukutomi (M519, +81-88-656-7367, fukutomi@me.tokushima-u.ac.jp)
- ⇒ Ichimiya (M520, +81-88-656-7368, ichimiya@me.tokushima-u.ac.jp) (Office Hour: 毎週火曜日, 17:00~ 18:00)

Advanced thermodynamics

2 units

Tetsuya Suekane · PROFESSOR / MECHANICAL SYSTEMS, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Masanori Kiyota · ASSOCIATE PROFESSOR / MECHANICAL SYSTEMS, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) Quality of energy must be considered to promote effective utilization of energy as well as its quantity. Exergy is suitable for that purpose since it is based on the second law of thermodynamics. So understanding of exergy and its application to the practical systems are aimed to realize effective use of energy. The latter part is an introduction to energy and environmental problems in modern civilization based on enormous consumption of fossil fuel. Emphasis is placed on thermal engineering and fluid dynamical aspects of efficient utilization of energy and the relationship between global environment and material circulation.

Outline) Exergy analysis is used to realize effective use of energy. Exergy is stated and its use is illustrated by presenting some examples. Lecture items are 1)About exergy, 2)Exergy flow in the steam power plant, 3)Exergy of combustion process, 4)Exergy flow in the co-generation system. In the latter part, emphasis is placed on the relation among the society, civilization, economics and technology from the viewpoints of global warming and/or huge consumption of energy.

Keyword) exergy, Global warming on the earth, fossil fuels

Requirement) The knowledge of engineering thermodynamics.

Goal)

1. Acquiring ability to apply exergy analysis to actual energy systems
2. Obtaining deeper understanding of entropy through examples of exergy analysis
3. Understandings of energy and environmental issues from global point of views.

Schedule) 1. About exergy 2. Conservation of exergy 3. Calculation of exergy 4. Exergy flow of steam power plant 5. Second law analysis of combustion process 6. Exergy of fuel 7. Exergy flow of co-generation systems (1) 8. Exergy flow of co-generation systems (2) 9. Environmental economics and sociology 10. History of the earth 11. Global warming and carbon emissions of anthropological activities 12. Conventional and un-conventional resources 13. Renewable energy 14. Carbon dioxide capture and storage 15. Waste management and material circulation 16. Final examination

Evaluation Criteria) Scores of reports and final test are used at a rate of 6 to 4.

Textbook) Manuscripts prepared by the lecturer

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169471>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Suekane (M521, +81-88-656-7373, suekane@me.tokushima-u.ac.jp)
- ⇒ Kiyota (M522, +81-88-656-7374, kiyota@me.tokushima-u.ac.jp)

Advanced Heat Transfer

2 units

Akiharu Ousaka · PROFESSOR / MECHANICAL SYSTEMS, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Koji Kusano · ASSISTANT PROFESSOR / MECHANICAL SYSTEMS, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces the two- and three-dimensional steady-state heat conduction problems, a number of heat transfer problems in either periodic or transient temperature variations and phase change problem.

Outline) The key problem of heat transfer is to determine the rate of heat transfer at a specified temperature difference to estimate the cost, the feasibility and the size of equipment necessary to transfer a specified amount of heat in a given time. In this class, following the two- and three-dimensional steady-state heat conduction problems, a number of heat transfer problems in either periodic or transient temperature variations and phase change problem are explained.

Style) Lecture and exercise

Keyword) Multidimensional steady-state heat conduction, Periodic heat conduction, Heat transfer with phase change

Requirement) Students are required to have a good understanding of undergraduate-level thermodynamics, hydrodynamics and related subjects.

Goal) To understand the solution of multidimensional steady-state heat conduction and heat transfer with phase change problems.

Schedule) 1. Recent topics on heat transfer 2. Multidimensional steady-state heat conduction problem (1) 3. Multidimensional steady-state heat conduction problem (2) 4. Quasi-steady-state heat conduction problem (1) 5. Quasi-steady-state heat conduction problem (2) 6. Unsteady-state heat conduction problem (1) 7. Unsteady-state heat conduction problem (2) 8. Unsteady-state heat conduction problem (3) 9. Boundary layer theory in laminar flow (1) 10. Boundary layer theory in laminar flow (2) 11. Boundary layer theory in laminar flow (3) 12. Heat transfer problem with phase change (1) 13. Heat transfer problem with phase change (2) 14. Heat transfer problem with phase change (3) 15. Heat transfer problem with phase change (4)

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169459>

Student) Able to be taken by only specified class(es)

System Design

2 units

Katsunobu Konishi · PROFESSOR / INTELLIGENT MACHINES, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Kenichi Okada · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces some representative methods for problem formulation and control system design.

Outline) System design is a process in which scientific principles and engineering tools are used to produce a plan which satisfy a human need. In this lecture, the conceptual design method such as NM method, KJ method and brainstorming method for problem formulation, and the control system design method such as modeling, equations of motion, modal analysis, observer and controller are explained.

Style) Lecture

Keyword) brainstorming method, NM method, KJ method, modeling, Equation of motion, vibration control

Fundamental Lecture) “Digital Control Theory”(1.0, ⇒p.24)

Relational Lecture) “Advanced Applied Dynamics of Machine”(0.5, ⇒p.19)

Requirement) Students are required to have a good understanding of undergraduate-level design engineering and automatic control theory.

Goal)

1. To understand the outline of the system design.
2. To understand the data structuralizing method.
3. To understand the modeling method for control.
4. To understand the vibration control method.

Schedule) 1. Outline of system design(1) 2. Outline of system design(2) 3. Data collection 4. Data Analysis 5. Structured design 6. Thinking pattern(1) 7. Thinking pattern(2) 8. Intermediate examination 9. Modeling 10. Equations of motion(1) 11. Equations of motion(2) 12. Modal analysis 13. Vibration control(1) 14. Vibration control(2) 15. Simulation 16. Final examination

Evaluation Criteria) Evaluate based on two examinations and reports

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169390>

Student) 開講コース学生のみ受講可能

Contact)

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- ⇒ Okada (M123, +81-88-656-7395, okada@me.tokushima-u.ac.jp)

Energy Conversion System

2 units

Tomoaki Yatsufusa · ASSOCIATE PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To understand principle of energy conversion and to consider improvement of energy conversion technologies on the point of saving energy consumption and decreasing environmental damages

Outline) Lecture on principle of energy conversion and its application, and on combustion mechanism and technologies of reducing toxic emissions of combustion engines as examples of energy conversion systems. This subject is concerned with industry.

Style) Lecture

Keyword) Energy conversion, Environmental protection, Combustion, Energy resources, Toxic emissions

Requirement) None

Notice) None

Goal) To understand principle of energy conversion, environmental effect of energy conversion and present technologies of energy conversion, and to recognize the importance of improvement of energy conversion technologies against environmental protection

Schedule) 1. Present energy problem 2. Energy resources 3. Fundamental of energy conversion 4. Energy conversion by combustion 5. Combustion chemistry 6. Combustion of gaseous fuels (1) 7. Combustion of gaseous fuels (2) 8. Combustion of liquid fuels (1) 9. Combustion of liquid fuels (2) 10. Formation of emissions originated by combustion 11. Present energy conversion technologies 12. Energy conversion and energy recirculation 13. Energy conversion and environmental problems (1) 14. Energy conversion and environmental problems (2) 15. Energy saving in energy conversion

Evaluation Criteria) Appraise the understanding of the content of the lecture by setting some reports
Textbook) Yukio Mizutani, "Combustion Engineering"
Reference) None
Webpage) <http://www.eco.tokushima-u.ac.jp/w3/miwa/index.html>
Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169314>
Student) Any students other than Ecosystem Engineering can attend this lecture.
Contact)
 ⇒ Yatsufusa (eco503, +81-88-656-7370, yatsu@eco.tokushima-u.ac.jp)
Note) Need to submit some reports

Digital Control Theory

2 units

Takuo Nagamachi · ASSOCIATE PROFESSOR / INTELLIGENT MACHINES, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
 Masafumi Miwa · ASSOCIATE PROFESSOR / INTELLIGENT MACHINES, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces the fundamental concept of digital control and neural network that can be used to design the optimal control systems based on the modern control theory.

Outline) In this lecture the fundamental conception of a digital control system and digital control strategies to apply the modern control theory is presented. In particular, two freedom control and a neural network is explained. The recent topics related to control engineering are also introduced.

Style) Lecture

Keyword) two freedom control, neural network, optimal control

Fundamental Lecture) "Automatic Control theory 1"(1.0), "Automatic Control theory 2"(1.0)

Relational Lecture) "Actuator Control Theory"(0.5, ⇒p.24)

Requirement) Students are required to have a good understanding of undergraduate-level control theory and related subjects.

Goal)

1. To understand the outline of the digital control.
2. To understand the applications of AI, neural network and fuzzy control

Schedule) 1. Outline of digital control system 2. Difference of analog and digital control systems 3. Mathematical representation of control signal 4. Pulse transfer function 5. Stability and steady state deviation 6. Design of digital control system(PID) 7. Design of digital control system(two freedom control) 8. Design of digital control system(model prediction) 9. Intermediate examination 10. Outline of artificial intelligence 11. Exercise of artificial intelligence 12. Outline of neural network 13. Exercise of neural network 14. Outline of fuzzy theory 15. Exercise of fuzzy theory 16. Final examination

Evaluation Criteria) evaluate based on two examinations and reports.

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169447>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Nagamachi (M524, ngmch@me.tokushima-u.ac.jp) (Office Hour: 毎週水曜日 17時 ~ 18時)
 ⇒ Miwa (M420, +81-88-656-7387, miw@me.tokushima-u.ac.jp)

Actuator Control Theory

2 units

Masafumi Miwa · ASSOCIATE PROFESSOR / INTELLIGENT MACHINES, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces the characteristics of actuators, the design methods of servo system.

Outline) The structure and function of actuators or control valves, the design of servo system, PWM control method, the practical and intelligent control algorithm are explained.

Style) Lecture

Keyword) actuator, servo system, control algorithm

Relational Lecture) "Digital Control Theory"(0.5, ⇒p.24), "Measurement Science and Technology"(0.5, ⇒p.24)

Requirement) Students are required to have a good understanding of undergraduate-level control engineering and related subjects.

Goal) To understand the design methods of servo system using actuators.

Schedule) 1. Outline of actuators 2. Micro-drive electromotive actuators 3. Electromotive actuators 4. Novel actuators 5. Hydraulic actuators 6. Hydraulic control valves 7. Hydraulic servo system 8. Pneumatic actuators 9. Pneumatic control valves 10. Pneumatic servo system 11. PWM control method 12. Model matching methods 13. Neural controller 14. Two-degree-of-freedom control method 15. Model driven control method 16. Examination

Evaluation Criteria) Assignments count 30 % and examination count 70 %.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169303>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Hashimoto .

Measurement Science and Technology

2 units

Tetsuo Iwata · PROFESSOR / INTELLIGENT MACHINES, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
 Hiroyuki Ukida · ASSOCIATE PROFESSOR / MECHANICAL SYSTEMS, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) To understand importance of the Fourier transformation for developing various kinds of measurement techniques, measurement equipments, measurement systems.

Outline) Among the various measurement techniques used in the fundamental and applied research, optical measurement methods including their principles, methodologies, instrumentations, and evaluation methods are reviewed. In the lecture, emphasized is the importance of the concept of the Fourier transformation to understand and to deal with linear systems in the modern scientific measurement system. Practical methods of object inspections, distance measurements, and shape reconstructions using images are also lectured.

Style) Lecture

Keyword) measurement techniques, measurement devices, Fourier transform

Relational Lecture) "Micro-Nano Engineering"(0.5, ⇒p.25), "Digital Control Theory"(0.5, ⇒p.24), "Actuator Control Theory"(0.5, ⇒p.24)

Goal)

1. 1. To understand Fourier series and Fourier transform.
2. 2. To understand relations among Fourier transform and measurement principles of scientific instruments.
3. 3. To understand techniques used with practicable various measurement devices.

Schedule) 1. Frequency response of the amplifier 2. Optical information processing 3. Fourier-transform infrared spectroscopy 4. Subfringe interferometry 5. Computed tomography 6. Sampling theorem and quantization theorem 7. Wavelet transformation 8. Lock-in amplifier and boxcar integrator 9. Optics for microscope 10. X-ray diffraction 11. Image measurement systems 12. Feature extraction from images 13. Binocular stereo method 14. Pattern projection 15. Shape from shading and texture 16. Examination

Evaluation Criteria) Assignments count 50% and examinations count 50%.

Textbook) Printed synopses are used.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169360>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Iwata (M427, +81-88-656-9743, iwata@me.tokushima-u.ac.jp)
 ⇒ Ukida (M424, +81-88-656-9448, ukida@me.tokushima-u.ac.jp) (Office Hour: 毎週金曜日 17:00~ 18:00)

Theory of Plasticity and Application to Metal Forming Processes

2 units

Yoshinari Kaieda · PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
 Yoshihiro Tada · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduce yield criteria of metals, plasticity theory and their application to metal forming processes.

Outline) Although metal forming techniques are diverse, the primary objective is to produce a desired shape change. The major concerns of the engineer are the forces required for the operations and the properties of the work materials. Engineering plasticity and its application to metal forming processes are introduced.

Style) Lecture

Keyword) yield theory, theory of plasticity, compressibility, anisotropy

Relational Lecture) "Machine Tool and Naching System"(0.5, ⇒p.25)

Requirement) Students are required to have a good understanding of undergraduate-level plasticity and fundamentals of metal forming operations.

Goal)

1. To understand yield theory and slab analysis.
2. To understand fundamentals of compressive and anisotropic plasticity theories.

Schedule) 1. Basic concept of yielding 2. Plastic behavior of metals under high hydrostatic pressure 3. Stress tensor and strain 4. Stress-strain curve and coordinate transformation 5. Principal stresses, invariants of stresses and Mohr's stress circle 6. Sress deviator tensor 7. Loading/unloading and yield theory 8. Exercise 9. Plastic working of compressive metals 10. Yield criteria of compressive materials 11. Constitutive equation of compressive materials 12. Analysis of plastic deformation of compressive materials 13. Mechanics of powder consolidation 14. Yield criteria of anisotropic materials 15. Constitutive equation of anisotropic materials 16. Examination

Evaluation Criteria) Assignments count 50% , exercises and examinations count 50%.

Textbook) Predistributed printed synopses are also used.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169351>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Yoshinari Kaieda, room:M-321,TEL:088-656-7379, e-mail:kaieda@me.tokushima-u.ac.jp

⇒ Yoshihiro Tada, room:M-319,TEL:088-656-7381, e-mail:tada@me.tokushima-u.ac.jp

Machining System

2 units

Masahiro Masuda · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) The lecture aims at learning approach methods in the process of understanding the recent advances in various machining.

Outline) The target of machining is to obtain high accuracy, high efficiency, low cost and desirable environment. In order to approach these targets various kinds of machining technology, watching systems, measuring technology have been advanced in the machining factory. The lecture deals with the basic concept and problems when machining difficult to cut materials, micro drilling, high speed milling, ultra-precision cutting and so on, as giving many examples.

Keyword) machining tecnology, machining concept, tool failure

Relational Lecture) "Theory of Plasticity and Application to Metal Forming Processes"(0.5, ⇒p.24)

Requirement) Students are required to have a good understanding of undergraduate-level mechanical engineering and related subjects.

Goal) To understand the trend and the basic concept of machining.

Schedule) 1. Recent trend on machining 2. Tool materials and tool failure 3. Cutting technology of various difficult to cut materials 4. High speed milling 5. Deep boring and drilling 6. Micro drilling 7. Electro discharge drilling applied ultrasonic waves 8. Ultra-precision cutting 9. Creep feed drinding 10. Machining for desirable envelonment 11. Watching system for machining 12. Quality engineering 13. Example (1) of quality engineering 14. Example (2) of quality engineering 15. Example (3) of quality engineering

Evaluation Criteria) Assignment for quality engineering (40%) and test (60%)

Textbook) None

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169330>

Contact)

⇒ Masuda (M320, +81-88-656-7380, masuda@me.tokushima-u.ac.jp) (Office Hour: 毎週月曜日 17:00-18:00)

Precision Machinery

2 units

Takao Hanabusa · PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) Learning of preparation and evaluation methods on thin films which are important to micro-machines and electronic parts.

Outline) We learn about basics of thin films, thin film preparation methods, crystal structure and stress in thin films. Since the development of residual stresses is a serious problem in thin film preparation, an evaluation and a control of the residual stresses are necessary in the fabrication of thin films. X-ray stress measurement and its application on the stress in thin films are to be understood. Recent works on stresses in thin films are introduced.

Keyword) X-ray diffraction, X-ray stress measurement, Crystal structure, Residual stress

Fundamental Lecture) "Material Engineering"(1.0, ⇒p.22)

Relational Lecture) "Physical properties of materials"(0.5, ⇒p.20)

Requirement) To master a basic concept of crysital

Notice) To learn by yourself thin film preparation, crystallography, X-ray diffraction, X-ray stress measurement, micromachine and so on

Goal)

1. Understanding of thin film preparation
2. Understanding of X-ray stress measurement
3. Understanding of stresses in thin films

Schedule) 1. Basics of thin film 2. Thin film preparation 3. Crystal structure and stress in thin films 4. Mechanical stress measurement of thin film 5. X-ray diffraction (1) Characteristics of X-rays 6. X-ray diffraction (2) Crystal structures 7. X-ray diffraction (3) Diffraction by an atom and a small crystal 8. X-ray diffraction (4) Powder diffraction 9. Report and presentation 10. Principle of X-ray stress measurement 11. Stress measurement of thn films 12. Development of residual stress 13. Recovery of residual stress 14. Thermal stress and stress migration 15. Application of thin films 16. Examination

Evaluation Criteria) Report & presentation 40%, examination 60%

Textbook) None

Reference)

- ◇ B. D. Cullity, Elements of X-ray Diffraction, Addison-Wesley
- ◇ K. Wetzig and C. M. Schneider (Eds.), Metal Based Thin Films For Electronics, Wiley-VCH

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169422>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Hanabusa(M317, 656-7377, hanabusa@me.tokushima-u.ac.jp)

Micro-Nano Engineering

2 units

Toshihiko Ooie · PROFESSOR / NANO-PROCESSING ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Masato Tanaka · ASSOCIATE PROFESSOR / NANO-PROCESSING ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces the fundamentals of micro-nano engineering.

Outline) Basics of micro-nano engineering for the beginners.

Requirement) Students are required to have a good understanding of under-graduate level physics and related subjects.

Goal) To understand the fundamentals of micro-nano engineering

Schedule) 1. Basics of micro-nano engineering 2. Various micro-nano process and photo-induced process 3. Laser radiation and oscillator 4. Optical components for laser systems 5. Laser induced phenomena 6. Heat conduction in laser processing 7. Laser welding 8. Laser drilling and cutting 9. Ultra-fast laser processing 10. Micro thermal process 11. Micro/nano processing in industry 12. Thermal inkjet process 13. Piezo inkjet process 14. Inkjet for biotechnology 15. Latest inkjet technology 16. Examination

Evaluation Criteria) Assignments counts 100%

Textbook) Norimitsu Hirai, Practical Laser Technology, Kyoritsu publishing ISBN4-320-08470-5 Takeshi Amari, Inkjet printer, CMC publishing ISBN4-88231-859-8 Electronic files on Web

Reference) Mitsuo Nakazawa, Practical Ultrafine Process and Measurement, NTS ISBN4-86043-035-2 Kenichi Iga, Basic Laser Optics, Ohm-sha ISBN4-274-02137-8 Kunihiko Sato, Yoshihiko Mukai, Masao Toyoda, Welding Engineering, Rikogaku-sha ISBN4-8445-2108-X

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169468>

Seminar on Mechanical Engineering

4 units
Teacher of course

Target) To obtain deeper knowledge and presentation abilities by reading scientific papers concerning mechanical engineering related to each Master's thesis.

Outline) In order to complete each Master's thesis, to read and to understand scientific papers and to make a discussion with an instructor.

Keyword) Master's thesis, Mechanical engineering

Goal) To obtain abilities to read scientific papers concerning each Master's thesis and to make a presentation.

Schedule) 1. To read ten scientific papers concerning each Master's thesis and to make a presentation. 2. To read five scientific papers concerning mechanical engineering and to make a presentation.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169341>

Student) Able to be taken by only specified class(es)

Exercise on Mechanical Engineering

2 units
Teacher of course

Target) To obtain sufficient knowledge and information required for completing each Master's thesis and to make a discussion with an instructor.

Outline) To read scientific papers on Master's thesis and to make a presentation under the direction of each laboratory's instructor.

Keyword) Master's thesis, Mechanical engineering

Goal) To obtain knowledge and information concerning each Master's thesis.

Schedule) 1. To make a research on a problem concerning each Master's thesis and to make a presentation. 2. To discuss and to make a presentation on each Master's thesis.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169339>

Student) Able to be taken by only specified class(es)

Mechanical Engineering Laboratory

6 units
Teacher of course

Target) To obtain comprehensive abilities for completing each Master's thesis through some related experiments.

Outline) To carry out some experiments concerning each Master's thesis.

Keyword) Master's thesis, Mechanical Engineering

Goal) To make a plan and to carry out experiments and to make a discussion on the results.

Schedule) Under the direction of the instructor, to make a plan and to carry out the experiment required for completing a Master's thesis.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169340>

Student) Able to be taken by only specified class(es)

Earth and Life Environmental Engineering — Chemical Science and Technology

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Introduction to Intellectual Property

2 units

Tohru Sakai · PART-TIME LECTURER / (前)工業所有権協カセンター, Juichiroh Osame · PART-TIME LECTURER

Akio Fujii · PART-TIME LECTURER / INTELLECTUAL PROPERTY OFFICE, Yasushi Toyosu · PART-TIME LECTURER, Kuniaki Kubota · PART-TIME LECTURER

Target) Understanding the basic systems and importance of protection and practical use of intellectual property based on some examples.

Outline) It is necessary for a working staff in a company, a university, etc., in a future. It is introduced the importance to protect and practical use of intellectual property at governments, industrial circles, universities and institutes in Japan using potential on scientific techniques. This lecture is treated the basic systems of protection and practical use of intellectual property particularly based on strategy and invasion of patent in an organization such as company, university, etc.

Style) Lecture

Keyword) Intellectual property, Patent Law, Protect and Use of Intellectual Property

Relational Lecture) "Introduction to Intellectual Property"(0.5)

Requirement) No requirement

Notice) It is necessary to be present at two concentrated lecture.

Goal)

1. Understanding concept of intellectual property right.
2. Understand the Patent Act, the Trademark Act, the Design Act and the Copyright Act.
3. Understanding on basical practical use of intellectual property.

Schedule) 1. Concept of intellectual property(Sakai) 2. Outline of intellectual property(Patent and Trademark)(Sakai) 3. Outline of intellectual property(Design and Copyright)(Sakai) 4. Patent, invention and invasion of patent (Sakai) 5. Management of intellectual property and use (Sakai) 6. A way of research and development and intellectual property in a future(Sakai) 7. The midterm examination and its comment for Target and 8. History of system of intellectual property (Osame) 9. International trend of system of intellectual property (Osame) 10. Acquisition method of intellectual property right(Fujii) 11. Use of intellectual property(Watanabe) 12. Strategy of intellectual property on development of techniques(Y.Higuchi) 13. Effective intellectual property in development of techniques (Kubota) 14. Special lecture on a use of intellectual property by a chief executive officer(1) 15. Special lecture on a use of intellectual property by a chief executive officer(2)

Evaluation Criteria) Passing mark is over 60% on the examinations and the reports for each reaching level, respectively.

Textbook) To be used textbooks made by lecturers.

Reference) Nobuhiro Nakayama: Titeki Shoyuken, Nikkan Kohgyo Shinbunsha

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169432>

Student) For the course students and other graduate school students.

Contact)

⇒ Sakai (+81-3-5600-2631,)
 ⇒ Mizuguchi (A501, +81-88-656-7349, mizuguch@ce.tokushima-u.ac.jp) (Office Hour: Monday,11:00-12:30, 17:00-18:00)

Management Theory of New Business

2 units

Vice chairperson of School Affairs Committee, Faculty of Engineering
 First-line men with experience of practical business · PART-TIME LECTURER

Target) New business is the word which means the business to make the most of technical knowledge, technology, the new idea and which is developed creatively, and that main bearer is the enterprise called a venture. There is a purpose of this class in providing the knowledge which is necessary, and know-how and a spirit so that a taking lecture student may establish a venture business.

Outline) The regeneration of the Japanese society with the vitality is being asked. Government enforced "a university venture 3 years 1000 companies plan" over Heisei 14-the 16th year. Though that goal was almost attained, it is very important to promote entrepreneur education continuously from now on. Tokushima Prefecture supports this class based on the recognition done like this, and it is established.

Requirement) The person whom the one with the classroom is constructed by the class start time in the person who doesn't learn the unit of "Introduction to new business" in the college, and a group are organized, and it is limited to the person with the intention to make a business plan, and taking lecture is recognized.

Notice) Being late and a whisper in class should be prohibited strictly. Be careful over and again because it should dispose of exit and future taking lecture may not be recognized when it is wicked.

Goal) Learning of the necessary knowledge to establish venture business, and the ability which can make a business plan.

Schedule) 1. Guidance 2. What is the new business? 3. Keynote lecture 4. Theory of a stand-alone version venture success 5. The law knowledge which is necessary for entrepreneur 6. Fund-raising and capital policy 7. Indirect finance 8. Direct finance 9. The basis of the company management 10. The elementary knowledge of the business accounting 11. The point of the business plan preparation 12. Management strategy and marketing 13. Product development and intellectual property 14. Business plan preparation practice 15. Examination 16. Business plan announcement meeting

Evaluation Criteria) It is evaluated by the presentation (40%) of the written examination (60%) and the business plan. And, the presentation of the written examination and the business plan is decided to be recognized only for the taking lecture student who attended it for 2/3 and more of the classes that it is opened.

Textbook) The summary is distributed every time.

Reference) Several are introduced in the school hours.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169469>

Student) he person who hasn't learned the unit of the new business outline that it is opened with this learning in all the students enrolled in the graduate school yet is made the target. The number of completion people may be restricted in the method such as a lottery in case of a taking lecture applicant many. As for the details, an applicant for taking lecture is to follow those directions because the notice which showed attention in taking lecture is done.

Contact)

⇒ Vice chairperson of School Affairs Committee, Faculty of Engineering

Note) The man of business that it is active in the forefront every time, and an adviser are invited as an instructor, and working knowledge is provided for theory plus practice in this class from the specialist's position. This class is the thing which is useful enough even if it is taken to the person who aims at a general enterprise and a laboratory, the employment to the self-governing body and so on.

Management of Technology

2 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) About the production management of the automobile industry, it is understood variously from the point of view such as "research and development", "production management", "purchasing" and "quality control" "marketing" and "cross-cultural management".

Outline) It learns about the production management. This time, "the automobile industry" specially takes up the production management of "Honda Motor Co.,Ltd. (following Honda)" even of that in the case, and the class to appreciate that importance with ranking of technology in management is taken.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business".

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of management is learned.
2. Ranking of the technology in management and that importance are appreciated.
3. It learns how to solve the various problems which always occur in the spot of the management through the case study and the business game.

Schedule) 1. Guidance 2. Lecture "What in Management of Technology?" 3. Case report "Research and development of Honda" 4. Case study "Plan an overseas factory." "A new car development order" 5. Lecture "Production management and purchasing" 6. Lecture "Quality control" 7. Case report "The production management of Honda"; "The supply chain management of Honda" 8. Case study "Plan an overseas factory." 9. Case report "The quality control of Honda" 10. Case study "Don't make material defects flare up again." 11. Lecture "Marketing strategy" 12. Lecture "Cross-cultural management" 13. Case report "Around the products project of Honda - the two-wheeled vehicle" 14. Case report "The path of internationalization of Honda" 15. Case report "The personnel management of Honda" 16. Summary and questions and answers

Evaluation Criteria) It is evaluated in the remark (20%) in class and the middle, end of a term report (80% in total).

Textbook) It doesn't specially use. The summary and so on is distributed every time.

Reference) Several are introduced in class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169348>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the doctor former term course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Note) This class invites seven Honda alumnuni who did work in "research and development", "production management", "purchasing", "quality control", "marketing", "cross-cultural management", and so on as an instructor, and it is the class to do case report. Even if it is seen nationwide, the trial done like this is very rare, and it is a precious class. And, an applicant for taking lecture is to attend it in the guidance to hold it in advance. A schedule is indicated separately.

Presentation Method (M)

2 units

Target) Poster and oral presentations, and journal publications are common means of appealing the research work in various scientific and technological disciplines. It's undoubtedly important for activating the research work. The lecture is intending for students to learn most efficient way to appeal their findings and discussions in scientific community.

Outline) Credits are acknowledged to the students who are supervised to give conference speech by themselves and do actually the lectures.

Goal) The lecture is aiming at having knowledge and experience of the presentaion in international conferences.

Evaluation Criteria) Students' achievement is evaluated by portfolios submitted showing the progress in preparation of international conferences as well as by presentation records.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169510>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Internship (M)

2 units

Target) This program is provided to increase knowledge and experience in the actual industrial technology in various fields. Through the practical experience, the program will allow students to become discerning and well-balanced researchers or engineers with deeper understanding of technological societies.

Outline) Credits are acknowledged to students who experienced the internship in companies and/or government offices. Their fulfillment is evaluated by activity reports during internship.

Goal)

1. Grasping internal systems of a company, management, action and strategy to achieve the company's goal. (2)
2. Understanding human relationship and communicative manner in a working society and a company.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by supervisors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169345>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Venture Business (M)

2 units

Target) Aims of the lecture are doing collaborative works with private enterprises and establishing venture businesses through such works.

Outline) The lecture is aiming at founding a venture business company as well as establishing collaborative research works with private enterprises. It's worth to apply their accomplishment to an actual society beyond the range of a laboratory work.

Goal) Objective of the lecture is to have experience and knowledge of collaborative works with private enterprises and to mature the works to venture businesses.

Evaluation Criteria) Credits are acknowledged in case of doing collaborative works with enterprises and/or maturing them to venture businesses. Handouts, reports, and presentation materials, etc. are evaluated to approve credits.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169332>

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Long-term Internship (M)

6 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This program is provided long-term internship in the actual industrial companies and so on, doing a joint study between companies and university on practical problems proposed by the company and practical experience of management of technologies. Through the long-term internship, the program will allow students to become an engineer with a core role in researches and companies

Outline) Credits are acknowledged to students who experienced the internship in companies or government offices of 270 hours during three months or more and presentation to executive officer of the company. Their fulfillment is evaluated by activity reports during internship and appraisal and interviewed report from a mentor.

Goal) Grasping abilities for practical engineers by studying activities in company and so on.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by mentors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169440>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Nishida (K409, +81-88-656-7630, nishida@kg.tokushima-u.ac.jp)
- ⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)
- ⇒ Morimoto (A407, +81-88-656-7619, emi_morimoto@kg.tokushima-u.ac.jp) (Office Hour: 月～木(10時～15時))

Note) Students who resister the coop-education program for "Pai-shape" engineers with sense for management of technology, are able to have a grant-in-aid for travel and so on. Ask committee members of long-term internship in your course or coordinators of this program.

Advanced Lecture in Theory of Business Models

2 units

Tatsuya Deguchi · PART-TIME LECTURER, Kenichi Yasumuro · PART-TIME LECTURER, Katsuo Touma · PART-TIME LECTURER

Takahide Yamaguchi · PART-TIME LECTURER, Shingou Nishii · PART-TIME LECTURER

Target) There is a purpose of this class in providing the knowledge which is necessary, and know-how so that students may achieve a business model in establishing enterprises based on the lecture of "Management Theory of New Business", and in making students understood the profit generating stream by studying on the frame work of companies in several business fields.

Outline) Business Model is a remarkable term in modern economic and organizational theories in these days but describes a broad range of definitions. In this lecture, Business Model is defined as "System which converts technology and know how into profit for the purpose of customers' satisfaction" and aims at providing the ability for the design of profitable system, by learning cost issues in establishing business strategies of companies.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business"

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of business model design is learned.
2. Understanding of the concept of business model by case study analysis are appreciated.
3. It learns forming ability of business plan through the case study on business models.

Schedule) 1. Guidance 2. Keynote lecture "Business Model Thinking" 3. Questions and answers, Discussions 4. Lecture "Theory of Business Models" 5. Lecture "Design principles of Business Models" 6. Lecture "Evaluation of Business Models" 7. Case Study "Business Model in a R&D company" 8. Case Study "Business Model in a manufacturing industrial company" 9. Case Study "Business Model in a company of service industry" 10. Case Study "Business Model in a company of information industry" 11. Business plan practice, Present situation analysis and alternatives. 12. Business plan practice, Concept ad design of business. 13. Business plan practice, Financial analysis . 14. Business plan practice, Concluding and submitting 15. Presentation(1) of Business plan practice. 16. Presentation(2) of Business plan practice, Comments and summary.

Evaluation Criteria) Participation in class(20%) Group work and its report(80%)

Textbook) Ken-ichi Amuro and Study Group of Business model "Case Book: Business Model Thinking" Bunshindo

Reference) Several are introduced in class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169656>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Contact)

- ⇒ Tatsuya Deguchi (Wakayama University)
- ⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

Note) This class is supported by Tokushima Prefecture Government

Advanced Environmental Technology on Chemistry

2 units

Junko Motonaka · PROFESSOR / PHYSICO-CHEMISTRY AND MATERIAL SCIENCE, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Katsuhiro Tamura · PROFESSOR / PHYSICO-CHEMISTRY AND MATERIAL SCIENCE, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Shigeru Sugiyama · PROFESSOR / CHEMICAL PROCESS ENGINEERING, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Masahiro Katoh · ASSOCIATE PROFESSOR / CHEMICAL PROCESS ENGINEERING, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) The present situation and subjects on chemistry in view of environmental pollution will be introduced. Recent development in chemistry to attempt to solve those subjects will be explained.

Outline) Based on the historical background on environmental pollution, the recent progress on analytical chemistry, biochemistry, catalysis and chemical process engineering for environmental protection will be explained.

Style) Lecture and exercise

Keyword) environment, analytical chemistry, biochemistry, catalyst, chemical process

Fundamental Lecture) "Advanced Analytical and Environmental Chemistry"(1.0, =>p.34), "Advanced Physical Chemistry"(1.0, =>p.33), "Advanced Materials Science"(1.0, =>p.34)

Relational Lecture) "Engineering of Biological Environment"(0.5, =>p.30), "Advanced Environmental Systems Engineering"(0.5, =>p.30)

Requirement) Requires undergraduate level knowledge of chemistry and chemical engineering.

Goal)

1. To understand the present situation for environmental subjects on engineering (lectures from 1st to 5th, 14th and 15th)..
2. To develop ability for solving the environmental subjects (lectures from 6th to 15th).

Schedule) 1. Endocrine disrupters 2. Contribution of certified reference materials to securing safe foods and industrial products 3. Environmental problem and crystal growth 4. Polymer materials and environment 5. Biodegradable polymer 6. The mystery of natural rubber 7. Present situation of phosphors for white LEDs 8. Recent advances in organic chemistry: Synthesis and Function 9. Optimization of chemical processes 10. High pressure bioscience and biotechnology 11. Properties of supercritical fluids and their utilization 12. Possible utilization of carbon dioxide for chemistry 13. Utilization of adsorption phenomena 14. Approach using apatite to studies on energy and environment 15. Introduction to engineering utilization of space environment

Evaluation Criteria) Assignments count 100% mainly based on the presentation and report submitted.

Textbook) To be announced in the class.

Reference) To be announced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169322>

Student) Able to be taken by only specified class(es)

Contact)

- => Motonaka (G611, +81-88-656-7409, motonaka@chem.tokushima-u.ac.jp)
- => Tamura (G509, +81-88-656-7416, tamura@chem.tokushima-u.ac.jp)
- => Sugiyama (G309, +81-88-656-7432, sugiyama@chem.tokushima-u.ac.jp)
- => Katoh (M304, +81-88-656-7429, katoh@chem.tokushima-u.ac.jp)

Engineering of Biological Environment

2 units

Yoshitoshi Nakamura · PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To understand recent studies on engineering of biological environment.

Outline) Advanced lectures for recent studies on engineering of biological environment

Style) Lecture

Keyword) Environment, Biology, Engineering

Requirement) N/A

Notice) N/A

Goal)

1. To understand general concepts of biomass
2. To understand biomass conversion engineering
3. To understand general concepts of bioremediation

Schedule) 1. General concepts of biological environment 2. Characteristics of biomass and its effective utilization 3. Pretreatment of biomass by physical method 4. Pretreatment of biomass by chemical method 5. Pretreatment of biomass by biological method 6. Conversion of biomass into useful materials 7. Conversion of biomass into useful materials 8. Process system engineering for effective conversion of biomass 9. Reports 10. Classification, role, and application method of environmental organism 11. Bioremediation in water environment 12. Bioremediation in air environment 13. Bioremediation in soil

environment 14. Environmental hormones, chemical pollutions and ethics 15. Recent topics and trend of industry for engineering of biological environment 16. Final Reports

Evaluation Criteria) Evaluation of Reports

Textbook) Prints

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169418>

Contact)

- => Nakamura (720, +81-88-656-7518, ynakamu@bio.tokushima-u.ac.jp) (Office Hour: 水曜日 17:00-18:00)

Advanced Environmental Systems Engineering

2 units

Shuichi Hashimoto · PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Yasunori Kozuki · PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Shoichiro Fujisawa · ASSOCIATE PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Akio Kondo · PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Yoshiyuki Kidoguchi · PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Shigeki Matsuo · ASSOCIATE PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Yoshinobu Hirose · ASSOCIATE PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Tomooki Yatsufusa · ASSOCIATE PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Ryoichi Yamanaka · ASSOCIATE PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Takuro Tomita · ASSISTANT PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To understand the present environmental problems and to acquire the advanced of the technique and the approach to solve problems on the point of the ecosystem engineering.

Outline) To explain the structure and function of environmental systems, the relationship between civil life and disaster prevention systems, and the changes of social system due to the technological revolution and the policy.

Style) Lecture

Keyword) environmental policy, natural disaster, energy saving technology, welfare technology, biomechanical engineering

Goal)

1. To understand the factor of environmental systems
2. To understand the structure of environmental systems
3. To understand the civil life and natural disaster prevention systems

Schedule) 1. The policy and natural disaster prevention measures (1) 2. The policy and natural disaster prevention measures (2) 3. The factor of environmental systems 4. Example of environmental systems 5. The structure of environmental systems 6. Example of structure of environmental systems 7. Civil life and nano-technology 1 8. Civil life and nano-technology 2 9. Midterm presentation 10. Well being technology 1 11. Well being technology 2 12. Ecosystem engineering 1 13. Ecosystem engineering 2 14. Hydrogen engine technology 15. Diesel engine engineering

Evaluation Criteria) Assignments count 100%

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169333>

Contact)

- => Matsuo (Eco404, +81-88-656-7538, matsuos@eco.tokushima-u.ac.jp)

Advanced Lecture on Semiconductor Nanotechnology

2 units

Toshiro Isu · PROFESSOR / INSTITUTE OF TECHNOLOGY AND SCIENCE, Takahiro Kitada · ASSOCIATE PROFESSOR / INSTITUTE OF TECHNOLOGY AND SCIENCE

Target) This class introduces basic principles of the semiconductor nanotechnology and their application to the quantum devices.

Outline) Basics of semiconductor physics and quantum mechanics are introduced to understand material properties of quantum confined nanostructures. Recent progress in fabrication techniques and device applications of semiconductor nanostructures (quantum wells, wires and dots) will be reviewed.

Style) Lecture

Keyword) Quantum confined nanostructures, Semiconductor nanoscience, Electron devices, Photonic devices
Requirement) None.

Notice) None.

Goal) To understand basic properties of semiconductor nanostructures and quantum devices.

Schedule) 1. Introduction to semiconductor nanostructures 2. Electronic states in quantum confined structures 3. Electrical properties of superlattices 4. Fabrication technique of quantum wires and wells 5. Characterization of heterointerfaces 6. Characterization of nanostructures 7. High-speed electron devices 8. Optical properties of quantum wells 9. Semiconductor laser diodes 10. Quantum effect devices 11. Fabrication technique of quantum dots 12. Quantum dot devices 13. Device application of quantum nano structures 14. Recent topics of semiconductor nanotechnology (1) 15. Recent topics of semiconductor nanotechnology (2)

Evaluation Criteria) Assignments count 100%

Textbook) None.

Reference) Will be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169477>

Student) Any students can attend the class.

Contact)

⇒ Isu (A224, +81-88-656-7670, t.isu@frc.tokushima-u.ac.jp) (Office Hour: Tue -Thu 10:00-14:00)

⇒ Kitada (A224, +81-88-656-7671, kitada@frc.tokushima-u.ac.jp) (Office Hour: Mon. 10:00-14:00)

Quantum mechanics and advanced lecture in quantum physics 2 units

Yoshitaka Michihiro · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces the quantum mechanics.

Outline) Basics of quantum mechanics are introduced.

Style) Lecture

Keyword) Quantum Mechanics

Goal) To understand the outline of quantum mechanics.

Schedule) 1. Introduction 2. Variational method 3. Lagrangian 4. Hamiltonian 5. Poisson's bracket expression 6. Quantization 7. Operator 8. Wavefunction 9. Expectation value 10. Schrödinger equation 11. Example (1) the square well potential 12. Example (2) the linear harmonic oscillator 13. Angular momentum 14. Example (3) hydrogen atom 15. Heisenberg equation 16. Field quantization

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169503>

Contact)

⇒ Yoshitaka Michihiro (A203)

Differential Equations 2 units

Nobuyoshi Fukagai · ASSOCIATE PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) Introduction to mathematical theory of differential equations.

Outline) Boundary value problems of second order linear differential equations.

Style) Lecture

Keyword) 微分方程式の境界値問題, Sturm-Liouville 問題

Goal) To be familiar with Sturm-Liouville type equations.

Schedule) 1. Introduction 2. Helmholtz's equation 3. Eigenvalues and eigenfunctions 4. Green's function 5. Residue analysis 6. Expansion of Green's function 7. Fourier series 8. Existence theorem 9. Sturm-Liouville problems 10. Characteristic function 11. Solvability of boundary value problems 12. Basic estimates 13. Distribution of eigenvalues 14. Eigenfunction expansion 15. Review

Reference) 望月清・トルシン 『数理解物理の微分方程式』 培風館

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169496>

Student) Able to be taken by student of other department

Contact)

⇒ 工学部数学教室 (A棟219室)

Advanced applied analysis 2 units

Kuniya Okamoto · ASSOCIATE PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) To learn the functional analytic methods which are basic tools for mathematical sciences.

Outline) This subject provides basic theory of functional analysis which is considered as linear algebra in infinite-dimensional spaces. Functional analytic approaches to phenomena described by differential equations are introduced.

Style) Lecture

Relational Lecture) “Topics of Analysis for Mathematical Science”(0.5, ⇒p.31)

Goal) To apply the theory of modern analysis and recognize its significant role.

Schedule) 1. Introduction (What is functional analysis?) 2. Linear operators on finite-dimensional linear spaces 3. Eigenvalue problems 4. Matrix exponentials 5. Hilbert spaces, Banach spaces 6. Function spaces 7. Linear operators in infinite-dimensional linear spaces 8. Spectral resolutions 9. Fourier transforms 10. Operational calculus 11. Integral transforms, Resolvent operators 12. Strongly continuous semigroups 13. Abstract Cauchy problems 14. Applications to partial differential equations 15. Summary

Evaluation Criteria) Evaluation by the report.

Webpage) <http://math9.pm.tokushima-u.ac.jp/lecture/>

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169316>

Contact)

⇒ 岡本(A212室, TEL/FAX: 656-9441, E-mail: okamoto@pm.tokushima-u.ac.jp)

Topics of Analysis for Mathematical Science 2 units

Atsuhito Kohda · ASSOCIATE PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) Mathematical theory and technique for analysis of engineering phenomena

Outline) Mathematical theory to analyze problems in engineering and its application, mainly theory and technique of differential equations

Style) Lecture

Relational Lecture) “Advanced applied analysis”(0.2, ⇒p.8), “Differential Equations”(0.2, ⇒p.8)

Requirement) If you like undergraduate-level mathematics, it will be sufficient.

Goal) To be familiar with mathematical theory, that helps engineering study.

Schedule) 1. Theory of sets and maps 2. Cardinal numbers and bijection 3. Equivalence relations and cryptography 4. Linear space and tensor 5. Vector analysis and differential form 6. Cauchy's theorem and vector analysis 7. Differential form and Cauchy's theorem 8. Projective plane 9. Quadratic curves and projective plane 10. All quadratic curves are circles? 11. The index of vector fields 12. Applications of the index: fundamental theorem of algebra 13. Vector fields on the unit sphere 14. Why there is the north pole on the earth 15. Mathematics and computers 16. Summary

Webpage) <http://math1.pm.tokushima-u.ac.jp/lecture/>

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169401>

Contact)

⇒ Kohda (A211, +81-88-656-7546, kohda@pm.tokushima-u.ac.jp) (Office Hour: 月曜 12:00~13:00)

Nuclear magnetic resonance 2 units

Takashi Ohno · PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) This lecture explains principles of NMR and introduces applications to solid state physics and chemistry.

Outline) Nuclear magnetic moment and its interaction with an external magnetic field are explained based on quantum mechanics. Some examples of its application to solid state physics and chemistry are introduced.

Style) Lecture

Keyword) Nuclear magnetic resonance, spectrum, spin - lattice relaxation, Knight shift, chemical shift

Schedule) 1. magnetic moment of nuclei and Boltzmann's distribution 2. magnetic moment of electron 3. method for NMR observation 4. apparatus for NMR measurement 5. spin echo and spectrum 6. spin - lattice relaxation rate 7. NMR in metals 8. high T_c superconductors 9. NMR / NQR in high T_c superconductors 10. chemical shift 11. Knight shift 12. NMR in chemistry 13. magnetism and NMR 14. NMR / NQR in superconductors 15. NMR in super ionic conductors

Textbook) 遍歴電子系の核磁気共鳴(朝山邦輔著, 裳華房)

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169328>

Contact)
⇒ Takashi Ohno (A201, 656-7549)

Solid State Ionics

2 units

Koichi Nakamura · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces topics in solid state ionics, conduction mechanism in ionic conductors and techniques to study solid state ionics.

Outline) Basic experimental and theoretical approaches to understand solid state ionics are introduced and discussed in terms of "ion dynamic".

Keyword) Ionic conductor, Ionic diffusion, Secondary battery

Goal)

1. To understand basic physical and chemical properties of ionic conductors.
2. To understand basic technique to study ionic conductors.

Schedule) 1. Introduction to solid state ionics 2. Band theory and conduction mechanism 3. Defect in ionic crystal 4. Diffusion in solid 5. Diffusion mechanism in solid 6. Solid electrolyte 7. Mixed conductor 8. Electrical conductivity 9. Application - Ion secondary battery - 10. Application - Fuel cell - 11. Electrical conductivity measurement 12. Nuclear Magnetic Resonance 13. Ultrasonic measurement 14. Recent topics on solid state ionics 15. Future in solid state ionics 16. Test

Evaluation Criteria) 期末試験で評価する.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169373>

Contact)
⇒ Nakamura (A216, +81-88-656-7577, koichi@pm.tokushima-u.ac.jp)

Advanced Materials Design

2 units

Yasuhiko Kawamura · PROFESSOR / SYNTHETIC AND POLYMER CHEMISTRY, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Keiji Minagawa · ASSOCIATE PROFESSOR / SYNTHETIC AND POLYMER CHEMISTRY, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To understand functions and design of various soft materials in relation to the molecular structure and properties.

Outline) This class introduces structures, properties, and functions of various soft materials including functional polymers.

Style) Lecture

Keyword) Soft Matter, Functional Polymer, Properties of Polymers

Goal)

1. To understand properties and functions of soft materials, especially polymers, in relation to the molecular structure.
2. To understand methods of molecular and material design for obtaining desired function.
3. To research and present topics related to functional polymers.

Schedule) 1. Introduction to soft materials 2. Structure of polymers 1 3. Structure of polymers 2 4. Properties of polymers 1 5. Properties of polymers 2 6. Functional polymers 1 7. Functional polymers 2 8. Hydrophilic polymers and hydrogels 9. Colloids 10. Amphiphilic molecules 11. Liquid crystals 12. Topics 1 13. Topics 2 14. Topics 3 15. Topics 4 16. Summary

Evaluation Criteria) Assignments count 100%.

Textbook) 荒木孝二他著, 有機機能材料, 東京化学同人, 2006

Reference) Ian W. Hamley, Introduction to Soft Matter, John Wiley & Sons, New York, 2000

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169383>

Contact)
⇒ Minagawa (G612, +81-88-656-9153, minagawa@chem.tokushima-u.ac.jp)

Advanced Organic Chemistry

2 units

Yasuhiko Kawamura · PROFESSOR / SYNTHETIC AND POLYMER CHEMISTRY, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) This lecture intends to reconstruct knowledge of basic organic chemistry in view of structure and reactivity aspects and thus, aims at grasping essence shown in the real organic chemistry journals.

Outline) We wish to discuss 1) an advanced nomenclature of complicated organic molecules and chemistry informatics, 2) stereochemistry, 3) logical synthesis of organic molecules, and finally, 4) physical influence on organic reactions.

Style) Lecture

Keyword) Nomenclature, Stereochemistry, C-C Bond formation, Multistep synthesis, Physical influence

Fundamental Lecture) "Organic Chemistry"(1.0), "Synthetic Organic Chemistry"(1.0), "Fundamentals of Organic Reaction Mechanisms"(1.0)

Relational Lecture) "Advanced Topics in Synthetic Chemistry"(0.5, ⇒p.35)

Goal)

1. Understanding essence of organic chemistry journals.
2. Ability to suggest or propose the way to solve various organic chemistry subjects.

Schedule) 1. Nomenclature of complicated organic molecules 1: Bridged cyclic and ring-fused hydrocarbons 2. Nomenclature of complicated organic molecules 2: Heterocyclic compounds 3. Chemistry informatics 4. Stereochemistry 1: Terminology and definition 5. Stereochemistry 2: Optical rotation and resolution, asymmetric synthesis 6. Functional group preparation 1: Carboxylic acids and their derivatives 7. Functional group preparation 2: Aldehydes and ketones, alcohols and ethers 8. Functional group preparation 3: Alkyl halides, amines, isocyanates, etc. 9. C-C Bond formation 1: Nucleophilic and electrophilic reactions, carbanions, and enolates 10. C-C Bond formation 2: Cycloaddition reactions 11. C-C Bond formation 3: Recent advances 12. Multistep synthesis 1: Retrosynthetic analysis and application 13. Multistep synthesis 2: Annelation reactions; Report on an example of the recent organic synthesis 14. Reaction mechanism and prediction: Reaction rates, Eyring and Hammett equations 15. Physical influence on organic reactions 16. Final exam.

Evaluation Criteria) Students are credited by the results of evaluation of their reports (50%) and scores of the final exam (50%).

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169523>

Student) Able to be taken by only specified class(es)

Contact)
⇒ Kawamura (410 Chem Bldg, +81-88-656-7401, kawamura@chem.tokushima-u.ac.jp)

Advanced Topics in Polymerization Reactions

2 units

Koichi Ute · PROFESSOR / SYNTHETIC AND POLYMER CHEMISTRY, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Tomohiro Hirano · ASSOCIATE PROFESSOR / SYNTHETIC AND POLYMER CHEMISTRY, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) The purpose of this class is to understand the principles of polymer syntheses and polymer characterizations.

Outline) The mechanisms in ionic, coordination, ring-opening, and metathesis polymerizations will be explained. Further, characterization of polymer properties will be introduced.

Style) Lecture

Keyword) living polymerization, stereospecific polymerization, coordination polymerization, property of polymer solution, solid-state properties of polymers

Fundamental Lecture) "Polymer Chemistry"(1.0), "Functional Polymer Design"(1.0)

Relational Lecture) "Advanced Organic Chemistry"(0.5, ⇒p.32)

Requirement) Requires undergraduate level knowledge of chemistry.

Notice) Bring the textbook in the lectures #8 - #15.

Goal)

1. To understand the principles of polymer syntheses.
2. To understand relationship between monomer structure and reactivity in polymerization reaction.
3. To understand the basic principles of solution properties and molecular weight determination.
4. To understand the basic principles of solid-state properties and the experimental methods for crystal structure determination.

Schedule) 1. classification of polymerization reaction. 2. stereospecific living anionic polymerization of methacrylates 3. characterization of polymers 4. Ziegler-Natta polymerization 5. Single-site catalysts 6. metathesis polymerization 7. polymerization of acetylene 8. outline of macromolecular science, determination of molecular weight 9. properties of polymer solution 1 (membrane osmometry and the 2nd virial coefficient) 10. properties of polymer solution 2 (theory and experimental methods of light scattering) 11. properties of polymer solution 3 (viscometry) 12. properties of polymer solution 4 (chromatography of polymer) 13. solid-state structure of polymer 1 (crystal and non-crystal, experimental methods for solid-state properties of polymers) 14. solid-state structure of polymer 2 (crystal structure) 15. thermal properties of polymers

Evaluation Criteria) Assignment counts 100% mainly based on the report submitted.

Textbook) 佐藤恒之他著「高分子化学」朝倉書店

Reference)

- ◇ 野瀬卓平他編「大学院高分子科学」講談社
- ◇ Silverstein 他著「有機化合物のスペクトルによる同定法」東京化学同人

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169393>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Ute (化学棟 406, +81-88-656-7402, ute@chem.tokushima-u.ac.jp) (Office Hour: Monday 15:00 - 17:00)

⇒ Hirano (G405, +81-88-656-7403, hirano@chem.tokushima-u.ac.jp)

Advanced Physical Chemistry

2 units

Katsuhiro Tamura · PROFESSOR / PHYSICO-CHEMISTRY AND MATERIAL SCIENCE, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Yasuhiro Uosaki · PROFESSOR / SYNTHETIC AND POLYMER CHEMISTRY, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Yoshihisa Suzuki · ASSOCIATE PROFESSOR / PHYSICO-CHEMISTRY AND MATERIAL SCIENCE, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) The main goal of this class is to understand the relationship between the principle of physical chemistry and real phenomena. Solvation, crystal growth, phase transition of lipid bilayer (as the model of biomembrane) and bioassay of pollutant are the main topics of this class.

Outline) (Solvation phenomena) Many chemical reactions are studied in liquids. Although solvation process plays a key role in these reactions, it is hard to understand the solvation quantitatively. In this lecture, "solvation thermodynamics" based on statistical mechanics is introduced and the methods to understand the solvation theoretically are explained. (Crystal Growth) Concepts and technology of crystal growth play an important role in design of materials and structure analysis. The main goal of this class is to provide a solid introduction to the fundamentals of crystal growth that can be used to describe various phenomena involving equilibrium conditions, rate processes, surface or interface properties, etc. (Phase transition and bioassay of pollutant) The physical properties of various micelles (normal and reversed micelles) and liposomal membranes are discussed. The chemical reactions including bioreactions in such molecular assemblies are also mentioned. Calorimetry and high-pressure techniques to study these chemical and physical phenomena are lectured from the viewpoint of basic and applied fields (for instance bioassay of pollutant).

Style) Lecture

Keyword) Solvation, crystal growth, Biomembrane, Bioassay

Fundamental Lecture) "Basic Physical Chemistry"(1.0), "Physico-chemical Exercise 1"(1.0), "Biophysical Chemistry"(1.0), "Physico-chemical Properties of Fluids"(1.0)

Relational Lecture) "Advanced Topics in Materials Science"(0.5, ⇒p.35)

Requirement) Students are required to have a good understanding of undergraduate-level physical chemistry and related subjects.

Goal)

1. To understand the fundamentals of solvation phenomena
2. To understand the fundamentals of crystal growth
3. To understand the outline of molecular assemblies and the fundamentals of thermal analysis
4. To understand bioassay as an analytical method for pollutant

Schedule) 1. Statistical mechanics and thermodynamics 2. Chemical potential 3. Solvation thermodynamics 4. Solvation energy 5. Ion solvation 6. Thermodynamics of phase transition 7. Nucleation 8. Ideal growth rate of crystal 9. Surface structure and roughening transition 10. Surface kinetics 11. Physical properties of associated micelles and chemical reactions in the micelle. 12. Basis of calorimetry and calorimetry in biochemistry 13. Measurement of bioactivities and growth thermograms of microorganisms 14. Application of calorimetry to the measurements of pollutant 15. Bioassay of gas by using a gas pressurizing method

Evaluation Criteria) Assignments count 100%.

Textbook) To be announced in the class

Reference) Yukio Saito, Statistical Physics of Crystal Growth, World Scientific, Singapore, 1996

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169508>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Tamura (G509, +81-88-656-7416, tamura@chem.tokushima-u.ac.jp)

Advanced quantumchemistry

2 units

Eiji Kanezaki · PROFESSOR / PHYSICO-CHEMISTRY AND MATERIAL SCIENCE, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) Molecular science based quantum chemistry minded for current topics will be present both in experimental and theoretical fields with emphasis on molecular spectroscopy in relation to molecular structure and molecular properties

Outline) Basic studies on the electronic states of molecules are presented from aspects of molecular spectroscopy under outer stresses of electric, magnetic and of optical forces to molecules or molecular assemblies. Although discussion will be mainly focused onto some resonance conditions of the forces, their double resonance will be included if time is not pressed

Style) Lecture

Keyword) molecular spectroscopy

Fundamental Lecture) "Graduate Seminar in Chemical Science and Technology"(1.0, ⇒p.35), "Advanced experiments on chemical science and technology"(1.0, ⇒p.36)

Relational Lecture) "Graduate Seminar in Chemical Science and Technology"(0.5, ⇒p.35), "Advanced experiments on chemical science and technology"(0.5, ⇒p.36)

Goal) To understand, at least, one of the current topics in quantum chemistry

Schedule) 1. about this lecture 2. basis of quantum chemistry 3. basis of quantum chemistry 4. basis of quantum chemistry 5. basis of quantum chemistry 6. electronic states of molecules 7. electronic states of molecules 8. electronic states of molecules 9. electronic states of molecules 10. electronic states of molecules 11. interaction of molecules with outer fields 12. interaction of molecules with outer fields 13. interaction of molecules with outer fields 14. interaction of molecules with outer fields 15. interaction of molecules with outer fields 16. examination

Textbook) not specified

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169450>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Kanezaki (G516, +81-88-656-9444, kanezaki@chem.tokushima-u.ac.jp) (Office Hour: refer to the official HP)

Advanced Analytical and Environmental Chemistry

2 units

Junko Motonaka · PROFESSOR / PHYSICOCHEMISTRY AND MATERIAL SCIENCE, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
 Mikito Yasuzawa · ASSOCIATE PROFESSOR / PHYSICOCHEMISTRY AND MATERIAL SCIENCE, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
 Tomoki Yabutani · ASSOCIATE PROFESSOR / PHYSICOCHEMISTRY AND MATERIAL SCIENCE, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) This class introduces current status and topics in the academic field of analytical chemistry and global environmental problems in the world.

Outline) The outline of this class is an introduction of history and advances of analytical chemistry and environmental problems. The contents for analytical chemistry include sample preparation, separation method and principles of some important analytical instruments for characterizing environmental problems.

Style) Lecture

Keyword) Analytical Chemistry, environmental analytical chemistry

Requirement) Students are required to have enough knowledge and training of analytical chemistry and environmental chemistry in undergraduate-level and related subjects.

Goal)

1. To understand the current advance in analytical chemistry.
2. To understand of the earth environmental problems in the viewpoint of analytical chemistry.

Schedule) 1. Introduction 2. Influence of chemical compounds to human health 3. Introduction of analytical methods of chemical compounds in biological samples 4. Current topics of analysis of chemical compounds in biological samples 5. Current status of pollution in global environment by toxic chemical compounds 6. Introduction of urban atmospheric environment 7. Current status and topics in urban atmospheric environment 8. Global climate change by greenhouse gas 9. Introduction of aquatic environment 10. Current status and topics of aquatic environment 11. Introduction of soil and lithospheric environment 12. Current status of soil and lithospheric environment 13. Introduction of analytical method for environmental analysis 14. Current advances of analytical method for environmental analysis 15. Current topics of environmental chemistry

Evaluation Criteria) The final grades will be determined numerically by averaging your scores with the following weights; homework reports 70% and quizzes 30%. The score will be described as 100-points scale. You will be passed for this class if you get over 60 point.

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169517>

Contact)

- ⇒ Motonaka (G611, +81-88-656-7409, motonaka@chem.tokushima-u.ac.jp)
- ⇒ Yasuzawa (G512, +81-88-656-7421, mik@chem.tokushima-u.ac.jp) (Office Hour: 月曜日 16:30~17:30)
- ⇒ Yabutani (G605, +81-88-656-7413, yabutani@chem.tokushima-u.ac.jp)

Advanced Chemical Reaction Engineering

2 units

Katsuhiro Kawashiro · PROFESSOR / CHEMICAL PROCESS ENGINEERING, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
 Ken-Ichiro Sotowa · ASSOCIATE PROFESSOR / CHEMICAL PROCESS ENGINEERING, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) This class introduces chemical reactor design and optimization techniques that can be used for determining the optimal design and operating conditions of chemical processes.

Outline) Basics of chemical reactor and process design and operation will be introduced using a chemical reaction process as an example.

Style) Lecture

Keyword) reactors, process design, optimization, reaction engineering

Fundamental Lecture) “Differential Equations”(0.2, ⇒p.31), “Chemical Reaction Engineering”(0.8), “Quantum mechanics and advanced lecture in quantum physics”(0.4, ⇒p.31)

Relational Lecture) “Advanced Materials Science”(0.2, ⇒p.34), “Advanced Separation Technology”(0.2, ⇒p.34)

Requirement) Students are required to have a good understanding of chemical engineering and related subjects in an undergraduate course.

Goal)

1. To understand the outline of chemical reactor and process design.
2. To understand several basic optimization techniques for chemical processes.

Schedule) 1. Single ideal reactors 2. Design for single reactors 3. Design for single reactors 4. Design for multiple reactions 1 5. Design for multiple reactions 2 6. Nonideal flow reactor 2 7. Nonideal flow reactor 2 8. Introduction to optimization problem 9. Linear programming 10. Nonlinear programming 11. Steepest descent method and line search 12. Integer programming problem 13. pinch technology 14. Process design exercise 15. Recent topics on process optimization

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169326>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Kawashiro (G308, +81-88-656-7431, kawasiro@chem.tokushima-u.ac.jp)
- ⇒ Sotowa (Chemistry and biotechnology building, 307., +81-88-656-4440, sotowa@chem.tokushima-u.ac.jp) (Office Hour: 16:00-17:00, Monday and Tuesday. (can be contacted whenever available))

Advanced Separation Technology

2 units

Masahiro Katoh · ASSOCIATE PROFESSOR / CHEMICAL PROCESS ENGINEERING, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) The purpose of this class is to understand typical separation processes, the concepts and mathematical treatments for mass transfer.

Outline) Separations are prominent in manufacture of chemicals, pharmaceuticals, metals etc. Various separation methods have been developed in chemical industry. Separations are also needed for treatment of hazardous wastes and for pollution control, especially for recycle and recovery of resources. The following types of systems will be discussed: principal of various separation methods, fundamentals of mass transfer, separation with phase change, gas absorption with chemical reactions, extraction, adsorption and ion exchange, membrane separation, methods of continuous separation. Mathematical treatments will include methods of characteristics and moment analysis. To facilitate understanding and practical application, a practice or a report will be also imposed on every item.

Style) Lecture

Keyword) mass transfer, separation processes

Goal)

1. To understand several separation processes
2. To understand mathematical treatments for mass transfer

Schedule) 1. Several separation processes and the concepts 2. Mass transfer 3. Gas absorption, steady analysis 4. Gas absorption, unsteady analysis 5. Gas absorption with chemical reaction 6. Gas absorption apparatuses 7. Adsorption equilibrium 8. Adsorption velocity and diffusion 9. Chromatography 10. Moment analysis 11. The principle of membrane separation 12. Membrane permeability 13. Separation process using hollow fiber 14. Continuous separation process 15. Test

Evaluation Criteria) Evaluate of approach to the lecture(40%) and test(60%).

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169518>

Contact)

- ⇒ Katoh (M304, +81-88-656-7429, katoh@chem.tokushima-u.ac.jp)

Advanced Materials Science

2 units

Shigeru Sugiyama · PROFESSOR / CHEMICAL PROCESS ENGINEERING, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
 Toshihiro Moriga · ASSOCIATE PROFESSOR / CHEMICAL PROCESS ENGINEERING, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
 Kei-ichiro Murai · ASSOCIATE PROFESSOR / CHEMICAL PROCESS ENGINEERING, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) The purpose of this class is to understand the basic concepts of group theory and the most up-to-date analytical procedures, which are necessary in developing new material science.

Outline) The fundamentals of group theory for understanding the physical properties of materials based on the crystal (molecular) symmetry will be introduced. The recent analytical techniques on catalysts such as XAFS and solid state NMR will be explained.

Style) Lecture

Keyword) point group, group theory, catalyst, XAFS, solid state NMR

Fundamental Lecture) “Nuclear magnetic resonance”(1.0, ⇒p.31), “Solid State Ionics”(1.0, ⇒p.32), “Material Science”(1.0)

Relational Lecture) “Advanced Chemical Reaction Engineering”(0.5, ⇒p.34), “Advanced Environmental Technology on Chemistry”(0.5, ⇒p.29)

Requirement) Requires undergraduate level knowledge of chemistry.

Notice) Submission of exercise or report will be requested in the lectures from the 1st to 7th.

Goal)

1. To understand the basis of group theory in the lectures from 1st to 7th.
2. To understand the advanced analytical procedure such as XAFS and NMR in the lectures from 8th to 15th.

Schedule) **1.** Point group, Symmetry operation **2.** Point group, Stereographic projection **3.** How to see the stereographic projection for point groups belonging to some crystal systems **4.** Point groups for simple molecules **5.** For understandings of space group: screw, and glide operations **6.** 2-Dimensional Space group **7.** Exercises **8.** XAFS (1): Introduction **9.** XAFS (2): Transmission mode **10.** XAFS (3): Fluorescence mode **11.** XAFS (4): Case study **12.** Solid state NMR (1): Introduction **13.** Solid state NMR (2): MAS **14.** Solid state NMR (3): CP MAS **15.** Solid state NMR (4): Case study. Submission of the report on the present course will be requested.

Evaluation Criteria) Assignment counts 100% mainly based on the report submitted.

Textbook) To be announced in the class.

Reference) To be announced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169381>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Sugiyama (G309, +81-88-656-7432, sugiyama@chem.tokushima-u.ac.jp)

Advanced Topics in Synthetic Chemistry

1 unit
Part-time Lecturer

Target) To learn recent research topics on organic and synthetic chemistry.

Outline) Recent topics in reaction and syntheses in organic, organometallic, biomimetic, inorganic, and polymer chemistries.

Style) Lecture

Keyword) organic chemistry, synthetic chemistry

Fundamental Lecture) “Organic Chemistry”(1.0), “Molecular Design in Chemistry”(1.0), “Synthetic Organic Chemistry”(1.0)

Relational Lecture) “Advanced Organic Chemistry”(0.5, ⇒p.32), “Advanced Topics in Polymerization Reactions”(0.5, ⇒p.32), “Advanced Materials Design”(0.5, ⇒p.32)

Goal) To be able to explain the importance and breakthrough in the research area.

Evaluation Criteria) To be announced by the lecturer in the class.

Textbook) To be announced in the class.

Reference) To be announced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169501>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Kawamura (410 Chem Bldg, +81-88-656-7401, kawamura@chem.tokushima-u.ac.jp)

Advanced Topics in Materials Science

1 unit
Part-time Lecturer

Target) To learn recent research topics on materials science

Outline) Basic theories of physical and chemical properties, and structure of materials will be lectured by an lecturer from other research institutions.

Style) Lecture

Keyword) material, properties, chemical structure

Fundamental Lecture) “Physical Chemistry”(1.0), “Inorganic Chemistry”(1.0)

Relational Lecture) “Advanced Physical Chemistry”(0.5, ⇒p.33), “Advanced Analytical and Environmental Chemistry”(0.5, ⇒p.34), “Advanced quantumchemistry”(0.5, ⇒p.33)

Goal) To be able to explain the importance and breakthrough in the research area

Schedule) To be announced by the lecturer

Evaluation Criteria) To be announced by the lecturer in the class.

Textbook) To be announced by the lecturer

Reference) To be announced by the lecturer

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169500>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Kanezaki (G516, +81-88-656-9444, kanezaki@chem.tokushima-u.ac.jp)

Advanced Topics in Chemical Process Engineering

1 unit
Part-time Lecturer

Target) To learn recent topics on chemical process engineering.

Outline) Recent trends in chemical engineering, process design and development will be explained by a lecturer from other research institutions.

Style) Lecture

Keyword) chemical engineering, process engineering

Fundamental Lecture) “Chemical Engineering Principles”(1.0), “Chemical Reaction Engineering”(1.0), “Separation Science and Technology”(1.0), “Material Science”(1.0)

Relational Lecture) “Advanced Chemical Reaction Engineering”(0.5, ⇒p.34), “Advanced Materials Science”(0.5, ⇒p.34), “Advanced Separation Technology”(0.5, ⇒p.34)

Goal) To be able to explain the importance and breakthrough in the research area.

Schedule) To be announced by the lecturer in the class

Evaluation Criteria) To be announced by the lecturer

Textbook) To be announced by the lecturer

Reference) To be announced by the lecturer

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169327>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Sugiyama (G309, +81-88-656-7432, sugiyama@chem.tokushima-u.ac.jp)

Graduate Seminar in Chemical Science and Technology

4 units
Teacher of course

Target) To improve the skills in reading academic papers and in making presentation.

Outline) The students will read some academic papers and make presentation on the context. Through the presentation and discussion, the students will improve the skill in making presentations and learn how the research results can be applied to the industry.

Style) Lecture in combination with Portfolio

Keyword) discussion, literature, presentation

Fundamental Lecture) “Undergraduate Work”(1.0), “Seminar on Chemical Science and Technology”(1.0)

Relational Lecture) “Advanced experiments on chemical science and technology”(0.5, ⇒p.36)

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169325>

Advanced experiments on chemical science and technology

8 units

Teacher of course

Target) To learn how to conduct a research as an independent researcher

Outline) Students will conduct a research work related to the master's thesis, and acquire a broader knowledge of engineering.

Keyword) research, thesis

Fundamental Lecture) “Undergraduate Work”(1.0), “Seminar on Chemical Science and Technology”(1.0)

Relational Lecture) “Graduate Seminar in Chemical Science and Technology”(0.5, =>p.35)

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169324>

Earth and Life Environmental Engineering — Biological Science and Technology

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Introduction to Intellectual Property

2 units

Tohru Sakai · PART-TIME LECTURER / (助)工業所有権協カセンター, Juichiroh Osame · PART-TIME LECTURER

Akio Fujii · PART-TIME LECTURER / INTELLECTUAL PROPERTY OFFICE, Yasushi Toyosu · PART-TIME LECTURER, Kuniaki Kubota · PART-TIME LECTURER

Target) Understanding the basic systems and importance of protection and practical use of intellectual property based on some examples.

Outline) It is necessary for a working staff in a company, a university, etc., in a future. It is introduced the importance to protect and practical use of intellectual property at governments, industrial circles, universities and institutes in Japan using potential on scientific techniques. This lecture is treated the basic systems of protection and practical use of intellectual property particularly based on strategy and invasion of patent in an organization such as company, university, etc.

Style) Lecture

Keyword) Intellectual property, Patent Law, Protect and Use of Intellectual Property

Relational Lecture) “Introduction to Intellectual Property”(0.5)

Requirement) No requirement

Notice) It is necessary to be present at two concentrated lecture.

Goal)

1. Understanding concept of intellectual property right.
2. Understand the Patent Act, the Trademark Act, the Design Act and the Copyright Act.
3. Understanding on basical practical use of intellectual property.

Schedule) 1. Concept of intellectual property(Sakai) 2. Outline of intellectual property(Patent and Trademark)(Sakai) 3. Outline of intellectual property(Design and Copyright)(Sakai) 4. Patent, invention and invasion of patent (Sakai) 5. Management of intellectual property and use (Sakai) 6. A way of research and development and intellectual property in a future(Sakai) 7. The midterm examination and its comment for Target and 8. History of system of intellectual property (Osame) 9. International trend of system of intellectual property (Osame) 10. Acquisition method of intellectual property right(Fujii) 11. Use of intellectual property(Watanabe) 12. Strategy of intellectual property on development of techniques(Y.Higuchi) 13. Effective intellectual property in development of techniques (Kubota) 14. Special lecture on a use of intellectual property by a chief executive officer(1) 15. Special lecture on a use of intellectual property by a chief executive officer(2)

Evaluation Criteria) Passing mark is over 60% on the examinations and the reports for each reaching level, respectively.

Textbook) To be used textbooks made by lecturers.

Reference) Nobuhiro Nakayama: Titeki Shoyuken, Nikkan Kohgyo Shinbunsha

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169432>

Student) For the course students and other graduate school students.

Contact)

⇒ Sakai (+81-3-5600-2631,)

⇒ Mizuguchi (A501, +81-88-656-7349, mizuguch@ce.tokushima-u.ac.jp) (Office Hour: Monday, 11:00-12:30, 17:00-18:00)

Management Theory of New Business

2 units

Vice chairperson of School Affairs Committee , Faculty of Engineering
First-line men with experience of practical business ·PART-TIME LECTURER

Target) New business is the word which means the business to make the most of technical knowledge, technology, the new idea and which is developed creatively, and that main bearer is the enterprise called a venture. There is a purpose of this class in providing the knowledge which is necessary, and know-how and a spirit so that a taking lecture student may establish a venture business.

Outline) The regeneration of the Japanese society with the vitality is being asked. Government enforced "a university venture 3 years 1000 companies plan" over Heisei 14-the 16th year. Though that goal was almost attained, it is very important to promote entrepreneur education continuously from now on. Tokushima Prefecture supports this class based on the recognition done like this, and it is established.

Requirement) The person whom the one with the classroom is constructed by the class start time in the person who doesn't learn the unit of "Introduction to new business" in the college, and a group are organized, and it is limited to the person with the intention to make a business plan, and taking lecture is recognized.

Notice) Being late and a whisper in class should be prohibited strictly. Be careful over and again because it should dispose of exit and future taking lecture may not be recognized when it is wicked.

Goal) Learning of the necessary knowledge to establish venture business, and the ability which can make a business plan.

Schedule) 1. Guidance 2. What is the new business? 3. Keynote lecture 4. Theory of a stand-alone version venture success 5. The law knowledge which is necessary for entrepreneur 6. Fund-raising and capital policy 7. Indirect finance 8. Direct finance 9. The basis of the company management 10. The elementary knowledge of the business accounting 11. The point of the business plan preparation 12. Management strategy and marketing 13. Product development and intellectual property 14. Business plan preparation practice 15. Examination 16. Business plan announcement meeting

Evaluation Criteria) It is evaluated by the presentation (40%) of the written examination (60%) and the business plan. And, the presentation of the written examination and the business plan is decided to be recognized only for the taking lecture student who attended it for 2/3 and more of the classes that it is opened.

Textbook) The summary is distributed every time.

Reference) Several are introduced in the school hours.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169469>

Student) he person who hasn't learned the unit of the new business outline that it is opened with this learning in all the students enrolled in the graduate school yet is made the target. The number of completion people may be restricted in the method such as a lottery in case of a taking lecture applicant many. As for the details, an applicant for taking lecture is to follow those directions because the notice which showed attention in taking lecture is done.

Contact)

⇒ Vice chairperson of School Affairs Committee , Faculty of Engineering

Note) The man of business that it is active in the forefront every time, and an adviser are invited as an instructor, and working knowledge is provided for theory plus practice in this class from the specialist's position. This class is the thing which is useful enough even if it is taken to the person who aims at a general enterprise and a laboratory, the employment to the self-governing body and so on.

Management of Technology

2 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) About the production management of the automobile industry, it is understood variously from the point of view such as "research and development", "production management", "purchasing" and "quality control" "marketing" and "cross-cultural management".

Outline) It learns about the production management. This time, "the automobile industry" specially takes up the production management of "Honda Motor Co.,Ltd. (following Honda)" even of that in the case, and the class to appreciate that importance with ranking of technology in management is taken.

Requirement) Finish " Introduction to new business " or " Advanced Lecture in management Theory of new business " .

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of management is learned.
2. Ranking of the technology in management and that importance are appreciated.
3. It learns how to solve the various problems which always occur in the spot of the management through the case study and the business game.

Schedule) 1. Guidance 2. Lecture "What in Management of Technology?" 3. Case report "Research and development of Honda" 4. Case study "Plan an overseas factory." "A new car development order" 5. Lecture " Production management and purchasing" 6. Lecture "Quality control" 7. Case report "The production management of Honda"; "The supply chain management of Honda" 8. Case study "Plan an overseas factory." 9. Case report "The quality control of Honda" 10. Case study "Don't make material defects flare up again." 11. Lecture "Marketing strategy" 12. Lecture "Cross-cultural management" 13. Case report "Around the products project of Honda - the two-wheeled vehicle " 14. Case report "The path of internationalization of Honda" 15. Case report "The personnel management of Honda" 16. Summary and questions and answers

Evaluation Criteria) It is evaluated in the remark (20%) in class and the middle, end of a term report (80% in total).

Textbook) It doesn't specially use. The summary and so on is distributed every time.

Reference) Several are introduced in class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169348>

Student) The person who finished "Introduction to new business" or " Advanced Lecture in management Theory of new business " in all the students enrolled in the doctor former term course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Note) This class invites seven Honda alumnuni who did work in "research and development", "production management", "purchasing", "quality control", "marketing" , "cross-cultural management", and so on as an instructor, and it is the class to do case report. Even if it is seen nationwide, the trial done like this is very rare, and it is a precious class. And, an applicant for taking lecture is to attend it in the guidance to hold it in advance. A schedule is indicated separately.

Presentation Method (M)

2 units

Target) Poster and oral presentations, and journal publications are common means of appealing the research work in various scientific and technological disciplines. It's undoubtedly important for activating the research work. The lecture is intending for students to learn most efficient way to appeal their findings and discussions in scientific community.

Outline) Credits are acknowledged to the students who are supervised to give conference speech by themselves and do actually the lectures.

Goal) The lecture is aiming at having knowledge and experience of the presentaion in international conferences.

Evaluation Criteria) Students' achievement is evaluated by portfolios submitted showing the progress in preparation of international conferences as well as by presentation records.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169510>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Internship (M)

2 units

Target) This program is provided to increase knowledge and experience in the actual industrial technology in various fields. Through the practical experience, the program will allow students to become discerning and well-balanced researchers or engineers with deeper understanding of technological societies.

Outline) Credits are acknowledged to students who experienced the internship in companies and/or government offices. Their fulfillment is evaluated by activity reports during internship.

Goal)

1. Grasping internal systems of a company, management, action and strategy to achieve the company's goal. (2)
2. Understanding human relationship and communicative manner in a working society and a company.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by supervisors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169345>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Venture Business (M)

2 units

Target) Aims of the lecture are doing collaborative works with private enterprises and establishing venture businesses through such works.

Outline) The lecture is aiming at founding a venture business company as well as establishing collaborative research works with private enterprises. It's worth to apply their accomplishment to an actual society beyond the range of a laboratory work.

Goal) Objective of the lecture is to have experience and knowledge of collaborative works with private enterprises and to mature the works to venture businesses.

Evaluation Criteria) Credits are acknowledged in case of doing collaborative works with enterprises and/or maturing them to venture businesses. Handouts, reports, and presentation materials, etc. are evaluated to approve credits.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169332>

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Long-term Internship (M)

6 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This program is provided long-term internship in the actual industrial companies and so on, doing a joint study between companies and university on practical problems proposed by the company and practical experience of management of technologies. Through the long-term internship, the program will allow students to become a engineer with a core role in researches and companies

Outline) Credits are acknowledged to students who experienced the internship in companies or government offices of 270 hours during three months or more and presentation to executive officer of the company. Their fulfillment is evaluated by activity reports during internship and appraisal and interviewed report from a mentor.

Goal) Grasping abilities for practical engineers by studying activities in company and so on.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by mentors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169440>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Nishida (K409, +81-88-656-7630, nishida@kg.tokushima-u.ac.jp)
- ⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)
- ⇒ Morimoto (A407, +81-88-656-7619, emi.morimoto@kg.tokushima-u.ac.jp) (Office Hour: 月～木(10時～15時))

Note) Students who resister the coop-education program for "Pai-shape" engineers with sense for management of technology, are able to have a grant-in-aid for travel and so on. Ask committee members of long-term internship in your course or coordinators of this program.

Advanced Lecture in Theory of Business Models

2 units

Tatsuya Deguchi · PART-TIME LECTURER, Kenichi Yasumuro · PART-TIME LECTURER, Katsuo Touma · PART-TIME LECTURER
Takahide Yamaguchi · PART-TIME LECTURER, Shingou Nishii · PART-TIME LECTURER

Target) There is a purpose of this class in providing the knowledge which is necessary, and know-how so that students may achieve a business model in establishing enterprises based on the lecture of "Management Theory of New Business", and in making students understood the profit generating stream by studying on the frame work of companies in several business fields.

Outline) Business Model is a remarkable term in modern economic and organizational theories in these days but describes a broad range of definitions. In this lecture, Business Model is defined as "System which converts technology and know how into profit for the purpose of customers' satisfaction" and aims at providing the ability for the design of profitable system, by learning cost issues in establishing business strategies of companies.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business"

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of business model design is learned.
2. Understanding of the concept of business model by case study analysis are appreciated.
3. It learns forming ability of business plan through the case study on business models.

Schedule) 1. Guidance 2. Keynote lecture "Business Model Thinking" 3. Questions and answers, Discussions 4. Lecture "Theory of Business Models" 5. Lecture "Design principles of Business Models" 6. Lecture "Evaluation of Business Models" 7. Case Study "Business Model in a R&D company" 8. Case Study "Business Model in a manufacturing industrial company" 9. Case Study "Business Model in a company of service industry" 10. Case Study "Business Model in a company of information industry" 11. Business plan practice, Present situation analysis and alternatives. 12. Business plan practice, Concept ad design of business. 13. Business plan practice, Financial analysis . 14. Business plan practice, Concluding and submitting 15. Presentation(1) of Business plan practice. 16. Presentation(2) of Business plan practice, Comments and summary.

Evaluation Criteria) Participation in class(20%) Group work and its report(80%)

Textbook) Ken-ichi Amuro and Study Group of Business model "Case Book: Business Model Thinking" Bunshindo

Reference) Several are introduced in class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169656>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Contact)

- ⇒ Tatsuya Deguchi (Wakayama University)
- ⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

Note) This class is supported by Tokushima Prefecture Government

Advanced Environmental Technology on Chemistry

2 units

Junko Motonaka · PROFESSOR / PHYSICO-CHEMISTRY AND MATERIAL SCIENCE, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Katsuhiko Tamura · PROFESSOR / PHYSICO-CHEMISTRY AND MATERIAL SCIENCE, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Shigeru Sugiyama · PROFESSOR / CHEMICAL PROCESS ENGINEERING, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Masahiro Katoh · ASSOCIATE PROFESSOR / CHEMICAL PROCESS ENGINEERING, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) The present situation and subjects on chemistry in view of environmental pollution will be introduced. Recent development in chemistry to attempt to solve those subjects will be explained.

Outline) Based on the historical background on environmental pollution, the recent progress on analytical chemistry, biochemistry, catalysis and chemical process engineering for environmental protection will be explained.

Style) Lecture and exercise

Keyword) environment, analytical chemistry, biochemistry, catalyst, chemical process

Fundamental Lecture) "Advanced Analytical and Environmental Chemistry"(1.0, ⇒p.34), "Advanced Physical Chemistry"(1.0, ⇒p.33), "Advanced Materials Science"(1.0, ⇒p.34)

Relational Lecture) "Engineering of Biological Environment"(0.5, ⇒p.40), "Advanced Environmental Systems Engineering"(0.5, ⇒p.40)

Requirement) Requires undergraduate level knowledge of chemistry and chemical engineering.

Goal)

1. To understand the present situation for environmental subjects on engineering (lectures from 1st to 5th, 14th and 15th)..
2. To develop ability for solving the environmental subjects (lectures from 6th to 15th).

Schedule) 1. Endocrine disrupters 2. Contribution of certified reference materials to securing safe foods and industrial products 3. Environmental problem and crystal growth 4. Polymer materials and environment 5. Biodegradable polymer 6. The mystery of natural rubber 7. Present situation of phosphors for white LEDs 8. Recent advances in organic chemistry: Synthesis and Function 9. Optimization of chemical processes 10. High pressure bioscience and biotechnology 11. Properties of supercritical fluids and their utilization 12. Possible utilization of carbon dioxide for chemistry 13. Utilization of adsorption phenomena 14. Approach using apatite to studies on energy and environment 15. Introduction to engineering utilization of space environment

Evaluation Criteria) Assignments count 100% mainly based on the presentation and report submitted.

Textbook) To be announced in the class.

Reference) To be announced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169322>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Motonaka (G611, +81-88-656-7409, motonaka@chem.tokushima-u.ac.jp)
- ⇒ Tamura (G509, +81-88-656-7416, tamura@chem.tokushima-u.ac.jp)
- ⇒ Sugiyama (G309, +81-88-656-7432, sugiyama@chem.tokushima-u.ac.jp)
- ⇒ Katoh (M304, +81-88-656-7429, katoh@chem.tokushima-u.ac.jp)

Engineering of Biological Environment

2 units

Yoshitoshi Nakamura · PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To understand recent studies on engineering of biological environment.

Outline) Advanced lectures for recent studies on engineering of biological environment

Style) Lecture

Keyword) Environment, Biology, Engineering

Requirement) N/A

Notice) N/A

Goal)

1. To understand general concepts of biomass
2. To understand biomass conversion engineering
3. To understand general concepts of bioremediation

Schedule) 1. General concepts of biological environment 2. Characteristics of biomass and its effective utilization 3. Pretreatment of biomass by physical method 4. Pretreatment of biomass by chemical method 5. Pretreatment of biomass by biological method 6. Conversion of biomass into useful materials 7. Conversion of biomass into useful materials 8. Process system engineering for effective conversion of biomass 9. Reports 10. Classification, role, and application method of environmental organism 11. Bioremediation in water environment 12. Bioremediation in air environment 13. Bioremediation in soil environment 14. Environmental hormones, chemical pollutions and ethics 15. Recent topics and trend of industry for engineering of biological environment 16. Final Reports

Evaluation Criteria) Evaluation of Reports

Textbook) Prints

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169418>

Contact)

⇒ Nakamura (720, +81-88-656-7518, ynakamu@bio.tokushima-u.ac.jp) (Office Hour: 水曜日 17:00-18:00)

Advanced Environmental Systems Engineering

2 units

Shuichi Hashimoto · PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Yasunori Kozuki · PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Shoichiro Fujisawa · ASSOCIATE PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Akio Kondo · PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Yoshiyuki Kidoguchi · PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Shigeki Matsuo · ASSOCIATE PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Yoshinobu Hirose · ASSOCIATE PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Tomoaki Yatsufusa · ASSOCIATE PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Yyoichi Yamataka · ASSOCIATE PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Takuro Tomita · ASSISTANT PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To understand the present environmental problems and to acquire the advanced of the technique and the approach to solve problems on the point of the ecosystem engineering.

Outline) To explain the structure and function of environmental systems, the relationship between civil life and disaster prevention systems, and the changes of social system due to the technological revolution and the policy.

Style) Lecture

Keyword) environmental policy, natural disaster, energy saving technology, welfare technology, miromechanical engineering

Goal)

1. To understand the factor of environmental systems
2. To understand the structure of environmental systems
3. To understand the civil life and natural disaster prevention systems

Schedule) 1. The policy and natural disaster prevention measures (1) 2. The policy and natural disaster prevention measures (2) 3. The factor of environmental systems 4. Example of environmental systems 5. The structure of environmental systems 6. Example of structure of environmental systems 7. Civil life and nano-technology 1 8. Civil life and nano-technology 2 9. Midterm presentation 10. Well being technology 1 11. Well being technology 2 12. Ecosystem engineering 1 13. Ecosystem engineering 2 14. Hydrogen engine technology 15. Diesel engine engineering

Evaluation Criteria) Assignments count 100%

Textbook) To be introduced in th class

Reference) To be introduced in th class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169333>

Contact)

- ⇒ Matsuo (Eco404, +81-88-656-7538, matsuos@eco.tokushima-u.ac.jp)

Advanced Lecture on Semiconductor Nanotechnology

2 units

Toshiro Isu · PROFESSOR / INSTITUTE OF TECHNOLOGY AND SCIENCE, Takahiro Kitada · ASSOCIATE PROFESSOR / INSTITUTE OF TECHNOLOGY AND SCIENCE

Target) This class introduces basic principles of the semiconductor nanotechnology and their application to the quantum devices.

Outline) Basics of semiconductor physics and quantum mechanics are introduced to understand material properties of quantum confined nanostructures. Recent progress in fabrication techniques and device applications of semiconductor nanostructures (quantum wells, wires and dots) will be reviewed.

Style) Lecture

Keyword) Quantum confined nanostructures, Semiconductor nanoscience, Electron devices, Photonic devices

Requirement) None.

Notice) None.

Goal) To understand basic properties of semiconductor nanostructures and quantum devices.

Schedule) 1. Introduction to semiconductor nanostructures 2. Electronic states in quantum confined structures 3. Electrical properties of superlattices 4. Fabrication technique of quantum wires and wells

5. Characterization of heterointerfaces 6. Characterization of nanostructures 7. High-speed electron devices 8. Optical properties of quantum wells 9. Semiconductor laser diodes 10. Quantum effect devices 11. Fabrication technique of quantum dots 12. Quantum dot devices 13. Device application of quantum nano structures 14. Recent topics of semiconductor nanotechnology (1) 15. Recent topics of semiconductor nanotechnology (2)

Evaluation Criteria) Assignments count 100%

Textbook) None.

Reference) Will be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169477>

Student) Any students can attend the class.

Contact)

⇒ Isu (A224, +81-88-656-7670, t.isu@frc.tokushima-u.ac.jp) (Office Hour: Tue -Thu 10:00-14:00)

⇒ Kitada (A224, +81-88-656-7671, kitada@frc.tokushima-u.ac.jp) (Office Hour: Mon. 10:00-14:00)

Quantum mechanics and advanced lecture in quantum physics 2 units

Yoshitaka Michihiro · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces the quantum mechanics.

Outline) Basics of quantum mechanics are introduced.

Style) Lecture

Keyword) Quantum Mechanics

Goal) To understand the outline of quantum mechanics.

Schedule) 1. Introduction 2. Variational method 3. Lagrangian 4. Hamiltonian 5. Poisson's bracket expression 6. Quantization 7. Operator 8. Wavefunction 9. Expectation value 10. Schrödinger equation 11. Example (1) the square well potential 12. Example (2) the linear harmonic oscillator 13. Angular momentum 14. Example (3) hydrogen atom 15. Heisenberg equation 16. Field quantization

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169506>

Contact)

⇒ Yoshitaka Michihiro (A203)

Superconductivity and superconducting materials 2 units

Yutaka Kishimoto · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) To understand basics and recent developments in superconductivity.

Outline) This class reviews quantum mechanics and introduces superconductivity and recent superconducting materials.

Style) Lecture

Keyword) superconductivity, Cooper pair, superconducting energy gap, density of states, anisotropic superconductivity

Goal) To understand the outline of superconductivity.

Schedule) 1. Introduction to superconductivity 2. Review of quantum mechanics (1), Schrödinger equation and wave function 3. Review of quantum mechanics (2), operators and expected values 4. Review of quantum mechanics (3), perturbation theory 5. Free electron model of metals 6. Phenomenological theory of superconductivity 7. To understand Meissner effect on the basis of quantum mechanics 8. Formation of Cooper pair 9. Formation of superconducting energy gap 10. Density of states, and energy gap at finite temperatures 11. Introduction to Nuclear Magnetic Resonance method 12. Frontier of superconductivity (1), strong coupling superconductor 13. Frontier of superconductivity (2), heavy Fermion superconductor 14. Frontier of superconductivity (3), copper oxide high Tc superconductor 15. Summary

Evaluation Criteria) Reports on several subjects in the class.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169442>

Contact)

⇒ Yutaka Kishimoto (A202)

Advanced Computational Science 2 units

Toshiki Takeuchi · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class provides the basic technology for numerical calculation for the differential equation.

Outline) The numerical calculation methods for the differential equation are introduced.

Style) Lecture

Keyword) Numerical analysis, Numerical computation, Differential equation

Fundamental Lecture) "Numerical Analysis"(1.0), "Basic Mathematics/微分積分学 I"(1.0), "Basic Mathematics/微分積分学 II"(1.0)

Relational Lecture) "Methods for analysis of mathematical phenomena"(1.0), "Numerical Analysis"(1.0)

Requirement) Students have to understand basic mathematics of undergraduate-level.

Goal) To understand principle of numerical calculation methods.

Schedule) 1. Introduction to numerical simulation 2. Mathematical model 3. Lagrange interpolation 4. Spline interpolation 5. Least squares method 6. Finite difference method 7. Arbitrary precision formula 8. Application to ordinary differential equation 9. Application to partial differential equation 10. Gauss-Seidel method 11. Successive Over-Relaxation method 12. Explicit method 13. Implicit method 14. Crank-Nicolson method 15. Numerical instabilities

Evaluation Criteria) Assignments count 100%

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169357>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Takeuchi (A206, +81-88-656-7544, takeuchi@pm.tokushima-u.ac.jp) (Office Hour: 木曜日 14:00-15:00)

Methods for analysis of mathematical phenomena 2 units

Hitoshi Imai · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Cheng-Hai Jin · PROFESSOR / INTERNATIONAL STUDENT CENTER

Target) To learn the to analyze the mathematical phenomena.

Outline) Methods used in analysis of mathematical phenomena are introduced. Especially, those in numerical analysis are focused on.

Style) Lecture

Keyword) Mathematics, Numerical, Analysis

Relational Lecture) "Advanced Computational Science"(0.5, ⇒p.52)

Requirement) Only the premise that have studied basic mathematics.

Goal) The adequacy of the two-dimensional boundary value problem governed by the Poisson equation can be understood by the finite difference method, etc.

Schedule) 1. Introduction to computer 2. Common sense in numerical computation 3. High-speed computation (Parallel computing) 4. Finite difference method I 5. Finite difference method II 6. Finite difference method III 7. Finite difference method IV 8. Finite element method I 9. Finite element method II 10. Finite element method III 11. Finite element method IV 12. Boundary element method I 13. Boundary element method II 14. Boundary element method III 15. Iterative method

Evaluation Criteria) Evaluation by the report.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169406>

Contact)

⇒ Imai(A220, +81-88-656-7541, The inquiry by means of the cellular phone or E-mail is not acceptable) (Office Hour: Office hours: Thursday 14:00-15:00)

Biochemical Thermodynamics

2 units

Hitoshi Matsuki · PROFESSOR / BIOLOGICAL FUNCTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) Thermodynamic treatments for molecular aggregates constructed by self-association of bio-related substances and effects of environmental variables such as temperature, pressure and additives on the aggregates are described.

Outline) The former part of this lecture reviews treatments for molecular aggregates such as monolayers, micelles and vesicles constructed by self-association of bio-related substances like surfactants, lipids and amphiphilic drugs from a thermodynamic viewpoint. The latter part describes various nature of these aggregates and structure changes of the aggregates by environmental variables such as temperature, pressure and additives. Further industrial application and utilization of molecular aggregates are also explained. This lecture deals with industrial subjects.

Style) Lecture

Keyword) Bio-related substance, Molecular aggregate, Thermodynamics, Phase behavior, Pressure

Fundamental Lecture) “Physical Chemistry 2”(1.0), “Biophysical Chemistry 2”(1.0)

Relational Lecture) “Advanced Biophysical Chemistry”(0.5, ⇒p.43)

Requirement) Students are required to have a good understanding of undergraduate-level physical chemistry and biophysical chemistry and related subjects.

Goal)

1. To understand the thermodynamic treatments of molecular aggregates formed by bio-related substances.
2. To understand the nature for aggregates of bio-related substances and effects of environmental variables on the aggregates.

Schedule) 1. Thermodynamics of molecular aggregates (1) thermodynamics of adsorption at interfaces 1 2. Thermodynamics of molecular aggregates (2) thermodynamics of adsorption at interfaces 2 3. Thermodynamics of molecular aggregates (3) phase transitions of monolayers 1 4. Thermodynamics of molecular aggregates (4) phase transitions of monolayers 2 5. Thermodynamics of molecular aggregates (5) thermodynamics of self-association 1: phase separation model 6. Thermodynamics of molecular aggregates (6) thermodynamics of self-association 2: mass action model 7. Thermodynamics of molecular aggregates (7) micelle formation in dilute solutions 1 8. Thermodynamics of molecular aggregates (8) micelle formation in dilute solutions 2 9. Structures and functions of molecular aggregates (1) solution behavior 1: Krafft point 10. Structures and functions of molecular aggregates (2) solution behavior 2: cloud point 11. Structures and functions of molecular aggregates (3) phase behavior of bilayers 1 12. Structures and functions of molecular aggregates (4) phase behavior of bilayers 2 13. Structures and functions of molecular aggregates (5) pressure effect on bilayers 1 14. Structures and functions of molecular aggregates (6) pressure effect on bilayers 2 15. Structures and functions of molecular aggregates (7) phase behavior of bilayer mixtures: domain formation 16. Summary, inquiry and report preparations

Evaluation Criteria) More than 80% percentage of attendance and reports (100%).

Textbook) To be distributed materials adequately in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169417>

Student) Able to be taken by student of other department

Contact)

⇒ Matsuki (G609, +81-88-656-7513, matsuki@bio.tokushima-u.ac.jp) (Office Hour: Friday 16:20-17:50)

Advanced Biochemistry

2 units

Masami Nagahama · ASSOCIATE PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Akihiko Tsuji · PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) This class introduces biological regulations by signal transduction in multicellular organisms.

Outline) Biological regulations involving enzymes, substrates, and other macromolecules are introduced. Molecular mechanisms of expression of biological activities are especially focused.

Style) Lecture

Keyword) signal transduction, signaling molecule, organelle

Fundamental Lecture) “Biochemistry 1”(1.0), “Cell Biology”(1.0)

Relational Lecture) “Advanced enzyme engineering”(0.5, ⇒p.45), “Biological macromolecular chemistry”(0.5, ⇒p.45)

Requirement) Students are required to have a good understanding of undergraduate-level biochemistry.

Goal)

1. Understanding of regulatory mechanism of synthesis and secretion of signaling molecules.
2. Understanding of signal transduction and its regulatory factors in cells.

Schedule) 1. Cell structure and role of organelles 2. Experimental techniques for studies of regulation of signal transduction(1) 3. Experimental techniques for studies of regulation of signal transduction(2) 4. Synthesis of peptide signaling molecules 5. Post-translational modifications of signaling molecules(1) Addition and processing of carbohydrate chains 6. Post-translational modifications of signaling molecules(2) Processing of polypeptides 7. Post-translational modifications of signaling molecules(3) Processing proteases(1) 8. Post-translational modifications of signaling molecules(3) Processing proteases(2) 9. Regulation of secretion of signaling molecules 10. Quality control of signaling molecules(1) 11. Quality control of signaling molecules(2) 12. ER stress proteins and chaperones(1) 13. ER stress proteins and chaperones(2) 14. Development of new drugs targeting regulatory factors for signal transduction 15. Transcriptional regulation by ER stress proteins 16. Report preparation

Evaluation Criteria) Evaluation by report

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169412>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Nagahama (G712, +81-88-656-7523, nagahama@bio.tokushima-u.ac.jp) (Office Hour: Monday 16:20-17:50)

Advanced Molecular Biology

2 units

Sumihare Noji · PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Hideyo Ohuchi · ASSOCIATE PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To understand advanced technology for molecular biology

Outline) We will present recent topics on molecular biology and its applications for genetic engineering. 1) Molecular biology on insects and its applications (3), 2) Molecular biology on brain and neural systems (3), 3) Molecular biology on vertebrate development and its applications (4). 4) Molecular biology on human diseases (4).

Style) Lecture

Keyword) Signaling pathways, Transcription factors, Genes and diseases

Relational Lecture) “Technology for Bioreaction”(0.5, ⇒p.45), “Advanced Cell Physiology”(0.5, ⇒p.43), “Advanced Biotechnology”(0.5, ⇒p.44)

Requirement) N/A

Notice) N/A

Goal) To understand molecular mechanisms of development and diseases

Schedule) 1. Molecular biology of insects, early development 2. Molecular biology of insects, late development 3. Molecular biology of insects, regeneration 4. Molecular biology of insects, brain development 5. Molecular biology of insects, neural development 6. Molecular biology of insects, mutations 7. Molecular biology of vertebrates, early development 8. Molecular biology of vertebrates, late development 9. report for evaluation 10. Molecular biology of vertebrates, brain and neural development 11. Molecular biology of vertebrates, regeneration 12. Molecular biology of human diseases, limbs 13. Molecular biology of human diseases, eyes 14. Molecular biology of human diseases, muscles 15. Molecular biology of human diseases, general 16. Final report for evaluation

Evaluation Criteria) Evaluate two reports (50% each)

Textbook) N/A

Reference) Handouts

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169515>

Student) all

Contact)

⇒ Noji (G803, +81-88-656-7528, noji@bio.tokushima-u.ac.jp) (Office Hour: Monday 15:30-17:00)

Cell Biotechnology

2 units

Hideaki Nagamune · PROFESSOR / BIOLOGICAL FUNCTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Toshifumi Tomoyasu · ASSOCIATE PROFESSOR / BIOLOGICAL FUNCTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) This class aims to expand the knowledge on cell biotechnology and improve the skill of debate through the debate dealing with cell biotechnology and its applications.

Outline) Debates among students dealing with the latest reports on technology and application concerned with production of useful materials, medical assay, and medical treatment using various cells are held in order to deepen the knowledge on cell biotechnology and its peripheral field. Training on skills of debate and communication is simultaneously carried out.

Style) Lecture

Keyword) Cell, Biotechnology, debate

Relational Lecture) “Advanced Biochemistry”(0.8, ⇒p.42), “Advanced Molecular Biology”(0.8, ⇒p.42), “Technology for Bioreaction”(0.8, ⇒p.45), “Biological macromolecular chemistry”(0.5, ⇒p.45), “Advanced enzyme engineering”(0.5, ⇒p.45)

Requirement) Students are required to have a good understanding of undergraduate-level of cell technology and related subjects

Goal)

1. To understand the latest cell biotechnology and its application examples
2. To gain the ability of debate on technologies concerned in cell biotechnology

Schedule) 1. Cell biotechnology on production of useful materials 1 2. Cell biotechnology on production of useful materials 2 3. Cell biotechnology on production of useful materials 3 4. Cell biotechnology on production of useful materials 4 5. Cell biotechnology on production of useful materials 5 6. Cell biotechnology on medical or industrial assay 1 7. Cell biotechnology on medical or industrial assay 2 8. Cell biotechnology on medical or industrial assay 3 9. Cell biotechnology on medical or industrial assay 4 10. Cell biotechnology on medical or industrial assay 5 11. Cell biotechnology on medical treatment 1 12. Cell biotechnology on medical treatment 2 13. Cell biotechnology on medical treatment 3 14. Cell biotechnology on medical treatment 4 15. Cell biotechnology on medical treatment 5

Evaluation Criteria) Assignments count 50%, Presentation count 50%

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169379>

Student) Able to be taken by student of other department

Contact)

⇒ Nagamune (G707, +81-88-656-7525, nagamune@bio.tokushima-u.ac.jp) (Office Hour: Monday 16:20-17:50)

Advanced Biophysical Chemistry

2 units

Hitoshi Matsuki · PROFESSOR / BIOLOGICAL FUNCTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) Treatments of solutions containing biomolecules and analytical methods for interactions between biomolecular aggregates and physiologically active substances by means of the treatments are described.

Outline) The former part of this lecture describes solutions in which biomolecules reveal their actions from the macroscopic, microscopic and electrochemical viewpoints. The latter part deals with ligand partitioning into lipid bilayer membranes as examples of interactions between molecular aggregates formed by biomolecules and physiologically active substances. The molecular mechanisms of anesthesia until now are reviewed on the basis of the above subjects. Further industrial application of the interactions such as drug delivery systems is also explained. This lecture deals with industrial subjects.

Style) Lecture

Keyword) Solution, Molecular aggregate, Ligand, Interaction, Mechanism of anesthesia

Fundamental Lecture) “Physical Chemistry 2”(1.0), “Biophysical Chemistry 2”(1.0)

Relational Lecture) “Biochemical Thermodynamics”(0.5, ⇒p.42)

Requirement) Students are required to have a good understanding of undergraduate-level physical chemistry and biophysical chemistry and related subjects.

Goal)

1. To understand the macroscopic, microscopic and electrochemical treatments of solutions.
2. To understand the partitioning modes of ligands into biomacromolecules and molecular mechanisms of anesthesia.

Schedule) 1. Solution chemistry of bio-related substances (1) thermodynamics of solutions 1 2. Solution chemistry of bio-related substances (2) thermodynamics of solutions 2 3. Solution chemistry of bio-related substances (3) thermodynamics of solutions 3 4. Solution chemistry of bio-related substances (4) statistical thermodynamics of solutions 1 5. Solution chemistry of bio-related substances (5) statistical thermodynamics of solutions 2 6. Solution chemistry of bio-related substances (6) statistical thermodynamics of solutions 3 7. Solution chemistry of bio-related substances (7) electrochemistry of solutions 1 8. Solution chemistry of bio-related substances (8) electrochemistry of solutions 2 9. Interactions between biomacromolecules and physiologically active substances (1) ligand partitioning into lipid membranes 1 10. Interactions between biomacromolecules and physiologically active substances (2) ligand partitioning into lipid membranes 2 11. Interactions between biomacromolecules and physiologically active substances (3) effect of dissociation equilibrium of ligand 12. Interactions between biomacromolecules and physiologically active substances (4) mechanisms of anesthesia 1: introduction 13. Interactions between biomacromolecules and physiologically active substances (5) mechanisms of anesthesia 2: lipid membrane theories 14. Interactions between biomacromolecules and physiologically active substances (6) mechanisms of anesthesia 3: protein receptor theories 15. Interactions between biomacromolecules and physiologically active substances (7) action mechanisms of local anesthetics 16. Summary, inquiry and report preparations

Evaluation Criteria) More than 80% percentage of attendance and reports (100%).

Textbook) To be distributed materials adequately in the class.

Reference)

◇ 本村欣士著「溶液化学」朝倉書店

◇ J. S. Rawlinson and F. L. Swinton “Liquids and Liquid Mixtures” Butterworths Scientific

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169421>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Matsuki (G609, +81-88-656-7513, matsuki@bio.tokushima-u.ac.jp) (Office Hour: Friday 16:20-17:50)

Advanced Cell Physiology

2 units

Yoshitoshi Nakamura · PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) This class is intended to demonstrate how to use capable molecular viewers (PyMol & Coot) for protein structure, which can be used for detailed analyses of protein 3D-structure.

Outline) This class (portfolio) introduces how the programs (PyMol & Coot) can be used, and what their capabilities are.

Style) Portfolio

Keyword) Protein 3D-structure, Protein Data Bank, PyMol, Coot

Relational Lecture) “Biological macromolecular chemistry”(0.5, ⇒p.45)

Requirement) Students are required to bring note-type PC, if necessary (Windows is better).

Goal)

1. To understand protein coordinate file.
2. To understand operation of molecular viewers.

Schedule) 1. Protein Data Bank and coordinate file 2. Installation of the programs 3. Getting started with mouse controls 4. Getting started with commands 5. Command syntax 6. Atom selection 7. Ray-tracing and stereo 8. Animation 9. Tutorial 1: basics 10. Tutorial 2: advanced techniques 11. Tutorial 3: example scripts 12. Exercise 1: editing of PDB file 13. Exercise 2: structural comparison 14. Exercise 3: DALI web server 15. Exercise 4: WHAT IF web server

Evaluation Criteria) Drawing products with brief explanation (assignments count 100%)

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169380>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Administration Office(M703)

Advanced Microbiological Engineering

2 units

Hiroki Kourai · PROFESSOR / BIOLOGICAL FUNCTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Hideaki Maseda · ASSOCIATE PROFESSOR / BIOLOGICAL FUNCTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) Acquire the fundamental and advanced microbiological engineering and fermentation technology

Outline) Target and summary of this class is to understand fermentation process of alcohol, lactic acid, amino acid, vitamin, nucleic acids, antibiotics and organic acids.

Style) Lecture

Keyword) fermentation, alcohol, amino acids

Fundamental Lecture) “Biomolecular Design”(0.4, ⇒p.44)

Relational Lecture) “Advanced enzyme engineering”(0.4, ⇒p.45)

Requirement) Students are required to have a good understanding of under graduate-level microbiology and related subjects.

Goal)

1. To understand the outline of microbial engineering
2. To understand the outline of fermentation

Schedule) 1. Outline of microbial engineering 2. Outline of fermentation engineering 3. Outline of fermentation process of food 4. Fermentation process of Japanese sake 5. Fermentation process of beer 6. Fermentation process of whiskey 7. Fermentation process of lactic acid 8. Fermentation process of acetic acid 9. Subject report-1 10. Fermentation process of amino acid 11. Fermentation process of antibiotics 12. Fermentation process of vitamin 13. Fermentation process of nucleic acid 14. Subject report-2 15. Recent topics on fermentation process 16. Final Examination

Evaluation Criteria) Grading with two reports (50%) and final examination (50%)

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169495>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Kourai (M813, +81-88-656-7408, kourai@bio.tokushima-u.ac.jp) (Office Hour: Friday 16:20-17:20)

Biomolecular Design

2 units

Hiroki Kourai · PROFESSOR / BIOLOGICAL FUNCTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Yoshihiro Uto · ASSOCIATE PROFESSOR / BIOLOGICAL FUNCTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) Conceptual and engineering-based strategic skills in molecular (functional) design, synthesis, and biological activities of biofunctional modifiers including physiologically active compounds and drugs.

Outline) Basics of biomolecular (functional) design of biofunctional modifiers including physiologically active compounds and drugs are introduced using the concept of molecular orbital.

Style) Lecture

Keyword) biomolecular functional design, molecular orbital theory

Relational Lecture) “Biological macromolecular chemistry”(0.5, ⇒p.45)

Goal)

1. To understand the molecular orbital theory as a tool of an biomolecular design
2. To calculate the molecular orbitals of simple biofunctional modifiers to discuss their physical and biological properties quantitatively

Schedule) 1.) Biomolecular (functional) design and the concept of molecular orbital 2. Enzymatic reaction and molecular orbital 3. Quantum theory-based atomic structure and molecular bonds 4. Molecular structures and the concept of hybridized orbitals. Subject review report-1 5. Heteroatom containing structures. Discussion on subject review report-1 6. Structures of intermediates. Subject review report-2 7. Molecular orbital calculation-1: localized π -bond. Discussion on subject review report-2 8. Molecular orbital calculation-2: localized π -bond. Subject review report-3 9.) Molecular orbital calculation-3: localized π -bond. Discussion on subject review report-3 10. Molecular orbital calculation-4:

delocalized π -bond (butadiene) 11. Round-table discussion on subject review report-4 12. Molecular orbital calculation-5: delocalized π -bond (cyclobutadiene). Subject review report-5 13. Round table discussion on subject review report-5 14. Another biomolecular design concepts: scaffold or “Ken-zan”, pharmacophores, isosteres 15. Round table discussion on subject review report-6 16. Round-table discussion on this class “biomolecular design”

Evaluation Criteria) Subject review reports (1-5) counts 100%.

Textbook) Katsuhiro Saito “KozoYukikagaku(in Japanese)(Structural Organic Chemistry)”(Sankyo-Syuppan) and CD-ROM “ WinMopac Version 3.0.3 (Trial) In Noriaki Hirayama, “Jissen Ryoshi-Kagaku (in Japanese: Practical Quantum Chemistry)”

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169514>

Student) Able to be taken by student of other department

Contact)

⇒ Hori (M821, +81-88-656-7514, hori@bio.tokushima-u.ac.jp) (Office Hour: Monday 11:55-12:50)

Advanced Biotechnology

2 units

Hideaki Maseda · ASSOCIATE PROFESSOR / BIOLOGICAL FUNCTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Hiroki Kourai · PROFESSOR / BIOLOGICAL FUNCTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) Acquire the fundamental, advanced and applied biotechnology

Outline) Target and summary of this class is to understand applied microbiology, ecology, bioinstrumentation, food biotechnology, waste management and environmental biotechnology.

Style) Lecture

Keyword) Applied microbiology, Food biotechnology, Environmental biotechnology

Fundamental Lecture) “Biomolecular Design”(0.4, ⇒p.44)

Relational Lecture) “Advanced enzyme engineering”(0.4, ⇒p.45)

Requirement) Students are required to have a good understanding of under graduate-level biotechnology and related subjects.

Goal)

1. To understand the outline of biotechnology
2. To understand the outline of advanced biotechnology

Schedule) 1. 1. Outline of microbial bioengineering 2. 2. Outline of microbial bioengineering 3. 1. Outline of biotechnology 4. 2. Outline of biotechnology 5. 1. Ecology 6. 2. Ecology 7. 1. Bioinstrumentation 8. 2. Bioinstrumentation 9. 1. Food biotechnology 10. 2. Food biotechnology 11. 3. Food biotechnology 12. 1. Waste management 13. 2. Waste management 14. 1. Environmental biotechnology 15. 2. Environmental biotechnology 16. Final Examination

Evaluation Criteria) Grading with final examination

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169318>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Maseda (生物棟 814, +81-88-656-7524, maseda@bio.tokushima-u.ac.jp) (Office Hour: Friday 16:20-17:50)

Advanced Biomaterials

2 units

Toshifumi Tomoyasu · ASSOCIATE PROFESSOR / BIOLOGICAL FUNCTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Hideaki Nagamune · PROFESSOR / BIOLOGICAL FUNCTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) Study and investigate about the scientific background which produced the new technology.

Outline) Students are required to investigate how the important discovery (which acquired the Nobel Prize as an example) were established and how improved our life and research activities by these accomplishments.

Style) Lecture

Keyword) Technology, Biomaterial, Research, Application

Requirement) Required to have a good understanding of undergraduate-level biochemistry and molecularbiology.

Goal)

1. Understand how the important discoveries in the scientific field were performed.
2. Investigate how the important discoveries are applied to our life and research.

Schedule) 1. Orientation 2. Discoveries concerning the role played by the chromosome in heredity. T. Morgan. 3. The production of mutations by means of X-ray irradiation. H. Muller 4. Discovery of mobile genetic elements. B. McClintock. 5. The discovery of penicillin and its curative effect in various infectious diseases. A. Fleming, E. Chain, H. Florey. 6. Discovery of tumour-inducing viruses. P. Rous. 7. Interpretation of the genetic code and its function in protein synthesis. R. Holley, H. Khorana, M. Nirenberg. 8. The discovery of restriction enzymes and their application to problems of molecular genetics. H. Smith, W. Arber. 9. Contributions concerning the determination of base sequences in nucleic acids. W. Gilbert, F. Sanger. 10. The genetic principle for generation of antibody diversity. S. Tonegawa. 11. Contributions to the developments of methods within DNA-based chemistry. K. Mullis, M. Smith. 12. Discovery concerning the genetic control of early embryonic development. L. Lewis, C. Nüsslein-Volhard, E. Wieschaus. 13. Discovery of Prions - a new biological principle of infection. S. Prusiner. 14. The development of methods for identification and structure analyses of biological macromolecules. J. Fenn, K. Tanaka, K. Wüthrich. 15. Generalization of lectures

Evaluation Criteria) Grades are judged about two attainment targets described above (100 points) by the reports. The student requires more than 60 points to a pass.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169419>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Tomoyasu (G701, +81-88-656-9213, tomoyasu@bio.tokushima-u.ac.jp) (Office Hour: Monday 16:20-17:50)

Advanced enzyme engineering

2 units

Akihiko Tsuji · PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Masami Nagahama · ASSOCIATE PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) This class introduces engineering of enzyme molecule for the medical application.

Outline) Basics of design of enzyme and their inhibitor by chemical and gene technologies for medical application are introduced.

Style) Lecture

Keyword) Enzyme, Medical application, Protein engineering

Fundamental Lecture) “Biochemistry 1”(1.0), “Protein Engineering”(1.0)

Relational Lecture) “Advanced Biochemistry”(0.5, ⇒p.42), “Biomolecular Design”(0.5, ⇒p.44), “Advanced Cell Physiology”(0.3, ⇒p.43)

Requirement) Students are required to have a good understanding of undergraduate-level biochemistry.

Goal)

1. Understanding of enzyme character required for therapeutic use.
2. Understanding of design of enzyme molecule for therapeutic use.

Schedule) 1. Introduction of medical application of enzyme 2. Basic of enzymology (1) 3. Basic of enzymology (2) 4. Therapeutic use of enzyme 5. Problem in therapeutic use of enzyme(1) Immunological problem 6. Problem in therapeutic use of enzyme(2) Drug delivery system. 7. Problem in therapeutic use of enzyme(3) Preparation of large quantity of enzyme 8. Example of design of enzyme for medical use (1) 9. Example of design of enzyme for medical use (2) 10. Example of engineered enzyme used for therapy of lysosome disease(1) 11. Example of engineered enzyme used for therapy of lysosome disease(2) 12. Application of PEG-modified enzyme (1) 13. Application of PEG-modified enzyme (2) 14. Target enzyme for development of new drug 15. Engineering of enzyme inhibitor 16. Report preparation

Evaluation Criteria) Evaluation by report

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169370>

Student) Able to be taken by student of other department

Contact)

⇒ Tsuji (G710, +81-88-656-7526, tsuji@bio.tokushima-u.ac.jp) (Office Hour: Monday 16:20-17:50)

Technology for Bioreaction

2 units

Sumihare Noji · PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Hideyo Ohuchi · ASSOCIATE PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) Lectures for science and technology to use biological reactions. Especially, focusing on morphological formation of organisms, we will talk about how genomic information is decoded to build up body by bottom-up strategies.

Outline) We present lectures about technology for application of biological reactions, especially medical and engineering applications. We will focus on 1) genome projects, 2) application of genome information, 3) application of PCR to genetic analyses, 4) in situ hybridization for analysis of gene expression pattern, 5) application of in situ hybridization, 6) transgenic animals, 7) applications of transgenic animals, 8) knock-out animals, 9) applications of knock-out animals, 10) medical applications of knock-out animals

Style) Lecture

Keyword) genomics, RNA engineering, Technology for Developmental biology

Relational Lecture) “Advanced Molecular Biology”(0.5, ⇒p.42), “Advanced Molecular Biology”(0.5, ⇒p.42), “Advanced Biochemistry”(0.5, ⇒p.42)

Requirement) N/A

Notice) N/A

Goal)

1. To understand structures of genomes and its analytical methods
2. To understand analytical methods for gene expression
3. To understand morphological genes and its structures
4. To understand mechanisms of developmental process

Schedule) 1. Evolution 2. Genomic structures and evolution 3. Transcription factors and gene expression 4. Cis-regulatory elements and regulation of gene expression 5. Gene expression patterns 6. Functions of RNAs 7. RNA interference 8. reports for evaluation 9. Homeobox genes 10. Genes for signalling pathways 11. Genes for cell-cell adhesion factors 12. Developmental mechanisms of C. elegans 13. Developmental mechanisms of insects 14. Developmental mechanisms of invertebrate 15. Developmental mechanisms of vertebrate 16. report for evaluation

Evaluation Criteria) Evaluate two reports (50% each).

Textbook) N/A

Reference) From DNA to Diversity

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169420>

Student) all students

Contact)

⇒ Noji (G803, +81-88-656-7528, noji@bio.tokushima-u.ac.jp) (Office Hour: Monday 15:30-17:00)

Biological macromolecular chemistry

2 units

Yoshihiro Uto · ASSOCIATE PROFESSOR / BIOLOGICAL FUNCTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Hitoshi Hori · PROFESSOR / BIOLOGICAL FUNCTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) The goal is to understand the structure and function of biological macromolecules from the perspective of molecular recognition and interaction.

Outline) How do biological macromolecules recognize the target molecule and function? An introduction to the basic structural biology and stereochemistry of biological macromolecules. Topics include protein and nucleic acid structure. Students should make presentations focusing on the molecular recognition and interaction of biological macromolecules based on the PDB data and their recent scientific papers with molecular modeling software “MacroModel”.

Style) Lecture

Keyword) molecular interaction, molecular recognition, protein data bank, molecular modeling

Fundamental Lecture) “Biomolecular Design”(0.5, ⇒p.44)

Relational Lecture) “Advanced Cell Physiology”(0.5, ⇒p.43)

Requirement) To understand the organic chemistry, medicinal chemistry, and the enzyme engineering

Notice) None

Goal)

1. To understand the principle of structure and function of biological macromolecule.
2. To understand the mechanisms of molecular recognition of biological macromolecule through PDB database search and molecular modeling software.

Schedule) **1.** Interactions involved in the drug-receptor complex **1:** forces **2.** Interactions involved in the drug-receptor complex **2:** topology and stereochemistry **3.** Mechanisms of enzyme catalysis **1:** specificity **4.** Mechanisms of enzyme catalysis **2:** reaction mechanisms **5.** Interactions involved in the DNA-drug complex **1:** DNA structure and properties **6.** Interactions involved in the DNA-drug complex **2:** DNA interactive Agents **7.** Molecular modeling and drug design **1:** computational chemistry **8.** Molecular modeling and drug design **2:** drug screening techniques **9.** Molecular modeling and drug design **3:** Introduction to MacroModel **10.** Exercise 1: search for protein 3D structures from the PDB **11.** Exercise 2: representation of protein 3D structures **12.** Exercise 3: structural change of small molecules **13.** Exercise 4: molecular modeling for small molecules **14.** Exercise 5: molecular modeling for proteins **1** **15.** Exercise 6: molecular modeling for proteins **2** **16.** Report

Evaluation Criteria) Report 100%

Textbook) none

Reference)

- ◇ R. B. Silverman; The ORGANIC CHEMISTRY of DRUG DESIGN and DRUG ACTION, ELSEVIER
- ◇ T. L. Lemke, D. A. Williams, V. F. Roche, S. W. Zito; FOYE'S PRINCIPLES OF MEDICINAL CHEMISTRY, Lippincott Williams & Wilkins

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169416>

Student) Able to be taken by student of other department

Contact)

⇒ Uto (M820, +81-88-656-7522, uto@bio.tokushima-u.ac.jp) (Office Hour: 木曜日 16:20-17:50)

Practice for understanding scientific papers in biological technology

2 units

Teacher of course

Target) To learn how to read scientific papers for research

Outline) In order to obtain information on research and to learn how to present research results, students read papers related to their subjects of master thesis, present its contents, and discuss about contents of the paper.

Style) Lecture and exercise

Keyword) Reading of paper, Oral presentation

Relational Lecture) “Seminar in Biological Technology”(0.5, ⇒p.46), “Biological science and technology laboratory”(0.5, ⇒p.46)

Requirement) N/A

Notice) N/A

Goal) To learn how to read papers

Schedule) **1.** presentation and discussion **1** **2.** presentation and discussion **2** **3.** presentation and discussion **3** **4.** presentation and discussion **4** **5.** presentation and discussion **5** **6.** presentation and discussion **6** **7.** presentation and discussion **7** **8.** presentation and discussion **8** **9.** presentation and discussion **9** **10.** presentation and discussion **10** **11.** presentation and discussion **11** **12.** presentation and discussion **12** **13.** presentation and discussion **13** **14.** presentation and discussion **14** **15.** presentation and discussion **15** **16.** presentation and discussion **16**

Evaluation Criteria) Mutual evaluation of presentation

Textbook) N/A

Reference) Related papers

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169427>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Administration Office(M703)

Seminar in Biological Technology

2 units

Teacher of course

Target) The goal of this lecture is to acquire the knowledge necessary for research related to the Master's thesis.

Outline) Student elevates the research ability and skill in the individual laboratory through presentation and active discussion as to the subject of study. In addition, industrial and medical applications of research results should be required.

Style) Exercise

Keyword) Discussion for research work, Oral presentation

Relational Lecture) “生命テクノサイエンス研究論文”(0.5), “Biological science and technology laboratory”(0.5, ⇒p.46), “Practice for understanding scientific papers in biological technology”(0.5, ⇒p.46)

Requirement) N/A

Notice) N/A

Goal) To learn how to perform research

Schedule) **1.** Research presentation 1 and discussion **2.** Research presentation 2 and discussion **3.** Research presentation 3 and discussion **4.** Research presentation 4 and discussion **5.** Research presentation 5 and discussion **6.** Research presentation 6 and discussion **7.** Research presentation 7 and discussion **8.** Research presentation 8 and discussion **9.** Research presentation 9 and discussion **10.** Research presentation 10 and discussion **11.** Research presentation 11 and discussion **12.** Research presentation 12 and discussion **13.** Research presentation 13 and discussion **14.** Research presentation 14 and discussion **15.** Research presentation 15 and discussion **16.** Research presentation 16 and discussion

Evaluation Criteria) Evaluate master thesis

Textbook) N/A

Reference) Research papers

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169423>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Administration Office(M703)

Biological science and technology laboratory

10 units

Teacher of course

Target) According to the subject of study, student carry out the research to obtain good ability and skill for research and for presentation.

Outline) Students carry out each research according to the subject of study to elevate their research ability and skill in the individual laboratory. In addition, they have to present their research results for evaluation.

Style) Experiment

Keyword) research work, Presentation

Relational Lecture) “Practice for understanding scientific papers in biological technology”(0.5, ⇒p.46), “Internship in Biological science and technology”(0.5, ⇒p.47)

Requirement) N/A

Notice) N/A

Goal) to learn how to perform experiments

Schedule) **1.** Experiments **1** **2.** Experiments **2** **3.** Experiments **3** **4.** Experiments **4** **5.** Experiments **5** **6.** Experiments **6** **7.** Experiments **7** **8.** Experiments **8** **9.** Experiments **9** **10.** Experiments **10** **11.** Experiments **11** **12.** Experiments **12** **13.** Experiments **13** **14.** Experiments **14** **15.** Experiments **15** **16.** Experiments **16**

Evaluation Criteria) Evaluate research papers for the master degree

Textbook) N/A

Reference) Research papers

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169426>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Administration Office(M703)

Internship in Biological science and technology

2 units
Teacher of course

Target› To obtain knowledges and skills for practiceal works

Outline› To work in institutes, industries, and companies, students can learn practical skills, knowledges, researches, etc., by internship.

Style› Internship

Keyword› Internship

Relational Lecture› “Practice for undrstanding scientific papers in bioogical technology”(0.5, ⇒p.46), “Biological science and technology laboratory”(0.5, ⇒p.46), “生命テクノサイエンス研究論文”(0.5)

Requirement› N/A

Notice› N/A

Goal› To learn what are practical knowledges, skills, and mind.

Schedule› **1.** Choose where to go **2.** Schedules depend on where to go. **3.** Provide Reports

Evaluation Criteria› Evaluate Reports

Textbook› N/A

Contents› <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169425>

Student› Able to be taken by only specified class(es)

Earth and Life Environmental Engineering — Ecosystem Engineering

SYLLABUS OF SUBJECTS

● Integrated Subjects

Introduction to Intellectual Property ... Sakai · Osame · Fujii · Toyosu · Kubota 48

Management Theory of New Business ... Vice chairperson of School Affairs Committee , Faculty of Engineering ·
First-line men with experience of practical business 49

Management of Technology ... Yamanaka 49

Presentation Method (M) 49

Internship (M) 50

Venture Business (M) 50

Long-term Internship (M) ... Yamanaka 50

Advanced Lecture in Theory of Business Models ... Deguchi · Yasumuro · Touma · Yamaguchi · Nishii 50

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Hirose · Yatsufusa · Yamanaka · Tomita 51

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● Basic Departmental Subjects

Advanced Computational Science ... Takeuchi 52

Topics of Analysis for Mathematical Science ... Kohda 52

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Energy and Environmental Engineering ... Kidoguchi 53

Energy conversion systems ... Yatsufusa 53

Urban and Regional Planning ... Kondo 54

Information Engineering of Regional Environment ... Hirose 54

Principles of Disaster Risk ... Kozuki · Yamanaka 54

Principle of Environmental Risk ... Yamanaka · Kozuki 54

Well-being Technology for All ... Fujisawa 55

Design of Assistive Products ... Fujisawa 55

Chemistry and Technology for Recovery of Marine Resources ... Hirotsu 55

mitigation engineering ... Ueshima 55

Advanced Environmental Ecology ... Kamada 56

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Optical properties of materials ... Fukui · Haraguchi 57

● Specialized Exercise and Experiments

Advanced Ecosystem Engineering Seminar ... Teacher of course 57

Advanced Ecosystem Engineering Exercise ... Teacher of course · Hosoi · Abe · 下津 · 奥野 · Sueda 58

Ecosystem Engineering Laboratory ... Teacher of course 58

Introduction to Intellectual Property

2 units

Tohru Sakai · PART-TIME LECTURER / (助) 工業所有権部センター, Juichiroh Osame · PART-TIME LECTURER
Akio Fujii · PART-TIME LECTURER / INTELLECTUAL PROPERTY OFFICE, Yasushi Toyosu · PART-TIME LECTURER, Kuniaki Kubota · PART-TIME LECTURER

Target) Understanding the basic systems and importance of protection and practical use of intellectual property based on some examples.

Outline) It is necessary for a working staff in a company, a university, etc., in a future. It is introduced the importance to protect and practical use of intellectual property at governments, industrial circles, universities and institutes in Japan using potential on scientific techniques. This lecture is treated the basic systems of protection and practical use of intellectual property particularly based on strategy and invasion of patent in an organization such as company, university, etc.

Style) Lecture

Keyword) Intellectual property, Patent Law, Protect and Use of Intellectual Property

Relational Lecture) “Introduction to Intellectual Property”(0.5)

Requirement) No requirement

Notice) It is necessary to be present at two concentrated lecture.

Goal)

1. Understanding concept of intellectual property right.
2. Understand the Patent Act, the Trademark Act, the Design Act and the Copyright Act.
3. Understanding on basical practical use of intellectual property.

Schedule) **1.** Concept of intellectual property(Sakai) **2.** Outline of intellectual property(Patent and Trademark)(Sakai) **3.** Outline of intellectual property(Design and Copyright)(Sakai) **4.** Patent, invention and invasion of patent (Sakai) **5.** Management of intellectual property and use (Sakai) **6.** A way of research and development and intellectual property in a future(Sakai) **7.** The midterm examination and its comment for Target and **8.** History of system of intellectual property (Osame) **9.** International trend of system of intellectual property (Osame) **10.** Acquisition method of intellectual property right(Fujii) **11.** Use of intellectual property(Watanabe) **12.** Strategy of intellectual property on development of techniques(Y.Higuchi) **13.** Effective intellectual property in development of techniques (Kubota) **14.** Special lecture on a use of intellectual property by a chief executive officer(1) **15.** Special lecture on a use of intellectual property by a chief executive officer(2)

Evaluation Criteria) Passing mark is over 60% on the examinations and the reports for each reaching level, respectively.

Textbook) To be used textbooks made by lecturers.

Reference) Nobuhiro Nakayama:Titeki Shoyuken, Nikkan Kohgyo Shinbunsha

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169432>

Student) For the course students and other graduate school students.

Contact)

⇒ Sakai (+81-3-5600-2631,)

⇒ Mizuguchi (A501, +81-88-656-7349, mizuguch@ce.tokushima-u.ac.jp) (Office Hour: Monday,11:00-12:30, 17:00-18:00)

Management Theory of New Business

2 units

Vice chairperson of School Affairs Committee , Faculty of Engineering

First-line men with experience of practical business -PART-TIME LECTURER

Target) New business is the word which means the business to make the most of technical knowledge, technology, the new idea and which is developed creatively, and that main bearer is the enterprise called a venture. There is a purpose of this class in providing the knowledge which is necessary, and know-how and a spirit so that a taking lecture student may establish a venture business.

Outline) The regeneration of the Japanese society with the vitality is being asked. Government enforced "a university venture 3 years 1000 companies plan" over Heisei 14-the 16th year. Though that goal was almost attained, it is very important to promote entrepreneur education continuously from now on. Tokushima Prefecture supports this class based on the recognition done like this, and it is established.

Requirement) The person whom the one with the classroom is constructed by the class start time in the person who doesn't learn the unit of "Introduction to new business" in the college, and a group are organized, and it is limited to the person with the intention to make a business plan, and taking lecture is recognized.

Notice) Being late and a whisper in class should be prohibited strictly. Be careful over and again because it should dispose of exit and future taking lecture may not be recognized when it is wicked.

Goal) Learning of the necessary knowledge to establish venture business, and the ability which can make a business plan.

Schedule) 1. Guidance 2. What is the new business? 3. Keynote lecture 4. Theory of a stand-alone version venture success 5. The law knowledge which is necessary for entrepreneur 6. Fund-raising and capital policy 7. Indirect finance 8. Direct finance 9. The basis of the company management 10. The elementary knowledge of the business accounting 11. The point of the business plan preparation 12. Management strategy and marketing 13. Product development and intellectual property 14. Business plan preparation practice 15. Examination 16. Business plan announcement meeting

Evaluation Criteria) It is evaluated by the presentation (40%) of the written examination (60%) and the business plan. And, the presentation of the written examination and the business plan is decided to be recognized only for the taking lecture student who attended it for 2/3 and more of the classes that it is opened.

Textbook) The summary is distributed every time.

Reference) Several are introduced in the school hours.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169469>

Student) he person who hasn't learned the unit of the new business outline that it is opened with this learning in all the students enrolled in the graduate school yet is made the target. The number of completion people may be restricted in the method such as a lottery in case of a taking lecture applicant many. As for the details, an applicant for taking lecture is to follow those directions because the notice which showed attention in taking lecture is done.

Contact)

⇒ Vice chairperson of School Affairs Committee , Faculty of Engineering

Note) The man of business that it is active in the forefront every time, and an adviser are invited as an instructor, and working knowledge is provided for theory plus practice in this class from the specialist's position. This class is the thing which is useful enough even if it is taken to the person who aims at a general enterprise and a laboratory, the employment to the self-governing body and so on.

Management of Technology

2 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) About the production management of the automobile industry, it is understood variously from the point of view such as "research and development", "production management", "purchasing" and "quality control" "marketing" and "cross-cultural management".

Outline) It learns about the production management. This time, "the automobile industry" specially takes up the production management of "Honda Motor Co.,Ltd. (following Honda)" even of that in the case, and the class to appreciate that importance with ranking of technology in management is taken.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business" .

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of management is learned.
2. Ranking of the technology in management and that importance are appreciated.
3. It learns how to solve the various problems which always occur in the spot of the management through the case study and the business game.

Schedule) 1. Guidance 2. Lecture "What in Management of Technology?" 3. Case report "Research and development of Honda" 4. Case study "Plan an overseas factory." "A new car development order" 5. Lecture "Production management and purchasing" 6. Lecture "Quality control" 7. Case report "The production management of Honda"; "The supply chain management of Honda" 8. Case study "Plan an overseas factory;" 9. Case report "The quality control of Honda" 10. Case study "Don't make material defects flare up again." 11. Lecture "Marketing strategy" 12. Lecture "Cross-cultural management" 13. Case report "Around the products project of Honda - the two-wheeled vehicle" 14. Case report "The path of internationalization of Honda" 15. Case report "The personnel management of Honda" 16. Summary and questions and answers

Evaluation Criteria) It is evaluated in the remark (20%) in class and the middle, end of a term report (80% in total).

Textbook) It doesn't specially use. The summary and so on is distributed every time.

Reference) Several are introduced in class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169348>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the doctor former term course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Note) This class invites seven Honda alumnuni who did work in "research and development", "production management", "purchasing", "quality control", "marketing", "cross-cultural management", and so on as an instructor, and it is the class to do case report. Even if it is seen nationwide, the trial done like this is very rare, and it is a precious class. And, an applicant for taking lecture is to attend it in the guidance to hold it in advance. A schedule is indicated separately.

Presentation Method (M)

2 units

Target) Poster and oral presentations, and journal publications are common means of appealing the research work in various scientific and technological disciplines. It's undoubtedly important for activating the research work. The lecture is intending for students to learn most efficient way to appeal their findings and discussions in scientific community.

Outline) Credits are acknowledged to the students who are supervised to give conference speech by themselves and do actually the lectures.

Goal) The lecture is aiming at having knowledge and experience of the presentation in international conferences.

Evaluation Criteria) Students' achievement is evaluated by portfolios submitted showing the progress in preparation of international conferences as well as by presentation records.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169510>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Internship (M)

2 units

Target) This program is provided to increase knowledge and experience in the actual industrial technology in various fields. Through the practical experience, the program will allow students to become discerning and well-balanced researchers or engineers with deeper understanding of technological societies.

Outline) Credits are acknowledged to students who experienced the internship in companies and/or government offices. Their fulfillment is evaluated by activity reports during internship.

Goal)

1. Grasping internal systems of a company, management, action and strategy to achieve the company's goal. (2)
2. Understanding human relationship and communicative manner in a working society and a company.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by supervisors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169345>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Venture Business (M)

2 units

Target) Aims of the lecture are doing collaborative works with private enterprises and establishing venture businesses through such works.

Outline) The lecture is aiming at founding a venture business company as well as establishing collaborative research works with private enterprises. It's worth to apply their accomplishment to an actual society beyond the range of a laboratory work.

Goal) Objective of the lecture is to have experience and knowledge of collaborative works with private enterprises and to mature the works to venture businesses.

Evaluation Criteria) Credits are acknowledged in case of doing collaborative works with enterprises and/or maturing them to venture businesses. Handouts, reports, and presentation materials, etc. are evaluated to approve credits.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169332>

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Long-term Internship (M)

6 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This program is provided long-term internship in the actual industrial companies and so on, doing a joint study between companies and university on practical problems proposed by the company and practical experience of management of technologies. Through the long-term internship, the program will allow students to become an engineer with a core role in researches and companies

Outline) Credits are acknowledged to students who experienced the internship in companies or government offices of 270 hours during three months or more and presentation to executive officer of the company. Their fulfillment is evaluated by activity reports during internship and appraisal and interviewed report from a mentor.

Goal) Grasping abilities for practical engineers by studying activities in company and so on.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by mentors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169440>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Nishida (K409, +81-88-656-7630, nishida@kg.tokushima-u.ac.jp)

⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

⇒ Morimoto (A407, +81-88-656-7619, emi.morimoto@kg.tokushima-u.ac.jp) (Office Hour: 月～木(10時～15時))

Note) Students who resister the coop-education program for "Pai-shape" engineers with sense for management of technology, are able to have a grant-in-aid for travel and so on. Ask committee members of long-term internship in your course or coordinators of this program.

Advanced Lecture in Theory of Business Models

2 units

Tatsuya Deguchi · PART-TIME LECTURER, Kenichi Yasumuro · PART-TIME LECTURER, KATSUO TOUMA · PART-TIME LECTURER

Takahide Yamaguchi · PART-TIME LECTURER, Shingou Nishii · PART-TIME LECTURER

Target) There is a purpose of this class in providing the knowledge which is necessary, and know-how so that students may achieve a business model in establishing enterprises based on the lecture of "Management Theory of New Business", and in making students understood the profit generating stream by studying on the frame work of companies in several business fields.

Outline) Business Model is a remarkable term in modern economic and organizational theories in these days but describes a broad range of definitions. In this lecture, Business Model is defined as "System which converts technology and know how into profit for the purpose of customers' satisfaction" and aims at providing the ability for the design of profitable system, by learning cost issues in establishing business strategies of companies.

Requirement) Finish " Introduction to new business " or " Advanced Lecture in management Theory of new business "

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of business model design is learned.
2. Understanding of the concept of business model by case study analysis are appreciated.
3. It learns forming ability of business plan through the case study on business models.

Schedule) 1. Guidance 2. Keynote lecture "Business Model Thinking" 3. Questions and answers, Discussions 4. Lecture "Theory of Business Models" 5. Lecture "Design principles of Business Models" 6. Lecture "Evaluation of Business Models" 7. Case Study "Business Model in a R&D company" 8. Case Study "Business Model in a manufacturing industrial company" 9. Case Study "Business Model in a company of service industry " 10. Case Study "Business Model in a company of information industry " 11. Business plan practice, Present situation analysis and alternatives. 12. Business plan practice, Concept ad design of business. 13. Business plan practice, Financial analysis . 14. Business plan practice, Concluding and submitting 15. Presentation(1) of Business plan practice. 16. Presentation(2) of Business plan practice, Comments and summary.

Evaluation Criteria) Participation in class(20%) Group work and its report(80%)

Textbook) Ken-ichi Amuro and Study Group of Business model "Case Book: Business Model Thinking" Bunshindo

Reference) Several are introduced in class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169656>

Student) The person who finished "Introduction to new business" or " Advanced Lecture in management Theory of new business " in all the students enrolled in the course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Contact)

⇒ Tatsuya Deguchi (Wakayama University)
⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

Note) This class is supported by Tokushima Prefecture Government

Advanced Environmental Technology on Chemistry

2 units

Junko Motonaka · PROFESSOR / PHYSICO-CHEMISTRY AND MATERIAL SCIENCE, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Katsuhiro Tamura · PROFESSOR / PHYSICO-CHEMISTRY AND MATERIAL SCIENCE, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Shigeru Sugiyama · PROFESSOR / CHEMICAL PROCESS ENGINEERING, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Masahiro Katoh · ASSOCIATE PROFESSOR / CHEMICAL PROCESS ENGINEERING, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) The present situation and subjects on chemistry in view of environmental pollution will be introduced. Recent development in chemistry to attempt to solve those subjects will be explained.

Outline) Based on the historical background on environmental pollution, the recent progress on analytical chemistry, biochemistry, catalysis and chemical process engineering for environmental protection will be explained.

Style) Lecture and exercise

Keyword) environment, analytical chemistry, biochemistry, catalyst, chemical process

Fundamental Lecture) “Advanced Analytical and Environmental Chemistry”(1.0, ⇒p.34), “Advanced Physical Chemistry”(1.0, ⇒p.33), “Advanced Materials Science”(1.0, ⇒p.34)

Relational Lecture) “Engineering of Biological Environment”(0.5, ⇒p.51), “Advanced Environmental Systems Engineering”(0.5, ⇒p.51)

Requirement) Requires undergraduate level knowledge of chemistry and chemical engineering.

Goal)

1. To understand the present situation for environmental subjects on engineering (lectures from 1st to 5th, 14th and 15th)..
2. To develop ability for solving the environmental subjects (lectures from 6th to 15th).

Schedule) 1. Endocrine disrupters 2. Contribution of certified reference materials to securing safe foods and industrial products 3. Environmental problem and crystal growth 4. Polymer materials and environment 5. Biodegradable polymer 6. The mystery of natural rubber 7. Present situation of phosphors for white LEDs 8. Recent advances in organic chemistry: Synthesis and Function 9. Optimization of chemical processes 10. High pressure bioscience and biotechnology 11. Properties of supercritical fluids and their utilization 12. Possible utilization of carbon dioxide for chemistry 13. Utilization of adsorption phenomena 14. Approach using apatite to studies on energy and environment 15. Introduction to engineering utilization of space environment

Evaluation Criteria) Assignments count 100% mainly based on the presentation and report submitted.

Textbook) To be announced in the class.

Reference) To be announced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169322>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Motonaka (G611, +81-88-656-7409, motonaka@chem.tokushima-u.ac.jp)
- ⇒ Tamura (G509, +81-88-656-7416, tamura@chem.tokushima-u.ac.jp)
- ⇒ Sugiyama (G309, +81-88-656-7432, sugiyama@chem.tokushima-u.ac.jp)
- ⇒ Katoh (M304, +81-88-656-7429, katoh@chem.tokushima-u.ac.jp)

Engineering of Biological Environment

2 units

Yoshitoshi Nakamura · PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To understand recent studies on engineering of biological environment.

Outline) Advanced lectures for recent studies on engineering of biological environment

Style) Lecture

Keyword) Environment, Biology, Engineering

Requirement) N/A

Notice) N/A

Goal)

1. To understand general concepts of biomass
2. To understand biomass conversion engineering
3. To understand general concepts of bioremediation

Schedule) 1. General concepts of biological environment 2. Characteristics of biomass and its effective utilization 3. Pretreatment of biomass by physical method 4. Pretreatment of biomass by chemical method 5. Pretreatment of biomass by biological method 6. Conversion of biomass into useful materials 7. Conversion of biomass into useful materials 8. Process system engineering for effective conversion of biomass 9. Reports 10. Classification, role, and application method of environmental organism 11. Bioremediation in water environment 12. Bioremediation in air environment 13. Bioremediation in soil environment 14. Environmental hormones, chemical pollutions and ethics 15. Recent topics and trend of industry for engineering of biological environment 16. Final Reports

Evaluation Criteria) Evaluation of Reports

Textbook) Prints

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169418>

Contact)

- ⇒ Nakamura (720, +81-88-656-7518, ynakamu@bio.tokushima-u.ac.jp) (Office Hour: 水曜日 17:00-18:00)

Advanced Environmental Systems Engineering

2 units

Shuichi Hashimoto · PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Yasunori Kozuki · PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Shoichiro Fujisawa · ASSOCIATE PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Akio Kondo · PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Yoshiyuki Kidoguchi · PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Shigeki Matsuo · ASSOCIATE PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Yoshinobu Hirose · ASSOCIATE PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Tomoaki Yatsufusa · ASSOCIATE PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Ryoichi Yamanaka · ASSOCIATE PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Takuro Tomita · ASSISTANT PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To understand the present environmental problems and to acquire the advanced of the technique and the approach to solve problems on the point of the ecosystem engineering.

Outline) To explain the structure and function of environmental systems, the relationship between civil life and disaster prevention systems, and the changes of social system due to the technological revolution and the policy.

Style) Lecture

Keyword) environmental policy, natural disaster, energy saving technology, welfare technology, biomechanical engineering

Goal)

1. To understand the factor of environmental systems
2. To understand the structure of environmental systems
3. To understand the civil life and natural disaster prevention systems

Schedule) 1. The policy and natural disaster prevention measures (1) 2. The policy and natural disaster prevention measures (2) 3. The factor of environmental systems 4. Example of environmental systems 5. The structure of environmental systems 6. Example of structure of environmental systems 7. Civil life and nano-technology 1 8. Civil life and nano-technology 2 9. Midterm presentation 10. Well being technology 1 11. Well being technology 2 12. Ecosystem engineering 1 13. Ecosystem engineering 2 14. Hydrogen engine technology 15. Diesel engine engineering

Evaluation Criteria) Assignments count 100%

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169333>

Contact)

- ⇒ Matsuo (Eco404, +81-88-656-7538, matsuos@eco.tokushima-u.ac.jp)

Advanced Lecture on Semiconductor Nanotechnology

2 units

Toshiro Isu · PROFESSOR / INSTITUTE OF TECHNOLOGY AND SCIENCE, Takahiro Kitada · ASSOCIATE PROFESSOR / INSTITUTE OF TECHNOLOGY AND SCIENCE

Target) This class introduces basic principles of the semiconductor nanotechnology and their application to the quantum devices.

Outline) Basics of semiconductor physics and quantum mechanics are introduced to understand material properties of quantum confined nanostructures. Recent progress in fabrication techniques and device applications of semiconductor nanostructures (quantum wells, wires and dots) will be reviewed.

Style) Lecture

Keyword) Quantum confined nanostructures, Semiconductor nanoscience, Electron devices, Photonic devices

Requirement) None.

Notice) None.

Goal) To understand basic properties of semiconductor nanostructures and quantum devices.

Schedule) 1. Introduction to semiconductor nanostructures 2. Electronic states in quantum confined structures 3. Electrical properties of superlattices 4. Fabrication technique of quantum wires and wells 5. Characterization of heterointerfaces 6. Characterization of nanostructures 7. High-speed electron devices 8. Optical properties of quantum wells 9. Semiconductor laser diodes 10. Quantum effect devices 11. Fabrication technique of quantum dots 12. Quantum dot devices 13. Device application of quantum nano structures 14. Recent topics of semiconductor nanotechnology (1) 15. Recent topics of semiconductor nanotechnology (2)

Evaluation Criteria) Assignments count 100%

Textbook) None.

Reference) Will be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169477>

Student) Any students can attend the class.

Contact)

⇒ Isu (A224, +81-88-656-7670, t.isu@frc.tokushima-u.ac.jp) (Office Hour: Tue -Thu 10:00-14:00)

⇒ Kitada (A224, +81-88-656-7671, kitada@frc.tokushima-u.ac.jp) (Office Hour: Mon. 10:00-14:00)

Advanced Computational Science

2 units

Toshiki Takeuchi · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class provides the basic technology for numerical calculation for the differential equation.

Outline) The numerical calculation methods for the differential equation are introduced.

Style) Lecture

Keyword) Numerical analysis, Numerical computation, Differential equation

Fundamental Lecture) “Numerical Analysis”(1.0), “Basic Mathematics/微分積分学 I”(1.0), “Basic Mathematics/微分積分学 II”(1.0)

Relational Lecture) “Methods for analysis of mathematical phenomena”(1.0, ⇒p.8), “Numerical Analysis”(1.0)

Requirement) Students have to understand basic mathematics of undergraduate-level.

Goal) To understand principle of numerical calculation methods.

Schedule) 1. Introduction to numerical simulation 2. Mathematical model 3. Lagrange interpolation 4. Spline interpolation 5. Least squares method 6. Finite difference method 7. Arbitrary precision formula 8. Application to ordinary differential equation 9. Application to partial differential equation 10. Gauss-Seidel method 11. Successive Over-Relaxation method 12. Explicit method 13. Implicit method 14. Crank-Nicolson method 15. Numerical instabilities

Evaluation Criteria) Assignments count 100%

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169354>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Takeuchi (A206, +81-88-656-7544, takeuchi@pm.tokushima-u.ac.jp) (Office Hour: 木曜日 14:00-15:00)

Topics of Analysis for Mathematical Science

2 units

Atsuhito Kohda · ASSOCIATE PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) Mathematical theory and technique for analysis of engineering phenomena

Outline) Mathematical theory to analyze problems in engineering and its application, mainly theory and technique of differential equations

Style) Lecture

Relational Lecture) “Advanced applied analysis”(0.2, ⇒p.8), “Differential Equations”(0.2, ⇒p.8)

Requirement) If you like undergraduate-level mathematics, it will be sufficient.

Goal) To be familiar with mathematical theory, that helps engineering study.

Schedule) 1. Theory of sets and maps 2. Cardinal numbers and bijection 3. Equivalence relations and cryptography 4. Linear space and tensor 5. Vector analysis and differential form 6. Cauchy's theorem and vector analysis 7. Differential form and Cauchy's theorem 8. Projective plane 9. Quadratic curves and projective plane 10. All quadratic curves are circles? 11. The index of vector fields 12. Applications of the index:fundamental theorem of algebra 13. Vector fields on the unit sphere 14. Why there is the north pole on the earth 15. Mathematics and computers 16. Summary

Webpage) <http://math1.pm.tokushima-u.ac.jp/lecture/>

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169400>

Contact)

⇒ Kohda (A211, +81-88-656-7546, kohda@pm.tokushima-u.ac.jp) (Office Hour: 月曜 12:00~13:00)

Advanced applied analysis

2 units

Kuniya Okamoto · ASSOCIATE PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) To learn the functional analytic methods which are basic tools for mathematical sciences.

Outline) This subject provides basic theory of functional analysis which is considered as linear algebra in infinite-dimensional spaces. Functional analytic approaches to phenomena described by differential equations are introduced.

Style) Lecture

Relational Lecture) “Topics of Analysis for Mathematical Science”(0.5, ⇒p.52)

Goal) To apply the theory of modern analysis and recognize its significant role.

Schedule) 1. Introduction (What is functional analysis?) 2. Linear operators on finite-dimensional linear spaces 3. Eigenvalue problems 4. Matrix exponentials 5. Hilbert spaces, Banach spaces 6. Function spaces 7. Linear operators in infinite-dimensional linear spaces 8. Spectral resolutions 9. Fourier transforms 10. Operational calculus 11. Integral transforms, Resolvent operators 12. Strongly continuous semigroups 13. Abstract Cauchy problems 14. Applications to partial differential equations 15. Summary

Webpage) <http://math9.pm.tokushima-u.ac.jp/lecture/>

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169315>

Contact)

⇒ 岡本(A212室, TEL/FAX: 656-9441, E-mail: okamoto@pm.tokushima-u.ac.jp)

Quantum mechanics and advanced lecture in quantum physics

2 units

Yoshitaka Michihiro · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces the quantum mechanics.

Outline) Basics of quantum mechanics are introduced.

Style) Lecture

Keyword) Quantum Mechanics

Goal) To understand the outline of quantum mechanics.

Schedule) 1. Introduction 2. Variational method 3. Lagrangian 4. Hamiltonian 5. Poisson's bracket expression 6. Quantization 7. Operator 8. Wavefunction 9. Expectation value 10. Schrödinger equation

11. Example (1) the square well potential 12. Example (2) the linear harmonic oscillator 13. Angular momentum 14. Example (3) hydrogen atom 15. Heisenberg equation 16. Field quantization

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169502>

Contact)

⇒ Yoshitaka Michihiro (A203)

Nano-material Engineering

2 units

Shuichi Hashimoto · PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To understand the physical and chemical properties of materials at micro- and nano-scales for designing and assembling nano-structured materials with special consideration to environmental issues

Outline) Physical and chemical properties as well as characterization techniques of various materials will be discussed on the basis of micro- and nanostructure.

Style) Lecture

Goal) 環境との相互作用を考慮しつつさまざまな材料の性質をミクロな視点から理解すること。

Schedule) 1. Introduction 2. Structure of solids 3. Structure of solids 4. Optical properties of solids 5. Optical properties of solids 6. Optical properties of solids 7. Optical properties of solids, assignment1 8. Evaluation technique of nano-materials 9. Evaluation technique of nano-materials 10. Evaluation technique of nano-materials 11. Evaluation technique of nano-materials, assignment2 12. Application of nano-materials 13. Application of nano-materials 14. Current topics in nano-materials and nanotechnology 15. Current topics in nano-materials and nanotechnology 16. exam

Evaluation Criteria) assignment1 25% assignment2 25% exam 50%

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169467>

Contact)

⇒ Hashimoto (Eco405, +81-88-656-7389, hashi@eco.tokushima-u.ac.jp)

Micromechanics

2 units

Shigeki Matsuo · ASSOCIATE PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To understand the science of micro-to-nanometer domain, and learn the techniques to investigate such a domain.

Outline) To study the methods for precise measurement and manufacturing, in addition, microsensors, micromachining, and microactuators. In addition, hot topics concerning science and technology will be referred and discussed at any time.

Style) Lecture

Keyword) micro, nano

Goal) To obtain basic knowledges on the micro-to-nanometer domain

Schedule) 1. Physics and chemistry in microdomain 2. Physics and chemistry in microdomain 3. Physics and chemistry in microdomain 4. Physics and chemistry in microdomain 5. Measurements in microdomain 6. Measurements in microdomain 7. Measurements in microdomain 8. Micromachining 9. Micromachining 10. Micromachining 11. Microsensors 12. Microsensors 13. Microsensors 14. Microactuators 15. Microactuators

Evaluation Criteria) Assignments count 100%.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169519>

Energy and Environmental Engineering

2 units

Yoshiyuki Kidoguchi · PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) This class addresses to understand characteristics and background of the global warming problem and the depletion of energy resources for effective utilization system of energy resources.

Outline) Lecture on fossil fuels resources, environmental pollutant and environmental loading, principal of thermal energy conversion and conversion technology, nuclear energy and thermal reactor, the renewable energy and waste energy systems.

Keyword) Environmental problem, Energy security, Global warming, Energy conversion

Requirement) None

Notice) Basic subjects concerning the engineering

Goal) To understand characteristics and background of the global warming problem and the depletion of energy resources, and to master the ability solving the energy security on the point of engineering field.

Schedule) 1. Energy Fundamentals 2. Pollution of the Atmosphere 3. Principal of Thermal Energy Conversion 4. Thermal Energy Conversion System 5. Fossil Fuels Coal, Petroleum and Natural Gas- 6. Combustion Method and System of Fossil Fuels 7. Nuclear Energy (1) Nuclear Fission 8. Nuclear Energy (2) Nuclear Fusion 9. Geothermal Energy System 10. Water and Wind Energy System 11. Solar Energy System 12. Biomass Energy System 13. Wastes Energy System 14. Hydrogen Energy System 15. Energy and Environment in Future 16. Summary and Final Report for Evaluation

Evaluation Criteria) Grading with final report

Textbook) To be introduced before the first lecture

Reference) To be introduced in the class

Webpage) <http://www.eco.tokushima-u.ac.jp/w3/miwa/index.html>

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169312>

Student) Able to be taken by student of other department

Contact)

⇒ Kidoguchi (Eco502, +81-88-656-9633, kidog@eco.tokushima-u.ac.jp)

Energy conversion systems

2 units

Tomooki Yatsufusa · ASSOCIATE PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To understand principle of energy conversion and to consider improvement of energy conversion technologies on the point of saving energy consumption and decreasing environmental damages

Outline) About 90% of world primary energy demands are provided by fossil fuel that is converted into heat, electricity, and power by combustion. The lecture will give you some information and idea about the details of combustion phenomena, and then the latest technologies of energy production and the environmental problems accompanying with energy production will be denoted. This subject is concerned with industry.

Style) Lecture

Keyword) Energy conversion, Energy resources, Energy problem, Climate change, Combustion

Requirement) None

Notice) None

Goal) To understand principle of energy conversion, environmental effect of energy conversion and present technologies of energy conversion, and to recognize the importance of improvement of energy conversion technologies against environmental protection

Schedule) 1. Present energy problem 2. Energy resources 3. Combustion chemistry 4. Thermal and fluid dynamics in combustion phenomena 5. Combustion limit, Explosion limit 6. Toxic emissions by combustion 7. Climate change by carbon dioxide emission 8. Fossil fuel power generation 9. Carbon capture and storage (CCS) 10. Nuclear power generation 11. Efficient utilization technologies of renewable energy 12. Energy saving technologies in cars (Present technologies) 13. Energy saving technologies in cars (Future technologies) 14. Energy saving technologies in ships, railroads, and airplanes 15. Construction of social systems designed with environment

Evaluation Criteria) Appraise the understanding of the content of the lecture by setting some reports

Textbook) Yokio Mizutani, "Combustion Engineering"

Reference) None

Webpage) <http://www.eco.tokushima-u.ac.jp/w3/miwa/index.html>

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169311>

Student) Any students other than this course can take this subject

Contact)

⇒ Yatsufusa (eco503, +81-88-656-7370, yatsu@eco.tokushima-u.ac.jp)

Note) Need to submit some reports

Urban and Regional Planning

2 units

Akio Kondo · PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) The concept and technique to describe not only the vision but also design in the future urban and regional plan are lectured.

Outline) The technique of urban and regional planning is explained using various materials in practical planning. The debate is introduced to develop the ability in design of planning for students.

Style) Lecture and exercise

Keyword) Urban and Regional Planning, Proposition of Vision, Planning Design

Fundamental Lecture) “Advanced Environmental Systems Engineering”(0.2, ⇒p.51)

Relational Lecture) “Information Engineering of Regional Environment”(0.8, ⇒p.54)

Requirement) 特になし

Notice) 特になし

Goal) To understand the concept and technique to describe the future urban and regional plan.

Schedule) 1. Guidance and purpose of this subject 2. Examples of urban planning 3. Examples of regional planning 4. Planning and law 1 5. Planning and law 2 6. Economic analysis in planning 1 7. Economic analysis in planning 2 8. Systems analysis in planning 1 9. Systems analysis in planning 2 10. Explanation of Exercise 11. Exercise of planning 1 12. Exercise of planning 2 13. Presentation of planning 14. Discussion about the future of region 15. Discussion about the vision of region

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Webpage) <http://www.eco.tokushima-u.ac.jp/w3/kondo/top/index.htm>

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169464>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Kondo (ECO602, +81-88-656-7339, kondo@eco.tokushima-u.ac.jp) (Office Hour: 月曜日9-10校時)

Note) 特になし

Information Engineering of Regional Environment

2 units

Yoshinobu Hirose · ASSOCIATE PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) The information of regional environment, technique in survey, information management and computer aid systems are explained. The method and technique using for application of environmental information to development of regional policies are lectured.

Outline) The information of regional environment, technique in survey, information management and computer aid systems are explained using the various kinds of materials and examples in practical planning.

Style) Lecture and exercise

Keyword) Information of Regional Environment, Technique in Survey, Computer Aid Systems

Relational Lecture) “Urban and Regional Planning”(0.8, ⇒p.54), “Advanced Environmental Systems Engineering”(0.2, ⇒p.51)

Requirement) 特になし

Notice) 特になし

Goal) To obtain the knowledge of the information of regional environment, technique in survey, information management and computer aid systems, and apply them to design of regional plan and political simulation.

Schedule) 1. Guidance and purpose of this subject 2. Examples of information of regional environment 3. Variety of information of regional environment 4. Technique in survey of information 5. Technique in production of information 6. Technique in management of information 7. Computer aid systems 1 8. Computer aid systems 2 9. Application of information to regional planning 10. Exercise of application of information 1 11. Exercise of application of information 2 12. Exercise of application of information 3 13. Presentation of results of exercise 14. Discussion about the information in the future 15. Discussion about the technique in the future

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Webpage) <http://www.eco.tokushima-u.ac.jp/w3/kondo/top/index.htm>

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169430>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Kondo (ECO602, +81-88-656-7339, kondo@eco.tokushima-u.ac.jp) (Office Hour: 月曜日9-10校時)

Note) 特になし.

Principles of Disaster Risk

2 units

Yasunori Kozuki · PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Ryoichi Yamanaka · ASSOCIATE PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To understand concept of risk, risk management, damage reducing measure ability to natural disaster

Outline) To understand historical earthquakes and tsunamis, characteristics of earthquake and tsunami, prediction of damage, to cultivate presentation skill and debate ability.

Keyword) Earthquakes and Tsunamis, Disaster Prevention Assessment, Risk Management

Relational Lecture) “Principle of Environmental Risk”(0.5, ⇒p.54)

Goal) Training-up of technical knowledge to the natural disaster, the basic knowledge which can correspond to the risk management and the crisis management

Schedule) 1. Historical Earthquakes in Japan 2. Historical Tsunamis in Japan 3. Characteristics of Earthquake 4. Characteristics of Tsunami 5. Generation Characteristics of Nankai Earthquake 6. Generation Characteristics of Nankai Earthquake and Tsunami 7. Disaster Prevention for Earthquakes and Tsunamis 8. Disaster Prevention Assessment for Earthquakes and Tsunamis 9. What is Risk Management? 10. Practice of Risk Management for Earthquakes and Tsunamis(1) 11. Practice of Risk Management for Earthquakes and Tsunamis(2) 12. Presentation of Tsunami Risk Assessment

Evaluation Criteria) Assignments Count 100%

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169378>

Student) To be limited to students of course

Contact)

⇒ Kozuki (Eco505, +81-88-656-7335, kozuki@eco.tokushima-u.ac.jp) (Office Hour: 火曜日, 14:35 から 16:05, 18:00 から 19:30)

Principle of Environmental Risk

2 units

Ryoichi Yamanaka · ASSOCIATE PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Yasunori Kozuki · PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To understand knowledge concerning the Environmental Risk and to develop abilities to solve problems regarding risk communication.

Outline) To explain the definition and kinds of environment risk, risk evaluation and risk management. To develop a ability for risk communication

Style) Lecture and exercise

Keyword) environmental risk, risk communication

Fundamental Lecture) “Advanced Environmental Systems Engineering”(1.0, ⇒p.51)

Relational Lecture) “mitigation engineering”(0.5, ⇒p.55), “Advanced Environmental Ecology”(0.5, ⇒p.10)

Goal) To be able to examine technique to mitigate and prevent the environmental risk

Schedule) 1. Guidance and purpose of this lecture 2. Introduction of the environmental risk 3. Ecological risk(1):Introduction 4. Ecological risk(2):Ecological risk assessment 5. Ecological risk(3): Examples 6. Ecological risk(4): debate 7. Environmental risks of chemicals(1):Introduction 8. Environmental risks of chemicals(2):Examples 9. Environmental risks of chemicals(3): debate 10. Law and economics for the environmental risk management 11. Discussion about the environmental risk communication(1): Examples 12. Discussion about the environmental risk communication(2): debate 13. examination 14. The environmental risk in the future(1) 15. Meeting for the results of trials regarding pro-environmental behavior 16. The environmental risk in the future(2)

Evaluation Criteria) Evaluate learning results by reports, debates and examination

Textbook) environment engineering, pp.81-86

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169338>

Contact)

⇒ Yamanaka (総合研究実験棟(エコ棟)504号室, +81-88-656-7334, yamanaka@eco.tokushima-u.ac.jp)
(Office Hour: Tuesday 14:35-17:50)

Note) 特になし

Well-being Technology for All

2 units

Shoichiro Fujisawa · ASSOCIATE PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To understand the philosophy of welfare and the classification of disability, and to learn the importance of assistive technology.

Outline) The role and the necessity of assistive technology will be explained, and provisions and means to assist a person with disabilities in daily living will be lectured.

Keyword) assistive technology, a person with disability, aged people, assistive products, assist of daily living

Goal) To understand the role and the necessity of the well-being technology, and to understand technical provisions and means to assist a person with disability in daily living.

Schedule) 1. History of rehabilitation engineering 2. Statistics of persons with disabilities 3. Classification of disabilities (1) 4. Classification of disabilities (2) 5. Infrastructure for persons with sensory impairments 6. Infrastructure for persons with physical impairments 7. Infrastructure for persons with intellectual impairments 8. Objective of a white cane and how to use it 9. experience of disability (1) : visual impairment 10. experience of disability (2) : visual impairment 11. Assistive products for transfer and mobility 12. Dynamics of wheelchair 13. experience of disability (3) : physical impairment 14. experience of disability (4) : physical impairment 15. Conclusion

Evaluation Criteria) Understanding of lecture will be evaluated through reports submitted after each lesson.

Textbook) To be introduced in th class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169525>

Contact)

⇒ Fujisawa (ECO704, 656-7537, s-fuji@eco.tokushima-u.ac.jp) (Office Hour: 水曜日 18:00~ 20:00)

Design of Assistive Products

2 units

Shoichiro Fujisawa · ASSOCIATE PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) It aims to learn how to realize and how to keep the quality of assistive products in the view point of international marketing and to acquire the ability of designing of products used at office, working place and home in which the concept of adapting the device to the human being is installed.

Outline) Assistive technology for daily living of persons with disabilities in the society. Human factors and R & D of assistive products and services. Adapting the environment to the people instead of the people adapting to the environment. Evaluation of appropriateness of assistive technology system for a person.

Style) Lecture

Keyword) Assistive product, Japanese Industrial Standard, International Standard, ISO, Outcome measure

Goal) Objective of this lecture is to understand the current state of assistive products in the world and international standard of them, and to learn designing of them. Moreover, it aimed to learn the method of outcome measure of assistive products and to be able to consider the total arrangement of products at working place and at home.

Schedule) 1. Introduction : assistive products as industrial products, ergonomic approach 2. Situation of assistive technology in the world : North America, Europe and Japan 3. Assistive products as industrial products : Japanese Standard, International Standard and Guidelines for all people including elderly and people with disabilities 4. Human factors (1) : Decrease of physical function according to aging 5. Human factors (2) : Decrease of sensory function according to aging 6. Japan Industrial Standards of Assistive Products : Wheelchair (1) 7. Japan Industrial Standards of Assistive Products : Wheelchair (1) 8. Japan Industrial Standards of Assistive Products : Artificial Legs 9. Japan Industrial Standards of Assistive Products : Artificial Arms 10. Japan Industrial Standards of Assistive Products : Beds 11. Japan Industrial Standards of Assistive Products : Hoists 12. Personal environment control system : Smart House, ECS and Home bus system 13. Fitting of assistive products in daily living (1) : Methods of outcome measure 14. Fitting of assistive products in daily living (2) : Methods of outcome measure 15. Guideline for work place : Legislation and remodeling of work place

Evaluation Criteria) Results will be evaluated through the lecture and reports submitted after each lesson.

Reference) To be introduced in th class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169470>

Contact)

⇒ Fujisawa (ECO704, 656-7537, s-fuji@eco.tokushima-u.ac.jp) (Office Hour: 水曜日 18:00~ 20:00)

Chemistry and Technology for Recovery of Marine Resources

2 units

Takahiro Hirotsu · PROFESSOR / MARINE ENVIRONMENT SCIENCE AND ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) This class describe the recovery of valuable elements in seawater that have not been utilized.

Outline) This class describe the advanced technology of recovery of valuable elements such as uranium and lithium in seawater and the remained subjects for practical use.

Style) Lecture

Keyword) seawater, rare resources, recovery, uranium, lithium, adsorption, ion exchange, chelation

Goal) understanding of the technology of recovery of valuable resources from seawater

Schedule) 1. Importance of recovery of valuable resources from seawater 2. Inorganic resources in seawater 3. Recovery methods of valuable resources in seawater 1 4. Recovery methods of valuable resources in seawater 2 5. Adsorption method 1 6. Adsorption method 2 7. Development of adsorbents 1: ion-exchangers 8. Development of adsorbents 2: ion-exchangers 9. Development of adsorbents 3: chelating resins 10. Development of adsorbents 4: chelating resins 11. Mechanism of ion-exchange of lithium ions 12. Recovery process of lithium from seawater 13. Mechanism of uptake of uranium 14. Recovery process of uranium 15. Recovery costs of uranium and lithium 16. Perspective of recovery of uranium and lithium from seater

Evaluation Criteria) Evaluation of degree of understanding by report of some essential subjects

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169387>

Student) Able to be taken by student of other department and faculty

Contact)

⇒ Hirotsu (National Institute of Advanced Industrial Science and Technology, +81-87-869-3562, takahiro-hirotsu@aist.go.jp)

mitigation engineering

2 units

Hideki Ueshima · PROFESSOR / GRADUATE SCHOOL OF ENGINEERING

Target) To understand the background and the significance of mitigation and to acquire fundamental principles of mitigation technique.

Outline) To explain western environmental ideas, progress of coastal development and concept, history, technology and examples of mitigation

Style) Lecture

Keyword) District Improvement Plan for Disaster Mitigation, coastal environment, ecosystem, environmental restoration

Fundamental Lecture) “Principle of Environmental Risk”(1.0, ⇒p.54), “Principles of Disaster Risk”(1.0, ⇒p.54), “Urban and Regional Planning”(1.0, ⇒p.54)

Relational Lecture) “Advanced Environmental Ecology”(0.5, ⇒p.10), “Advanced Environmental Systems Engineering”(0.5, ⇒p.51)

Goal) To acquire ideas and fundamental of mitigation

Schedule) 1. Guidance of this subject 2. Background and history of the mitigation 3. Coastal development(1) 4. Coastal development(2) 5. Deterioration of coastal environment 6. Restoration for coastal environment 7. Mitigation for coastal environment(1) 8. Mitigation for coastal environment(2) 9. Mitigation technology(1) 10. Mitigation technology(2) 11. Mitigation technology(3) 12. Example of mitigation in Western Europe 13. Example of mitigation in Japan(1) 14. Example of mitigation in Japan(2) 15. Discussion

Evaluation Criteria) Assignments count 100%

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169522>

Contact)

⇒ Ueshima (National Institute of Advanced Industrial Science and Technology, +81-823-72-1901, h-ueshima@aist.go.jp)

Advanced Environmental Ecology

4 units

Mahito Kamada · ASSOCIATE PROFESSOR / ENVIRONMENTAL CONSERVATION ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) The purpose is to develop the knowledge and skill for conservation and restoration of ecosystems.

Outline) Current situation of ecosystems and technical problems for conservation and restoration are explained. The way of ecosystem management is emphasized to improve ecosystem. All students must give a presentation to introduce their own activities.

Style) Lecture

Keyword) Ecosystem management, Environmental conservation, Nature restoration

Goal) Every student has basic knowledge and skill to improve ecosystem function in the actual society.

Schedule) 1. Guidance 2. Interdisciplinary aspects for ecosystem management 1 3. Interdisciplinary aspects for ecosystem management 2 4. Current situation and problems in ecosystem management 1 5. Current situation and problems in ecosystem management 2 6. Current situation and problems in ecosystem management 3 7. Current situation and problems in ecosystem management 4 8. View points to know the structure and function of ecosystems 1 9. View points to know the structure and function of ecosystems 2 10. View points to know the structure and function of ecosystems 3 11. View points to know the structure and function of ecosystems 4 12. Toward an adequate management of ecosystems 1 13. Toward an adequate management of ecosystems 2 14. Toward an adequate management of ecosystems 3 15. General discussion / Report

Evaluation Criteria) Result is evaluated by contents of the reports, which are set after every related lectures. Over 60% marks is necessary to pass.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169334>

Student) Able to be taken by student of other department and faculty

Contact)

⇒ Kamada (A306, +81-88-656-9134, kamada@ce.tokushima-u.ac.jp) (Office Hour: 年度ごとに学科の掲示を参照すること。)

City and Transport System Planning

4 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Masahiro Miyake · PART-TIME LECTURER / 武庫川学院

Target) Advanced course on concept and case study of social and public policies on urban, regional and transport planning. Study on contents and usage of measures on such planing fields.

Outline) Lectures on Systems approaches on city planning and transport planning, theories and usage of planning models and planning methods. A unit is consisted of three hours lecture and an hour training.

Style) Lecture and exercise

Keyword) City Plannig, Transport Planning, Concensus Building

Fundamental Lecture) “Urban & Transport Planning”(1.0), “Project Evaluation Methods for Infrastructure Planning”(1.0)

Relational Lecture) “都市・地域計画論”(0.5), “Infrastructure Planning”(0.5)

Goal)

1. Understanding of problems and recent strategies on city and transport planning

2. Understanding of concensus buidling method for developing city and transport strategies

Schedule) 1. Problems of City and Transport Systems 1 2. Problems of City and Transport Systems 2 3. Recent Planning Strategies of City and Transport System 1 4. Recent Planning Strategies of City and Transport System 2 5. Recent Planning Strategies of City and Transport System 3 6. Recent Planning Strategies of City and Transport System 4 7. Debate by gropus on transport strategies 8. Method of Decision Making and Social Concensus Building 9. Negotiation theory and Concemnsus Building 10. Negotiation Simulation 1 11. Negotiation Simulation 2 12. Project Cycle Management Participatory Planning Method 1 13. Project Cycle Management Participatory Planning Method 2 14. Project Cycle Management Participatory Planning Method 3 15. Debate by groups on Concensus Building

Evaluation Criteria) Achievement level of the each target is evaluated by the submitted essays and reports. Score of 60points or over is required to clear the target. Students are required to clear the both of targets. Total score is average of the scores of two targets.

Textbook) Textbook is ibtroduced in the class. Realted documents is distributed to students.

Reference) Rojer Fisher and Williamn Uly: Getting to yes, Houghton Mifflin,1981

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169462>

Student) Able to be taken by student of other department

Contact)

⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

Actuator Control Theory

2 units

Masafumi Miwa · ASSOCIATE PROFESSOR / INTELLIGENT MACHINES, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces the characteristics of actuators, the design methods of servo system.

Outline) The structure and function of actuators or control valves, the design of servo system, PWM control method, the practical and intelligent control algorithm are explained.

Style) Lecture

Keyword) actuator, servo system, control algorithm

Relational Lecture) “Measurement Science and Technology”(0.5, ⇒p.24)

Requirement) Students are required to have a good understanding of undergraduate-level control engineering and related subjects.

Goal) To understand the design methods of servo system using actuators.

Schedule) 1. Outline of actuators 2. Micro-drive electromotive actuators 3. Electromotive actuators 4. Novel actuators 5. Hydraulic actuators 6. Hydraulic control valves 7. Hydraulic servo system 8. Pneumatic actuators 9. Pneumatic control valves 10. Pneumatic servo system 11. PWM control method 12. Model matching methods 13. Neural controller 14. Two-degree-of-freedom control method 15. Model driven control method 16. Examination

Evaluation Criteria) Assignments count 30 % and examination count 70 %.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169302>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Miwa (M420, +81-88-656-7387, miw@me.tokushima-u.ac.jp)

Measurement Science and Technology

2 units

Tetsuo Iwata · PROFESSOR / INTELLIGENT MACHINES, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICAL SYSTEMS ENGINEERING
Hiroyuki Ukida · ASSOCIATE PROFESSOR / MECHANICAL SYSTEMS, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICAL SYSTEMS ENGINEERING

Target) To understand importance of the Fourier transformation for developing various kinds of measurement techniques, measurement equipments, measurement systems.

Outline) Among the various measurement techniques used in the fundamental and applied research, optical measurement methods including their principles, methodologies, instrumentations, and evaluation methods are reviewed. In the lecture, emphasized is the importance of the concept of the Fourier transformation to understand and to deal with linear systems in the modern scientific measurement system. Practical methods of object inspections, distance measurements, and shape reconstructions using images are also lectured.

Style) Lecture

Keyword) measurement techniques, measurement devices, Fourier transform

Relational Lecture) “Micro-Nano Engineering”(0.5), “Digital Control Theory”(0.5), “Actuator Control Theory”(0.5)

Goal)

1. 1. To understand Fourier series and Fourier transform.
2. 2. To understand relations among Fourier transform and measurement principles of scientific instruments.
3. 3. To understand techniques used with practicable various measurement devices.

Schedule) 1. Frequency response of the amplifier 2. Optical information processing 3. Fourier-transform infrared spectroscopy 4. Subfringe interferometry 5. Computed tomography 6. Sampling theorem and quantization theorem 7. Wavelet transformation 8. Lock-in amplifier and boxcar integrator 9. Optics for microscope 10. X-ray diffraction 11. Image measurement systems 12. Feature extraction from images 13. Binocular stereo method 14. Pattern projection 15. Shape from shading and texture 16. Examination

Evaluation Criteria) Assignments count 50% and examinations count 50%.

Textbook) Printed synopses are used.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169359>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Iwata (M427, +81-88-656-9743, iwata@me.tokushima-u.ac.jp)
⇒ Ukida (M424, +81-88-656-9448, ukida@me.tokushima-u.ac.jp) (Office Hour: 毎週金曜日 17:00~18:00)

Advanced Theory of Electronic Circuits

2 units

Masaki Hashizume · PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING
Hiroyuki Yotsuyanagi · ASSOCIATE PROFESSOR / INTELLIGENT NETWORKS AND COMPUTER SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) The purpose of this lecture is to understand advanced theory and the state-of-the-art technology for the IC implementation.

Outline) Electronic circuits have been implemented as ICs. This lecture introduces advanced theories and the state-of-the-art technologies for the IC implementation. The following are the topics: 1. Analysis and synthesis of logic circuits, 2. Integrated digital circuits, 3. Analysis and synthesis of analog circuits, 4. Integrated analog circuits, 5. Low power digital circuits

Style) Lecture in combination with Portfolio

Keyword) electronic circuits, IC implementation, integrated circuits, circuit design

Fundamental Lecture) “Electronic Circuits”(1.0), “Computer Circuits”(1.0)

Relational Lecture) “Advanced Theory of Integrated Circuits”(0.3)

Requirement) Familiarity with electric circuit and IC technology

Goal) To understand advanced theories and the state-of-the-art technologies for IC implementation of electronic circuits.

Schedule) 1. Introduction of related topics 2. The state-of-the-art technologies for IC implementation (13wks) 3. Examination 4. The exposition about the examination

Evaluation Criteria) Attendance and presentation:30%; Final examination:70%

Textbook) specified in the first class

Reference) introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169455>

Student) Able to be taken by student of other department

Contact)

- ⇒ Hashizume (E 棟 3 階南 D-2, +81-88-656-7473, tume@ee.tokushima-u.ac.jp)
⇒ Yotsuyanagi (E 棟 3 階南 D-3, +81-88-656-9183, yanagi4@ee.tokushima-u.ac.jp) (Office Hour: 水・金 17:00~18:00)

Note) This lecture will be given in English.

Optical properties of materials

2 units

Masuo Fukui · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING
Masanobu Haraguchi · ASSOCIATE PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) To understand the principle of optical response of atoms, molecules and crystals. To develop ability to apply such optical phenomena to applications.

Outline) With quantum mechanics, we lecture optical process of materials. This course will cover the following topics: optical properties of materials for engineering, classical electromagnetic theory and optical property, optical transitions and optical process of atoms, molecules and semiconductors.

Style) Lecture

Keyword) Quantum mechanics, condensed matter, optical process, semiconductor

Relational Lecture) “Advanced Optical and Optoelectronic Devices”(0.5), “Lecture in Optical Materials and Devices, Part 1”(0.5)

Requirement) Students should have fundamental knowledges of quantum mechanics.

Goal)

1. Students can explain the optical processes of atoms and molecules.
2. Students can explain the optical processes in semiconductors.

Schedule) 1. Introduction 2. Optical response described by classical electro-magnetic theory 3. Schrodinger equation and wave function 4. Hydrogen atom model 5. spin angular momentum 6. Quantum mechanics of light 7. Transition induced by interaction between electron state and light 8. Light absorption and emission 9. Electron transition in atoms and molecules 10. Optical spectra of atoms and molecules 11. Optical spectra of organic molecules 12. Energy bands in condensed matters 13. Optical processes in semiconductors 14. Optical spectra of impurity atoms in a crystal 15. Optical process of P-N junction 16. Final Examination

Evaluation Criteria) Activity: 20%, Reports: 40% and Final Exam.:40%

Textbook) 中澤, 鎌田著, 光物性・デバイス工学の基礎, 培風館 1999

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169493>

Contact)

- ⇒ Haraguchi (Opt.209, +81-88-656-9411, haraguti@opt.tokushima-u.ac.jp) (Office Hour: 16:05-18:00)
⇒ Fukui (Opt.208, +81-88-656-9410, fukui@opt.tokushima-u.ac.jp)

Advanced Ecosystem Engineering Seminar

4 units

Teacher of course

Target) To improve the skill of presentation, writing, reading and discussion regarding the ecosystem engineering by reading the current paper written in English

Outline) Students read the current paper written in English under the supervision of faculties and present orally their contents

Style) Portfolio

Keyword) ecosystem engineering, peruse paper in English

Goal) To obtain the fundamental knowledge regarding research theme and the presentation skill

Schedule) Seminar on research theme

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169310>

Student) Able to be taken by only specified class(es)

Advanced Ecosystem Engineering Exercise

6 units

Teacher of course, Yoshihiko Hosoi · PROFESSOR / TOTTORI UNIVERSITY, Hirofumi Abe · PROFESSOR / OKAYAMA UNIVERSITY
名姓・肩書 / BIENRI UNIVERSITY, 名姓・肩書 / SHIZUOKA UNIVERSITY

Osamu Sueda · PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To learn the current issue about the ecosystem engineering in the various kinds of fields and to improve the abilities to find and solve problems related to the research theme.

Outline) External experts lecture on the current issue about the ecosystem engineering.

Style) Lecture in combination with Portfolio

Keyword) ecosystem engineering

Notice) Students have to take every lecture to acquire the credit of this subject.

Goal) To understand how to find and solve problems related to the research theme

Schedule) 1. Guidance 2. The current issue in the ecosystem engineering(1) 3. The current issue in the ecosystem engineering(2) 4. The current issue in the ecosystem engineering(3) 5. The current issue in the ecosystem engineering(4) 6. The current issue in the ecosystem engineering(5)

Evaluation Criteria) Assignment count 100%

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169308>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Matsuo (Eco404, +81-88-656-7538, matsuos@eco.tokushima-u.ac.jp)

Ecosystem Engineering Laboratory

4 units

Teacher of course

Target) To perform experiments toward Master's thesis

Outline) Students perform experiments towards their Master's thesis under the supervision of faculties.

Style) Lecture and exercise

Keyword) ecosystem engineering, Master's thesis

Goal) To summarize the results of experiments and to present the contents

Schedule) Experiments and research

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169309>

Student) Able to be taken by only specified class(es)

Systems Innovation Engineering — Electrical and Electronic Engineering

SYLLABUS OF SUBJECTS

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● Basic Departmental Subjects

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Engineering of Correlated Electron Matter ... Kawasaki 63

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Topics in topology ... Sumida-Takahashi 63

● Applied Departmental Subjects

Advanced Plasma Engineering ... Ohya 64

Advanced Theory of Electron Devices ... Ohno · Ao 64

Advanced Device Processing ... Naoi 64

Advance Theory of Electrical and Electronic Materials ... Tominaga 64

Advanced Theory of Semiconductors ... Nishino 65

Advanced Optoelectronic Devices ... Sakai 65

Advanced Theory of Optoelectronics ... Sakai · Tajima 65

Advanced High Voltage Engineering ... Shimomura 66

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Advanced Theory of Electric Power Engineering ... Kawada · Kawasaki · Takigawa 66

Advanced Electrical Control System ... Yasuno 66

Electromechanical Systems ... Morita 67

Advanced Power Electronics ... Ohnishi · Hojo 67

Advanced Control Theory ... Kubo 67

Advanced Theory of System Analysis ... Kawakami 68

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Advanced Biological Engineering ... Kinouchi · Akutagawa 68

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Advanced Lecture of Intelligent Information Processing ... Shimamoto · Song 69

● Specialized Exercise and Experiments

Electrical and Electronic Engineering Seminar and Exercise ... Teacher of course 70

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Introduction to Intellectual Property

2 units

Tohru Sakai · PART-TIME LECTURER / (助)工業所有権部センター, Juichiroh Osame · PART-TIME LECTURER
Akio Fujii · PART-TIME LECTURER / INTELLECTUAL PROPERTY OFFICE, Yasushi Toyosu · PART-TIME LECTURER, Kuniaki Kubota · PART-TIME LECTURER

Target) Understanding the basic systems and importance of protection and practical use of intellectual property based on some examples.

Outline) It is necessary for a working staff in a company, a university, etc., in a future. It is introduced the importance to protect and practical use of intellectual property at governments, industrial circles, universities and institutes in Japan using potential on scientific techniques. This lecture is treated the basic systems of protection and practical use of intellectual property particularly based on strategy and invasion of patent in an organization such as company, university, etc.

Style) Lecture

Keyword) Intellectual property, Patent Law, Protect and Use of Intellectual Property

Relational Lecture) “Introduction to Intellectual Property”(0.5)

Requirement) No requirement

Notice) It is necessary to be present at two concentrated lecture.

Goal)

1. Understanding concept of intellectual property right.
2. Understand the Patent Act, the Trademark Act, the Design Act and the Copyright Act.
3. Understanding on basical practical use of intellectual property.

Schedule) 1. Concept of intellectual property(Sakai) 2. Outline of intellectual property(Patent and Trademark)(Sakai) 3. Outline of intellectual property(Design and Copyright)(Sakai) 4. Patent, invention and invasion of patent (Sakai) 5. Management of intellectual property and use (Sakai) 6. A way of research and development and intellectual property in a future(Sakai) 7. The midterm examination and its comment for Target and 8. History of system of intellectual property (Osame) 9. International trend of system of intellectual property (Osame) 10. Acquisition method of intellectual property right(Fujii) 11. Use of intellectual property(Watanabe) 12. Strategy of intellectual property on development of techniques(Y.Higuchi) 13. Effective intellectual property in development of techniques (Kubota) 14.

Special lecture on a use of intellectual property by a chief executive officer(1) 15. Special lecture on a use of intellectual property by a chief executive officer(2)

Evaluation Criteria) Passing mark is over 60% on the examinations and the reports for each reaching level, respectively.

Textbook) To be used textbooks made by lecturers.

Reference) Nobuhiro Nakayama:Titeki Shoyuken, Nikkan Kohgyo Shinbunsha

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169432>

Student) For the course students and other graduate school students.

Contact)

⇒ Sakai (+81-3-5600-2631,)

⇒ Mizuguchi (A501, +81-88-656-7349, mizuguch@ce.tokushima-u.ac.jp) (Office Hour: Monday,11:00-12:30, 17:00-18:00)

Management Theory of New Business

2 units

Vice chairperson of School Affairs Committee , Faculty of Engineering

First-line men with experience of practical business ·PART-TIME LECTURER

Target) New business is the word which means the business to make the most of technical knowledge, technology, the new idea and which is developed creatively, and that main bearer is the enterprise called a venture. There is a purpose of this class in providing the knowledge which is necessary, and know-how and a spirit so that a taking lecture student may establish a venture business.

Outline) The regeneration of the Japanese society with the vitality is being asked. Government enforced "a university venture 3 years 1000 companies plan" over Heisei 14-the 16th year. Though that goal was almost attained, it is very important to promote entrepreneur education continuously from now on. Tokushima Prefecture supports this class based on the recognition done like this, and it is established.

Requirement) The person whom the one with the classroom is constructed by the class start time in the person who doesn't learn the unit of "Introduction to new business" in the college, and a group are organized, and it is limited to the person with the intention to make a business plan, and taking lecture is recognized.

Notice) Being late and a whisper in class should be prohibited strictly. Be careful over and again because it should dispose of exit and future taking lecture may not be recognized when it is wicked.

Goal) Learning of the necessary knowledge to establish venture business, and the ability which can make a business plan.

Schedule) 1. Guidance 2. What is the new business? 3. Keynote lecture 4. Theory of a stand-alone version venture success 5. The law knowledge which is necessary for entrepreneur 6. Fund-raising and capital policy 7. Indirect finance 8. Direct finance 9. The basis of the company management 10. The elementary knowledge of the business accounting 11. The point of the business plan preparation 12. Management strategy and marketing 13. Product development and intellectual property 14. Business plan preparation practice 15. Examination 16. Business plan announcement meeting

Evaluation Criteria) It is evaluated by the presentation (40%) of the written examination (60%) and the business plan. And, the presentation of the written examination and the business plan is decided to be recognized only for the taking lecture student who attended it for 2/3 and more of the classes that it is opened.

Textbook) The summary is distributed every time.

Reference) Several are introduced in the school hours.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169469>

Student) he person who hasn't learned the unit of the new business outline that it is opened with this learning in all the students enrolled in the graduate school yet is made the target. The number of completion people may be restricted in the method such as a lottery in case of a taking lecture applicant many. As for the details, an applicant for taking lecture is to follow those directions because the notice which showed attention in taking lecture is done.

Contact)

⇒ Vice chairperson of School Affairs Committee , Faculty of Engineering

Note) The man of business that it is active in the forefront every time, and an adviser are invited as an instructor, and working knowledge is provided for theory plus practice in this class from the specialist's position. This class is the thing which is useful enough even if it is taken to the person who aims at a general enterprise and a laboratory, the employment to the self-governing body and so on.

Management of Technology

2 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) About the production management of the automobile industry, it is understood variously from the point of view such as "research and development", "production management", "purchasing" and "quality control" "marketing" and "cross-cultural management".

Outline) It learns about the production management. This time, "the automobile industry" specially takes up the production management of "Honda Motor Co.,Ltd. (following Honda)" even of that in the case, and the class to appreciate that importance with ranking of technology in management is taken.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business" .

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of management is learned.
2. Ranking of the technology in management and that importance are appreciated.
3. It learns how to solve the various problems which always occur in the spot of the management through the case study and the business game.

Schedule) 1. Guidance 2. Lecture "What in Management of Technology?" 3. Case report "Research and development of Honda" 4. Case study "Plan an overseas factory." "A new car development order" 5. Lecture "Production management and purchasing" 6. Lecture "Quality control" 7. Case report "The production management of Honda"; "The supply chain management of Honda" 8. Case study "Plan an overseas factory." 9. Case report "The quality control of Honda" 10. Case study "Don't make material defects flare up again." 11. Lecture "Marketing strategy" 12. Lecture "Cross-cultural management" 13. Case report "Around the products project of Honda - the two-wheeled vehicle" 14. Case report "The path of internationalization of Honda" 15. Case report "The personnel management of Honda" 16. Summary and questions and answers

Evaluation Criteria) It is evaluated in the remark (20%) in class and the middle, end of a term report (80% in total).

Textbook) It doesn't specially use. The summary and so on is distributed every time.

Reference) Several are introduced in class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169348>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the doctor former term course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Note) This class invites seven Honda alumnuni who did work in "research and development", "production management", "purchasing", "quality control", "marketing", "cross-cultural management", and so on as an instructor, and it is the class to do case report. Even if it is seen nationwide, the trial done like this is very rare, and it is a precious class. And, an applicant for taking lecture is to attend it in the guidance to hold it in advance. A schedule is indicated separately.

Presentation Method (M)

2 units

Target) Poster and oral presentations, and journal publications are common means of appealing the research work in various scientific and technological disciplines. It's undoubtedly important for activating the research work. The lecture is intending for students to learn most efficient way to appeal their findings and discussions in scientific community.

Outline) Credits are acknowledged to the students who are supervised to give conference speech by themselves and do actually the lectures.

Goal) The lecture is aiming at having knowledge and experience of the presentaion in international conferences.

Evaluation Criteria) Students' achievement is evaluated by portfolios submitted showing the progress in preparation of international conferences as well as by presentation records.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169510>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Internship (M)

2 units

Target) This program is provided to increase knowledge and experience in the actual industrial technology in various fields. Through the practical experience, the program will allow students to become discerning and well-balanced researchers or engineers with deeper understanding of technological societies.

Outline) Credits are acknowledged to students who experienced the internship in companies and/or government offices. Their fulfillment is evaluated by activity reports during internship.

Goal)

1. Grasping internal systems of a company, management, action and strategy to achieve the company's goal. (2)
2. Understanding human relationship and communicative manner in a working society and a company.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by supervisors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169345>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Venture Business (M)

2 units

Target) Aims of the lecture are doing collaborative works with private enterprises and establishing venture businesses through such works.

Outline) The lecture is aiming at founding a venture business company as well as establishing collaborative research works with private enterprises. It's worth to apply their accomplishment to an actual society beyond the range of a laboratory work.

Goal) Objective of the lecture is to have experience and knowledge of collaborative works with private enterprises and to mature the works to venture businesses.

Evaluation Criteria) Credits are acknowledged in case of doing collaborative works with enterprises and/or maturing them to venture businesses. Handouts, reports, and presentation materials, etc. are evaluated to approve credits.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169332>

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Long-term Internship (M)

6 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This program is provided long-term internship in the actual industrial companies and so on, doing a joint study between companies and university on practical problems proposed by the company and practical experience of management of technologies. Through the long-term internship, the program will allow students to become a engineer with a core role in researches and companies

Outline) Credits are acknowledged to students who experienced the internship in companies or government offices of 270 hours during three months or more and presentation to executive officer of the company.

Their fulfillment is evaluated by activity reports during internship and appraisal and interviewed report from a mentor.

Goal) Grasping abilities for practical engineers by studying activities in company and so on.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by mentors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169440>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Nishida (K409, +81-88-656-7630, nishida@kg.tokushima-u.ac.jp)

⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

⇒ Morimoto (A407, +81-88-656-7619, emi.morimoto@kg.tokushima-u.ac.jp) (Office Hour: 月 ~ 木 (10時 ~ 15時))

Note) Students who resister the coop-education program for "Pai-shape" engineers with sense for management of technology, are able to have a grant-in-aid for travel and so on. Ask committee members of long-term internship in your course or coordinators of this program.

Advanced Lecture in Theory of Business Models

2 units

Tatsuya Deguchi · PART-TIME LECTURER, Kenichi Yasumuro · PART-TIME LECTURER, Katsuo Touma · PART-TIME LECTURER
Takahide Yamaguchi · PART-TIME LECTURER, Shingou Nishii · PART-TIME LECTURER

Target) There is a purpose of this class in providing the knowledge which is necessary, and know-how so that students may achieve a business model in establishing enterprises based on the lecture of "Management Theory of New Business", and in making students understood the profit generating stream by studying on the frame work of companies in several business fields.

Outline) Business Model is a remarkable term in modern economic and organizational theories in these days but describes a broad range of definitions. In this lecture, Business Model is defined as "System which converts technology and know how into profit for the purpose of customers' satisfaction" and aims at providing the ability for the design of profitable system, by learning cost issues in establishing business strategies of companies.

Requirement) Finish " Introduction to new business " or " Advanced Lecture in management Theory of new business "

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of business model design is learned.
2. Understanding of the concept of business model by case study analysis are appreciated.
3. It learns forming ability of business plan through the case study on business models.

Schedule) 1. Guidance 2. Keynote lecture "Business Model Thinking" 3. Questions and answers, Discussions 4. Lecture "Theory of Business Models" 5. Lecture "Design principles of Business Models" 6. Lecture "Evaluation of Business Models" 7. Case Study "Business Model in a R&D company" 8. Case Study "Business Model in a manufacturing industrial company" 9. Case Study "Business Model in a company of service industry " 10. Case Study "Business Model in a company of information industry " 11. Business plan practice, Present situation analysis and alternatives. 12. Business plan practice, Concept ad design of business. 13. Business plan practice, Financial analysis . 14. Business plan practice, Concluding and submitting 15. Presentation(1) of Business plan practice. 16. Presentation(2) of Business plan practice, Comments and summary.

Evaluation Criteria) Participation in class(20%) Group work and its report(80%)

Textbook) Ken-ichi Amuro and Study Group of Business model "Case Book: Business Model Thinking" Bunshindo

Reference) Several are introduced in class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169656>

Student) The person who finished "Introduction to new business" or " Advanced Lecture in management Theory of new business " in all the students enrolled in the course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Contact)

⇒ Tatsuya Deguchi (Wakayama University)
⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

Note) This class is supported by Tokushima Prefecture Government

Advanced Theory of Complex System Engineering

2 units

Tetsushi Ueta · ASSOCIATE PROFESSOR / APPLIED INFORMATION MEDIA ENGINEERING, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Hiroshi Kawakami · EXECUTIVE DIRECTOR / THE UNIVERSITY OF TOKUSHIMA

Target) comprehension and application of complex systems by using engineering methodologies

Outline) Complex systems are defined as compound dynamical systems whose behavior and features cannot be predicted because of their nonlinearities and connecting conditions. This emergence of behavior is not possible for a single dynamical system, therefore, connection, coupling, compounding are keywords of this theory. Emergence of rhythm in biological systems, self organization, chaotic properties in high degrees of freedom, learning and associative memory are example features of complex systems. In this lecture, based on physical systems which are ubiquitously found and treated by system engineering subjects, we study analytical methods to understand these phenomena, bifurcation theory of nonlinear and linear systems, applied extraction methods of valuable information from observed data, system design methods of compound dynamical systems.

Style) Lecture

Keyword) complex system, bifurcation, chaos, nonlinear phenomena

Fundamental Lecture) “Differential Equations (II)”(1.0), “Transient Analysis”(1.0), “Industrial Basic Physics”(1.0)

Relational Lecture) “Advanced Theory of System Analysis”(0.5, ⇒p.68), “Topics of mathematical physics”(0.5, ⇒p.74), “Advanced Electrical Control System”(0.5, ⇒p.66), “Advanced Theory of Electronic Circuits”(0.5, ⇒p.69)

Requirement) none

Goal)

1. understanding of the definition and target area of complex systems
2. understanding of qualitative approach for given dynamical system
3. understanding and application of bifurcation theory

Schedule) 1. examples of complex systems 2. relationship between bifurcation problems and complex systems 3. completion of bifurcation parameter values 4. chaos and bifurcation phenomenon 5. chaotic itinerary 6. emergence mechanism of spatio temporal chaos and its clustering 7. phase transition and synchronization 8. spatio temporal intermittency and emergence of patterns 9. chaos neural network 10. neuronal circuits as complex systems 11. bifurcations in emergence systems 12. analysis of social systems 13. survey on complex systems 14. exercise 1 15. exercise 2 16. questions and answers

Evaluation Criteria) The total grade is evaluated by homework reports (70 %) and attendance of the class. (30 %)

Textbook) specified every class.

Reference) Chaotic Scenario of Complex Systems, Asakura-Shoten, 1996 (in Japanese)

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169498>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Ueta (Ait502, +81-88-656-7501, tetsushi@ait.tokushima-u.ac.jp) (Office Hour: Wednesday, afternoon)
⇒ Kawakami (E 棟 3 階北 C-7, +81-88-656-7465, hukugakk@honbu.tokushima-u.ac.jp)

Advanced Theory of Electromagnetic Compatibility

2 units

Masatake Kawada · ASSOCIATE PROFESSOR / ELECTRIC ENERGY ENGINEERING, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Katsuo Isaka · PART-TIME LECTURER / ELECTRIC ENERGY ENGINEERING, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) The purpose of this lecture is to help students understand (1) electromagnetic environments quantitatively, (2) their electrical effects on the industrial products and (3) their biological effects on humans.

Outline) (1) Fundamentals of electromagnetic theory, (2) Electromagnetic compatibility (EMC) of industrial products, (3) Guideline of protection of humans from environmental electromagnetic fields, and (4) Concept of EMC in 21st century.

Style) Lecture

Keyword) Electromagnetic field, Electromagnetic interference, Electromagnetic immunity

Fundamental Lecture) “Advanced Circuit Theory”(0.2, ⇒p.68), “Advanced Theory of Electronic Circuits”(0.2, ⇒p.69), “Advanced Biological Engineering”(0.2, ⇒p.68)

Relational Lecture) “Electric Power System”(0.2, ⇒p.66)

Requirement) Good understanding of electromagnetics theory.

Goal)

1. To be able to understand natural and artificial environments by the theoretical use of electromagnetic fields.
2. To be able to understand the practice of electromagnetic compatibility design of electric and electronic equipments.
3. To be able to understand the discussions of electromagnetic fields effects on living bodies by international agencies.

Schedule) 1. Electric field, magnetic field and Electromagnetic field (1). 2. Electric field, magnetic field and Electromagnetic field (2). 3. Electric field, magnetic field and Electromagnetic field (3). 4. Electromagnetic fields in natural environment. 5. Man-made low frequency electromagnetic fields. 6. Low frequency electromagnetic fields in residential and occupational environments. 7. Man-made High frequency electromagnetic fields. 8. Concept of electromagnetic compatibility. 9. Electromagnetic interference and immunity 10. Effects of environmental electromagnetic fields on electronic circuits. 11. Biological effects of electromagnetic fields. 12. Protection of humans from ionizing and non-ionizing electromagnetic fields. 13. Precautionary principle by World Health Organization. 14. Living environments in 21st century and EMC. 15. Review talk and discussions. 16. Examination.

Evaluation Criteria) Assignments count 30% and Examination 70%.

Textbook) None.

Reference) Will be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169457>

Student) Any students can attend the class.

Contact)

⇒ Kawada (E 棟 2 階北 B-10, +81-88-656-7460, kawada@ee.tokushima-u.ac.jp) (Office Hour: (水)(木) 16:00-17:00)

Note) This lecture will be given in English.

Advanced Lecture of E-business

2 units

Yohsuke Kinouchi · PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) To master key technologies used in e-business and the principles.

Outline) Key technologies for e-business are introduced.

Style) Lecture

Keyword) e-business, internet

Requirement) none

Notice) none

Goal)

1. To get knowledge on e-business
2. To get skills for e-business

Schedule) 1. e-business 2. Internet and the mechanism 3. Mobile network and the mechanism 4. Network management 5. Security for e-business 6. typical e-business model 7. establishment of e-business 8. administration of e-business 9. accounting for e-business 10. customer management in e-business 11. complaints management in e-business 12. Examples of e-business in production areas 13. Examples of e-business in commercial areas 14. Examples of e-business in service areas 15. Example of e-business in social areas 16. Comments on reports

Evaluation Criteria) Evaluated by portfolios and/or examinations

Textbook) Printed materials

Reference) References will be introduced in the classes.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169304>

Student) Able to be taken by only specified class(es)

Contact)
⇒ Kinouchi (E 棟 3 階北 C-4, +81-88-656-7475, kinouchi@ee.tokushima-u.ac.jp)

Advanced Lecture on Semiconductor Nanotechnology 2 units

Toshiro Isu · PROFESSOR / INSTITUTE OF TECHNOLOGY AND SCIENCE, Takahiro Kitada · ASSOCIATE PROFESSOR / INSTITUTE OF TECHNOLOGY AND SCIENCE

Target) This class introduces basic principles of the semiconductor nanotechnology and their application to the quantum devices.

Outline) Basics of semiconductor physics and quantum mechanics are introduced to understand material properties of quantum confined nanostructures. Recent progress in fabrication techniques and device applications of semiconductor nanostructures (quantum wells, wires and dots) will be reviewed.

Style) Lecture

Keyword) Quantum confined nanostructures, Semiconductor nanoscience, Electron devices, Photonic devices

Requirement) None.

Notice) None.

Goal) To understand basic properties of semiconductor nanostructures and quantum devices.

Schedule) **1.** Introduction to semiconductor nanostructures **2.** Electronic states in quantum confined structures **3.** Electrical properties of superlattices **4.** Fabrication technique of quantum wires and wells **5.** Characterization of heterointerfaces **6.** Characterization of nanostructures **7.** High-speed electron devices **8.** Optical properties of quantum wells **9.** Semiconductor laser diodes **10.** Quantum effect devices **11.** Fabrication technique of quantum dots **12.** Quantum dot devices **13.** Device application of quantum nano structures **14.** Recent topics of semiconductor nanotechnology (1) **15.** Recent topics of semiconductor nanotechnology (2)

Evaluation Criteria) Assignments count 100%

Textbook) None.

Reference) Will be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169477>

Student) Any students can attend the class.

Contact)
⇒ Isu (A224, +81-88-656-7670, t.isu@frc.tokushima-u.ac.jp) (Office Hour: Tue -Thu 10:00-14:00)
⇒ Kitada (A224, +81-88-656-7671, kitada@frc.tokushima-u.ac.jp) (Office Hour: Mon. 10:00-14:00)

Nuclear Magnetic Resonance 2 units

Takashi Ohno · PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) This lecture explains principles of nuclear magnetic resonance and introduces its application to solid state physics and chemistry.

Outline) Nuclear magnetic moment and its interaction with an external magnetic field are explained based on quantum mechanics. Some examples of its application to solid state physics and chemistry are introduced.

Style) Lecture

Keyword) NMR, NMR spectrum, spin - lattice relaxation, Knight shift, Chemical shift

Schedule) **1.** Magnetic moment of nuclei and Boltzmann's distribution **2.** Magnetic moment of electron **3.** Method for NMR observation **4.** Apparatus for NMR measurement **5.** Spin echo and NMR spectrum **6.** Spin - lattice relaxation **7.** NMR in metals **8.** High Tc superconductors **9.** NMR and NQR of High Tc superconductors **10.** Chemical shift **11.** Knight shift **12.** NMR in chemistry **13.** Magnetism and NMR **14.** Superconductors and NMR - NQR **15.** Super ionic conductors and NMR

Textbook) 遍歴電子系の核磁気共鳴 (朝山邦輔著・裳華房)

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169329>

Contact)

⇒ Takashi Ohno, A201, 656-7549

Engineering of Correlated Electron Matter 2 units

Yu Kawasaki · ASSOCIATE PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) In many solid-state materials, new phenomena evolve due to strong electron interactions. In this Lecture, review will be given on these phenomena and potential applications to technology after an introductory talk on magnetism and superconductivity.

Outline) New types of superconducting and magnetic phenomena emerge in correlated electron matters. After an introductory talk on magnetism and superconductivity, review will be given on some advanced topic and potential application of correlated electron matters to technology focusing on spintronics or strongly correlated electronics.

Style) Lecture

Keyword) strongly correlated electron, magnetism, superconductivity

Goal) To understand basic concept of correlated electron matter and its application

Schedule) **1.** Correlated electron matters **2.** Introduction to magnetism **3.** Electronic states of atoms **4.** Magnetic ions in crystal **5.** Magnetic interaction **6.** Local-moment magnetism **7.** Local-moment magnetism **8.** Itinerant-electron magnetism **9.** Ferromagnet and its application to technology **10.** Superconducting phenomenology **11.** Electron-phonon interaction **12.** Magnetic flux quantum and SQUID **13.** Type II superconductor **14.** New type of superconductivity **15.** Manganese oxide and spintronics

Evaluation Criteria) Reports on several subjects in lecture

Textbook) no specific text

Reference) 太田恵造「磁気工学の基礎 I & II」共立全書

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169350>

Topics of mathematical physics 2 units

Shigeaki Nagamachi · PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) We study the quantum computing.

Outline) We study the elementary theory of numbers and group theory in order to understand RSA cryptography based on the difficulty of factorization for a big number. We study the theory of Hilbert spaces and their operators to understand Shor's fast factorization algorithm for quantum computers.

Goal) Understanding the principle of quantum computation

Schedule) **1.** Group theory 1 **2.** Group theory 2 **3.** Number theory 1 **4.** Number theory 2 **5.** RSA cryptography **6.** Shor's factorization algorithm 1 **7.** Hilbert space **8.** Operators on Hilbert space **9.** Quantum mechanics 1 **10.** Quantum mechanics 2 **11.** Quantum information **12.** Quantum circuits **13.** Quantum Fourier transformation **14.** Shor's factorization algorithm 2 **15.** The complexity of Shor's factorization algorithm **16.** Reserve day

Textbook) Mika Hirvensalo, Quantum Computing, Springer (2004)

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169410>

Topics in topology 2 units

Hiroki Sumida-Takahashi · ASSOCIATE PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) We will learn works of Euler who is the founder of topology. Further we will understand effectiveness of mathematics in natural science.

Outline) In this course we will learn basic facts of mathematics. Further we will understand their interesting applications.

Keyword) Euler characteristics, Euler's identity, Euler-Maclaurin method

Fundamental Lecture) "Basic Mathematics/Calculus 1"(1.0), "Basic Mathematics/Calculus 2"(1.0)

Relational Lecture) "Complex Analysis"(0.5)

Goal) We will learn fundamentals of modern mathematics and realize its effectiveness.

Schedule) 1. Introduction 2. Leonhard Euler 3. Bernoulli number 4. Logarithm and Exponential 5. Sine and Cosine 6. Fourier series 7. Tangent and Cotangent 8. Seven bridges 9. Polyhedron 10. Zeta function 11. Euler-Maclaurin method 12. Special values 13. Euler products 14. Riemann hypothesis 15. Fast Fourier transform 16. Summation

Evaluation Criteria) Evaluation will be based on assignments.

Textbook) 特に指定しない。

Reference)

- ◇ 『無限オイラー解析』(現代数学社) 高橋浩樹
- ◇ 『オイラー入門』(シュプリンガー・フェアラーク東京)W. ダンハム

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169305>

Contact)

⇒ Sumida-Takahashi (A204, +81-88-656-7542, hiroki@pm.tokushima-u.ac.jp) (Office Hour: Wednesday, 17:00-18:00)

Note) I will pleasantly explain to beginners.

Advanced Plasma Engineering

2 units

Kaoru Ohya · PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) The purpose of the lecture is to give an introduction to the behavior of plasmas and its treatment.

Outline) The elements of plasma physics and chemistry are introduced in this lecture.

Style) Lecture and exercise

Keyword) plasma, nuclear fusion

Goal)

1. Understanding on properties of plasmas
2. Understanding on an introduction to theories of plasma physics

Schedule) 1. Single-particle motions (1) 2. Single-particle motions (2) 3. Single-particle motions (3) 4. Plasma as fluids (1) 5. Plasma as fluids (2) 6. Waves in plasmas (1) 7. Waves in plasmas (2) 8. Waves in plasmas (3) 9. Diffusion and resistivity (1) 10. Diffusion and resistivity (2) 11. Equilibrium and stability (1) 12. Equilibrium and stability (2) 13. Introduction to controlled nuclear fusion (1) 14. Introduction to controlled nuclear fusion (2) 15. Introduction to controlled nuclear fusion (3) 16. Conclusions and future problems

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169509>

Contact)

⇒ Ohya (E 棟 2 階南 A-9, +81-88-656-7444, ohya@ee.tokushima-u.ac.jp)

Advanced Theory of Electron Devices

2 units

Yasuo Ohno · PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Jin-Ping AO · ASSOCIATE PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) Understanding of deep levels in compound semiconductor electron device performances

Outline) Semiconductor device physics for the analyses and design of semiconductor electron devices will be lectured. After teaching basic concepts of band diagram and fermi levels, carrier transport theory and device operation mechanisms will be presented. Various instable phenomena, which limit the device performance, will also be presented with theoretical backgrounds. The topics include, silicon, GaAs and GaN as semiconductor materials, and MOSFET, HEMT and HBT as electron devices. The lecture items are, 1 Band diagram, 2 Electron transport, 3 Short channel effects, 4 Impurity levels, 5 Deep traps, 6 Semi-insulating substrate, 7 HEMT, 8 Side-gating effect, 9 Drain-lag and DLTS, and 10 Surface states and breakdown.

Style) Lecture

Keyword) band diagram, HEMT

Goal) Draw band diagrams including deep levels in non-thermal equilibrium

Schedule) 1. Band Diagram 2. Thermodynamics of Electron Transport 3. Short Channel Effects 4. Impurity Levels 5. Electrical Performance of Deep Levels 6. Semi-insulating Substrate 7. Hetero Junction Transistors 8. Side-Gating Effect 9. Drain Lag and DLTS 10. Surface States and Breakdown

Voltage 11. Discussion 12. Midterm Examination 13. Wide-Gap Semiconductors 14. AlGaIn/GaN HFET 15. Discussion 16. Term Examination

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169458>

Contact)

⇒ Ohno (E 棟 2 階南 A-7, +81-88-656-7438, ohno@ee.tokushima-u.ac.jp)

⇒ Ao (EE A-8, +81-88-656-7442, jpao@ee.tokushima-u.ac.jp)

Note) This lecture will be given in English.

Advanced Device Processing

2 units

Yoshiki Naoi · ASSOCIATE PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) This course will cover topics related to device processing engineering and science, in semiconductor and dielectric devices.

Outline) Basic subjects such as physical chemistry, vacuum engineering, surface science, crystal growth technology and measurement methods for device evaluations will be lectured.

Style) Lecture

Keyword) Device Processing, Surface Physics and Chemistry, Vacuum Engineering

Fundamental Lecture) “Advanced Theory of Semiconductors”(1.0, ⇒p.65), “Advanced Theory of Integrated Circuits”(1.0, ⇒p.69)

Relational Lecture) “Advance Theory of Electrical and Electronic Materials”(0.5, ⇒p.64)

Goal) To understand the physics of the device processing technology.

Schedule) 1. Semiconductor and devices. 2. Property of vacuum 3. Production of vacuum 4. Pressure measurement 5. Interaction of atoms and molecules with surface 6. Vapor pressure, application to crystal growth using vacuum technology 7. Physisorption and chemisorption 8. Plasma etching 9. Chemical etching and Physical etching 10. Physics of diffraction 11. Electron optics 12. Electron spectroscopy 13. Scanning Electron Microscopy 14. Transmission Electron Microscopy 15. Atomic Force Microscopy 16. Examination

Evaluation Criteria) Problem Sets: 50%, Paper: 50%

Textbook) none - references will be cited during lectures

Reference) S. M. Sze, Physics of Semiconductor Devices, Second Edition (John Wiley & Sons, 1981).

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169449>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Naoi (E 棟 2 階南 A-4, +81-88-656-7447, naoi@ee.tokushima-u.ac.jp) (Office Hour: Th 5:00-6:00PM)

Note) This lecture will be given in English.

Advance Theory of Electrical and Electronic Materials

2 units

Kikuo Tominaga · ASSOCIATE PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) This course aims to improve the ability to develop new materials by learning the fundamentals of material science and the properties of various electrical and electronic materials.

Outline) Material science of metals, oxide semiconductors, superconductors, magnetic materials, dielectric materials are lectured for the students of electrical and electronic engineering. The fundamentals of these materials are explained at first as basic knowledge. Oxide semiconductors, superconductor, ferroelectric materials, ferromagnetic materials and ferrite are included. Dielectric and magnetic materials are stressed here. General outline of those materials are given at first. After that, magnetization mechanism of ferromagnetics and various properties of dielectrics are discussed mostly at the view-points of both solid state physics and applications. 1. Solid state physics of metals, 2. oxide semiconductors and transparent conductive oxides, 3. superconductors, 4. dielectrics and ferroelectric materials, 5. magnetization of the substance and magnetic domain structure, 6. ferrite and recent magnets, 7. piezoelectric materials and applications, 8. optoelectronics materials such as CCD, laser, and displays.

Style) Lecture and exercise

Keyword) Material science, Electrical and Electronic Engineering, dielectric material, magnetic material, semiconductor materials

Relational Lecture) “Advanced Theory of Semiconductors”(0.5, ⇒p.65), “Advanced Device Processing”(0.5, ⇒p.64), “Advanced Optoelectronic Devices”(0.5, ⇒p.65)

Goal) Understand the fundamentals in material science for electrical and electronic engineering.

Schedule) 1. Solid state physics of metals 2. Solid state physics of oxide semiconductors 3. Transparent conductive oxide films 4. Physics of superconductor 5. Superconductors and their applications 6. Paradielectric materials 7. Various properties of ferroelectric materials 8. Magnetization of the substance 9. Ferromagnetic materials 10. Ferrite 11. Recent magnets(bond magnets) 12. Piezoelectric materials 13. Application of piezoelectric materials 14. Optoelectronic materials (1)(CCD, laser materials) 15. Optoelectronic materials (2)(display materials) 16. Exercise

Evaluation Criteria) Examination for each theme.

Textbook) Electrical and Electronic Materials, Tadashi Shiosaki, Kyouritsu Shuppan (in Japanese)

Reference) 内野研二・石井孝明「強誘電体デバイス」森北出版, 高木豊・沢田正三「磁性体・誘電体の物性工学」オーム社, 塩崎忠「圧電材料とその応用」シーエムシー出版

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169452>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Tominaga (E棟2階南 A-6, +81-88-656-7439, tominaga@ee.tokushima-u.ac.jp) (Office Hour: Thurs day and Friday, pm.17:00-18:30)

Note) This lecture is carried out by the use of power point. Prepare electronic memory for the study in home.

Advanced Theory of Semiconductors

2 units

Katsushi Nishino · ASSOCIATE PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) To understand semiconductor physics and fundamental device operations for various semiconductor devices

Outline) Semiconductor physics, especially behavior of carriers in semiconductor, is described. Properties of pn junction and Schottky barrier, including non-ideal case, are also lectured.

Style) Lecture

Keyword) Semiconductor, Metal-semiconductor contact, pn junction diode

Relational Lecture) “Advanced Device Processing”(0.5, ⇒p.64), “Advanced Theory of Electron Devices”(0.5, ⇒p.64), “Advanced Optoelectronic Devices”(0.5, ⇒p.65)

Goal)

1. To understand behavior of carries (such as scattering mechanisms) in semiconductor
2. To solve diffusion equations in simple conditions
3. To understand properties of pn junction and Schottky barrier

Schedule) 1. Crystal Structure 2. Energy Bands 3. Carrier Concentration at Thermal Equilibrium 4. Carrier Transport 5. Phonon 6. High-Field Effect 7. Continuity Equations and Diffusion Equations of Carriers 8. Band Structure of Metal-Semiconductor Contact 9. Current Transport Processes of Schottky Barrier 10. Characterization of Schottky Barrier Height 11. Ohmic Contact 12. Band Structure of pn Junction Diode 13. Capacitance-Voltage Characteristics of pn Junction Diode 14. Current-Voltage Characteristics of pn Junction Diode 15. Heterojunction 16. Examination

Evaluation Criteria) Report 50%, Examination 50%. More than 60% is required to pass this class.

Textbook) Physics of Semiconductor Devices, by S.M.Sze

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169476>

Contact)

⇒ Nishino (E棟2階南 A-5, +81-88-656-7464, nishino@ee.tokushima-u.ac.jp)

Advanced Optoelectronic Devices

2 units

Shiro Sakai · PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) Understanding of opt-electronic devices

Outline) I lecture on an optical amplification and its effect on a semiconductor laser and optical properties of semiconductors. Carrier and light confinements, reflection and guided mode stripe lasers, and the

quantum confinement hetero-structure lasers are explained. Reports are required in each of the step, and it is bases of final grade. Lecture schedule are follows. 1. Optical confinement and wave-guide. 2. v-b curves and effective index. 3. Einstein's relation in a semiconductor and black body radiation. 4. Semiconductor light absorption, spontaneous and stimulated emission. 5. Matrix element and density of state of a semiconductor. 6. Optical amplification and the various model calculation in a semiconductor. 7. Optical amplification and semiconductor lasers. 8. The design of a semiconductor laser. 9. The growth of a semiconductor laser. 10. Summary.

Keyword) Laser, Semiconductor, Light confinement

Requirement) Students are required to have a good understand undergraduate level physics of semiconductor.

Goal) To understand of the opto-electronic semiconductors

Schedule) 1. Optical confinement and wave-guide. 2. v-b curves and effective index 1. 3. v-b curves and effective index 2. 4. Einstein's relation in a semiconductor and black body radiation. 5. Semiconductor light absorption, spontaneous and stimulated emission. 6. Matrix element and density of state of a semiconductor 1. 7. Matrix element and density of state of a semiconductor 2. 8. Optical amplification and the various model calculation in a semiconductor 1. 9. Optical amplification and the various model calculation in a semiconductor 2. 10. Optical amplification and semiconductor lasers 1. 11. Optical amplification and semiconductor lasers 2. 12. The design of a semiconductor laser 1. 13. The design of a semiconductor laser 2. 14. The growth of a semiconductor laser 1. 15. The growth of a semiconductor laser 2. 16. Summary.

Evaluation Criteria) Report 40, Test 60, Total 100. Above 60 pass the examination.

Textbook) Diode lasers and photonic integrated circuits, by L.A.Coldren, S.W.Corzine, John Wiley & sons, Inc., (1995) ISBN 0-471-11875-3

Reference) Hetero-structure lasers, by H.C.Casey, Jr, M.B.Panish, Academic Press, (1978), ISBN 0-12-163101

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169492>

Contact)

⇒ Sakai (E棟2階南 A-3, +81-88-656-7446, sakai@ee.tokushima-u.ac.jp)

Advanced Theory of Optoelectronics

2 units

Shiro Sakai · PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Kazuhiro Tajima · PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) The purpose of this class is to understand principles of new optical devices based on optical nonlinearities.

Outline) Principles of optical fiber communication and new optical devices based on optical nonlinearities are introduced in this class.

Style) Lecture

Keyword) optical fiber, optical device, optical communications

Goal)

1. understand principles of optical fiber communications
2. understand optical nonlinearities
3. understand principles of nonlinear optical devices
4. understand application methods of nonlinear optical devices

Schedule) 1. linearities of single mode optical fibers(2 weeks) 2. Soliton effects in single mode optical fibers(2 weeks) 3. optical devices (2weeks) 4. Various nonlinearities in semoconductors and their comparison.(2weeks) 5. All optical devices based on semiconductor and differential phase modulation(2weeks) 6. Limiting factors of semiconductor all-optical devices(2weeks) 7. Application to optical communications(3weeks) 8. Examination

Evaluation Criteria) Examinations and portfolios

Textbook) Printed materials

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169478>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Sakai (E棟2階南 A-3, +81-88-656-7446, sakai@ee.tokushima-u.ac.jp)

⇒ Tajima (E棟2階南 A-2, +81-88-656-9716, tajima@ee.tokushima-u.ac.jp)

Note) Since he is sick taking a rest, you have to check whether a course is opened.

Advanced High Voltage Engineering

2 units

Naoyuki Shimomura · ASSOCIATE PROFESSOR / ELECTRIC ENERGY ENGINEERING, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) It doesn't stay in the field of electric power engineering and the knowledge of the high voltage and large-current engineering is acquired. The latest use of the high voltage and large-current technology and the application will be learned.

Outline) The high-voltage engineering the large-current engineering has supported industries and the electric energy engineering and is still developing. In this lecture, the various physical phenomena involved in high voltage and large current as well as the phenomena of discharges and the characteristics of insulators are described in detail. Moreover, it lectures on the technology of the generation and the diagnostics of the high voltage and so on including the latest technology. In its applications, the new technology and application rather than the electric power system are introduced, as pulsed power and inertia confinement fusion. The current or upcoming topics such as environmental applications and medical applications will be discussed in the class.

Style) Lecture and exercise

Keyword) High voltage, Large current, Pulsed power

Fundamental Lecture) "High Voltage Engineering"(1.0)

Goal)

1. To understand fundamental phenomena of the discharge and mechanisms of the insulation
2. To understand fundamental phenomena of large current

Schedule) 1. The recent trends of technologies on high voltage and large current 2. The recent trends of pulsed power technologies and their applications 3. The state-of-the-art technologies for pulsed power (12wks) 4. Term-end exam 5. The exposition about the exam

Evaluation Criteria) Participation and presentation:50%; Final examination:50%

Textbook) None

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169371>

Student) Able to be taken by student of other department

Contact)

⇒ Shimomura (E 棟 2 階北 B-8, +81-88-656-7463, simomura@ee.tokushima-u.ac.jp) (Office Hour: (月) 16:00 - 19:00 ※掲示板で確認されたい。)

Note) Language in this subject may be English.

Electric Power System

2 units

Kiyoshi Inoue · PROFESSOR / ELECTRIC ENERGY ENGINEERING, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) Based on the fundamental knowledge of electric power system engineering, detailed understanding on electric-magnetic environments around the power transmission system are expected through this lecture. Superconducting electrical machines, such as superconducting power transmission cable, SMES, superconducting generator, superconducting current limiter, and superconducting transformer, are expected to be incorporated in the practical power transmission system, of which influences are also lectured.

Outline) Considering through the general characteristics of AC and DC power transmission system and its history of level-up of transmission voltage, detailed understanding on the rapid development of power transmission system in past-100 years, and in future are expected. The future power transmission system is expected to be concerned with the superconducting facilities, as a superconducting power transmission cable. Considering the historical developments of power transmission system, transmission system materials, and superconducting materials, this lecture is performed. The analytical and measuring methods of the electro-magnetic fields around the power transmission facilities and the superconducting facilities are also included in this lecture. The lecture is one of the technological lectures including (1) the general characteristics of AC, DC and superconducting power transmission systems, (2) The history and future of power transmission system with large capacity, (3) the insulation reliability of insulator, oil, and cryogen, (4) the superconducting machines, and (5) the analytical and measuring methods of the electric and magnetic fields.

Keyword) superconductivity

Goal)

1. Analysis of electric power, frequency, and voltage in transmission system can be performed.
2. Electro-magnetic field around power transmission lines and superconducting facilities can be understood.
3. Superconductive applications to power transmission systems can be understood.

Schedule) 1. Characteristics of effective electric power and reactive electric power. 2. Stability of frequency and voltage 3. Superconducting power cable 4. Comparison of DC and AC power cable. 5. Influence of superconducting generator on electric power system. 6. Problems on long-length cryogenic cooling. 7. Characteristics of electric fields from the power systems and the superconducting facilities. 8. Characteristics of magnetic fields from the power transmission systems and the superconducting facilities 9. Protection facilities for the power system and the superconducting facilities. 10. Stability of the superconducting facilities 11. Electro-magnetic field effects on a living body 12. Superconducting transformer, superconducting current limiter, and SMES. 13. Progress on the materials in electric power system 14. Thermal insulation and electric insulation. 15. Magnetic field shield. 16. Conclusions and report

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169460>

Contact)

⇒ Inoue (B-7, +81-88-656-7462, inouek@ee.tokushima-u.ac.jp) (Office Hour: Monday 13:30 - 17:30, Wednesday 13:30 - 17:30)

Advanced Theory of Electric Power Engineering

2 units

Masatake Kawada · ASSOCIATE PROFESSOR / ELECTRIC ENERGY ENGINEERING, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Kensuke Kawasaki · PROFESSOR / ELECTRIC POWER, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Kiyoshi Takigawa · ASSOCIATE PROFESSOR / ELECTRIC POWER, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) To give the students understanding of the principles and the trends of technologies used in electric power engineering and the related environmental aspects. To improve the oral presentation skill of students by presenting the latest transaction or journal papers in this field in English.

Outline) This course presents the principles and trends of technologies used in electric power engineering and the related environmental aspects. Students are required to present the latest transaction or journal papers in this field in English.

Style) Lecture and exercise

Keyword) Electromagnetics, Electrical Circuits

Relational Lecture) "Advanced Theory of Electromagnetic Compatibility"(0.5, ⇒p.62), "Electric Power System"(0.5, ⇒p.66), "Advanced High Voltage Engineering"(0.5, ⇒p.66)

Requirement) Prerequisites: electrical power engineering, energy engineering or equivalent in undergraduate.

Goal)

1. To understand the principles and the trends of technologies used in electric power engineering
2. To understand the environmental aspects of electric power engineering

Schedule) 1. Principles of electric power engineering 1 2. Principles of electric power engineering 2 3. Materials in electric power engineering 4. Instrumentation in electric power engineering 5. Generators 6. Transformers 7. Switchgear 8. Cable 9. Power system 10. Power quality and electromagnetic compatibility 11. Presentation of surveyed transaction or journal papers 1 12. Presentation of surveyed transaction or journal papers 2 13. Presentation of surveyed transaction or journal papers 3 14. Presentation of surveyed transaction or journal papers 4 15. Examination 16. Return of examination and conclusion

Evaluation Criteria) Final examination 50%, Presentation 50% Attendance and participation in class is essential. More than 60 % is required to get the credits

Textbook) D.F. Warne, Electrical Power Engineer's Handbook second edition, Newnes

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169461>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Kawada (E 棟 2 階北 B-10, +81-88-656-7460, kawada@ee.tokushima-u.ac.jp) (Office Hour: Wednesday 16:00-17:00, Thursday 16:00-17:00)

Note) Language: English

Advanced Electrical Control System

2 units

Takashi Yasuno · ASSOCIATE PROFESSOR / ELECTRIC ENERGY ENGINEERING, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) This class introduces the basic principle of making to high performance and the intelligence in control system used for an industrial machine. And the control design of various control systems is understood.

Outline) The control system configuration used for the industrial machine is described, and applications of intelligent control method using fuzzy reasoning and neural net works are introduced. Moreover, Current topics of fields mentioned above are introduced.

Style) Lecture and exercise

Keyword) Motion Control, Fuzzy Reasoning, Neural Network

Relational Lecture) "Advanced Lecture of Intelligent Information Processing"(0.5, ⇒p.69), "Advanced Control Theory"(0.5, ⇒p.67)

Goal)

1. The configuration of the control system used for an industrial machine should be understood.
2. The intelligent control method should be understood.

Schedule) 1. Control object 2. Feedback control and feedforward control 3. Two degree-of-freedom control 4. Analysis of control system 5. Control method 1 of feedback control 6. Control method 2 of feedback control 7. Design criterion of feedforward controller 8. Fuzzy sets 9. Fuzzy reasoning 10. Control system application of fuzzy reasoning 11. Artificial neural network 12. Neural network 13. Learning algorithm 14. Control system application of neural networks 15. Conclusions 16. Return of report or examination

Evaluation Criteria) Total evaluation based on Reports or examinations

Textbook) The print is distributed.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169413>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Yasuno (E棟2階北 B-5, +81-88-656-7458, yasuno@ee.tokushima-u.ac.jp) (Office Hour: Monday, 15:00-17:30)

Electromechanical Systems

2 units

Kikuro Morita · PROFESSOR / ELECTRIC ENERGY ENGINEERING, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) The purpose of Electromechanical System is to understand the conceptual philosophy of new ac machine drive systems, which are found in a vast number of industries.

Outline) We discuss the mathematical modeling techniques of ac machines in the various reference frames, the vector control method using these modeling techniques and the sensorless control methods. Furthermore we introduce the configurations of power converter and the architectures of the control systems embedded the micro-controller LSI and DSP chips. By simulation analysis using "Mathematica" and "MATLAB" in the first half, and through the practical designs in the second half, the more theoretical and practical understandings are expected.

Style) Lecture and exercise

Keyword) dq transformation, synchronous motor, induction motor, vector control, sensorless control

Relational Lecture) "Advanced Power Electronics"(0.3, ⇒p.67)

Requirement) Prerequisites (preferable) : "Electrical machines (I),(II)" ,"Power electronics" and "Electrical machine dynamics and controls" in undergraduate.

Goal) To understand the conceptual philosophy of new ac machine drive control systems

Schedule) 1. Modeling of synchronous motors. 2. Modeling of induction motors. 3. Vector control of synchronous motors. 4. Vector control of induction motors (1). 5. Vector control of induction motors (2). 6. Sensorless vector control of synchronous motors. 7. Sensorless vector control of induction motors (1). 8. Sensorless vector control of induction motors (2). 9. Inverter circuits for ac motor drives. 10. LSI for ac motor drive controls. 11. DSP for ac motor drive controls. 12. Configuration of ac motor drive controls system (1). 13. Configuration of ac motor drive controls system (2). 14. Sum-up and conclusions. 15. Final examination. 16. Review of final examination.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169451>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Morita (E棟2階北 B-3, +81-88-656-7451, morita@ee.tokushima-u.ac.jp)

Advanced Power Electronics

2 units

Tokuo Ohnishi · PROFESSOR / ELECTRIC ENERGY ENGINEERING, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING
Masahide Hojo · ASSOCIATE PROFESSOR / ELECTRIC ENERGY ENGINEERING, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) To understand and learn application technologies of power conversion control circuit using switching power devices.

Outline) Basic power electronics covers the basic operation and its characteristics of the static power conversion circuit by using switching power devices. In the advanced power electronics, how to generate the switching control signal for these power conversion circuit, how to construct the control system and how to apply the power converter to many apparatus are lectured and discussed. Subjects are as follows; harmonics analysis, rotating axes transformation, instantaneous active and reactive power, PWM control methods, Sinusoidal PWM control, PFC converter, interconnected inverter, active filter, reactive power compensator, sensorless controls.

Keyword) Inverter, Power supply, Motor drive, Utility interconnection

Fundamental Lecture) "Power Electronics"(1.0), "Electrical Machines (I)"(1.0), "Electrical Machines (II)"(1.0)

Relational Lecture) "Electrical Machine Dynamics and Controls"(0.5), "Electrical Machine Dynamics and Controls"(0.5)

Requirement) Prerequisites: power electronics in undergraduate

Goal)

1. Ability of theoretical analysis
2. Understanding the control operation of application circuit
3. Understanding the control system of application circuits
4. Understanding the operation of control systems

Schedule) 1. Harmonics analysis 2. Rotating axes transformation 3. Instantaneous active power and instantaneous reactive power 4. PWM switching methods 5. Sinusoidal PWM inverter 6. Power factor correction converter 7. Midterm test 8. Utility interconnecting inverter 9. Active power filter 10. Reactive power compensator 11. Variable speed control of DC motors 12. Variable speed control theory of AC motors 13. Variable speed control system of AC motors 14. Application of power conversion for renewable energy 15. Final test 16. Explanation of the test and check of the results

Evaluation Criteria) Final examination 50%, Presentation (Participation) 50%

Textbook) None (Prints)

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169475>

Contact)

⇒ Ohnishi (E棟2階北 B-1, +81-88-656-7456, ohnishi@ee.tokushima-u.ac.jp)

⇒ Hojo (E棟2階北 B-2, +81-88-656-7452, hojo@ee.tokushima-u.ac.jp)

Advanced Control Theory

2 units

Tomohiro Kubo · PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) The purpose of this lecture is to explain the design theory of control systems based on the state space method.

Outline) The state space method describes the dynamics of systems with the state equation, and it has a merit that it can deal with multi-input multi-output systems as well as single-input single-output systems. In this lecture, among the design methods belonging to the state space method, the linear-quadratic regulator and pole assignment are demonstrated.(lecture style)

Style) Lecture

Keyword) linear-quadratic regulator, pole assignment method

Fundamental Lecture) "Basic Theory of Systems"(1.0)

Relational Lecture) "Control Theory (II)"(0.5), "Control System Design"(0.5, ⇒p.142)

Requirement) Basic knowledge about the linear algebra is required to attend this lecture.

Note) Take notes carefully.

Goal)

1. To understand the notion of the system structure in the state space method
2. To master the design method of the linear-quadratic regulator

Schedule) 1. What is the linear-quadratic regulator? 2. Determinant and inverse of matrix 3. Eigenvalues, eigenvectors and diagonalization of matrix 4. Quadratic form and positive definiteness 5. Necessary and sufficient condition for the controllability 6. Observability and duality 7. State variable transformation and equivalence 8. Diagonal canonical form 9. Controllability canonical form 10. Lyapunov function and the stability of systems 11. Constructing the linear-quadratic regulator 12. Stability of the closed loop system 13. Optimality of the control law 14. Solving Riccati equation 15. Pole assignment method 16. Examination

Evaluation Criteria) Mainly by the examination.

Textbook) Not used.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169414>

Contact)

⇒ Kubo (E 棟 3 階北 C-6, +81-88-656-7466, kubo@ee.tokushima-u.ac.jp) (Office Hour: 月曜日 8:30~ 9:30, 木曜日 17:00~ 18:00)

Advanced Theory of System Analysis

2 units

Hiroshi Kawakami · EXECUTIVE DIRECTOR / THE UNIVERSITY OF TOKUSHIMA

Target) Modeling, analysis method and design method of dynamical systems are introduced in this lecture.

Outline) An analytical method of linear lumped constant systems is introduced in this lecture. Also, various nonlinear phenomena and the qualitative analysis method are explained. Furthermore, relationship between linear systems and nonlinear ones are discussed in this lecture.

Goal)

1. Understand behaviors of linear systems
2. Understand behaviors of nonlinear systems and the qualitative analysis method.

Schedule) 1. Dynamical systems and mechanics system models(2weeks) 2. Components in mechanics systems 3. Classification of components in mechanics systems(2weeks) 4. Equilibria and their stability(3weeks) 5. Fixed points of discrete time systems and their stability(2weeks) 6. Analytic approach for periodic solutions 7. Bifurcations 8. Chaotic state 9. linear phenomenon and nonlinear ones 10. summary and examination

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169389>

Contact)

⇒ Kawakami (E 棟 3 階北 C-7, +81-88-656-7465, hukugakk@honbu.tokushima-u.ac.jp)

Advanced Theory of Electrical Communication

2 units

Takahiro Oie · PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) Understanding analysing techniques of the communication system and multi-nodes networks.

Outline) The purpose of communication theory is to analyze the transmission of information-bearing signal via communication channels. The lecture is concerned with the study of digital communication. Fundamental mathematics for digital communication, pulse code modulation, basic digital modulation/demodulation techniques for baseband and carrier transmission are discussed in this lecture. Furthermore, as an example of digital communication, we discuss architecture and implementation of computer networks. (Lecture style)

Style) Lecture

Keyword) digital communication, computer networks, network architecture

Fundamental Lecture) “Communication Systems”(1.0), “Applied Communication Engineering”(1.0), “Computer Networks”(1.0)

Requirement) Students are required to have a good understanding of undergraduate-level communication engineering and related subjects.

Goal)

1. Understanding the analysing techniques of the communication system.
2. Understanding the control techniques and implementation of computer network application.

Schedule) 1. Overview of digital communication 2. Mathematical preparation 3. Coding and decoding 4. Pulse code modulation 5. Baseband modulation 6. Carrier modulation 7. Error correction and control 8. Network architecture 9. Physical layer and datalink layer 10. Network layer and routing 11. Transport layer 12. Traffic control 13. Session, presentation and application layer 14. Implementation example of application layer (HTTP, SMTP) 15. Implementation example of application layer (DNS, SNMP)

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169444>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Oie (E-3F-C-1, +81-88-656-7479, alex@ee.tokushima-u.ac.jp) (Office Hour: Monday 16:20~ 17:20, Thursday 16:50~ 17:50)

Advanced Biological Engineering

2 units

Yohsuke Kinouchi · PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING
Masatake Akutagawa · ASSOCIATE PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) Understanding modeling and clarification of biological functions and their applications on engineering.

Outline) This lecture introduces fundamental technologies to apply engineering technologies for medical field, such as, diagnoses, treatment and function substitution; growth of engineering based on biological mechanisms; functional characteristics of biological systems and their information processing basics of application for control. The topics are 1. physiological characteristics of biological system, 2. biological measurement, 3. medical equipments for diagnosis or treatment, 4. equipments for replacement or assistance of biological functions, 5. functions of nerve system, 6. applications of artificial neural networks.

Style) Lecture

Goal)

1. Understanding of modeling of biological neural network function and its analysis
2. Understanding of modeling of biological control system and its analysis
3. Understanding of modeling of biological sensory system

Schedule) 1. Physiological functions of a neuron and their mathematical models 2. Modeling of neural networks 3. Functional analysis of artificial neural networks 4. Applications of artificial neural networks on engineering 5. Signal processing using artificial neural networks 6. Exercise in neural networks 7. Various modeling of neural networks 8. Modeling of biological control scheme 9. Analysis of biological control scheme 10. Information processing in biological visual system 11. Information processing in biological auditory system 12. Introduction of biosensors 13. Physiome

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169415>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Kinouchi (E 棟 3 階北 C-4, +81-88-656-7475, kinouchi@ee.tokushima-u.ac.jp)

⇒ Akutagawa (工学部電気棟 3 階北 C-5, +81-88-656-7477, makutaga@ee.tokushima-u.ac.jp) (Office Hour: Wed. 18:00 - 20:00, Fri. 17:00 - 18:00)

Note) This lecture will be given in English.

Advanced Circuit Theory

2 units

Yoshifumi Nishio · ASSOCIATE PROFESSOR / INTELLIGENT NETWORKS AND COMPUTER SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) Analysis method of nonlinear circuits, and behavior of nonlinear oscillatory circuits and its applications are lectured.

Outline) Modeling of nonlinear devices, DC analysis and transient analysis of nonlinear circuits, and steady-state analysis are lectured. Synchronization and chaotic phenomena in nonlinear oscillatory circuits are introduced and their applications to information and communication engineering are discussed. (Style: Lecture)

Style) Lecture and exercise

Keyword) Nonlinear circuits, Circuit analysis, Oscillatory circuits

Fundamental Lecture) “Electrical Circuit Theory (I) and Exercise”(0.7), “Electrical Circuit Theory (II) and Exercise”(0.5), “Network Analysis”(0.3)

Relational Lecture) “Advanced Theory of Complex System Engineering”(0.5, ⇒p.62), “Advanced Theory of System Analysis”(0.5, ⇒p.68)

Requirement) Students are required to know how to analyze basic linear circuits.

Notice) Course is taught in English.

Goal)

1. Understanding of analysis methods of nonlinear circuits.
2. Understanding of behavior of nonlinear circuits and its applications.

Schedule) **1.** Modeling of nonlinear devices. **2.** DC analysis of nonlinear circuits by Newton method. **3.** Transient analysis of nonlinear circuits. **4.** Steady-state analysis of nonlinear circuits (for 4 lectures). **5.** Synchronization phenomena in nonlinear oscillatory circuits (for 2 lectures). **6.** Chaotic phenomena in nonlinear oscillatory circuits (for 2 lectures). **7.** Engineering applications of nonlinear circuits (for 4 lectures). **8.** Conclusions and final examination.

Evaluation Criteria) Final examination 80% and exercise 20%.

Textbook) None.

Reference)

- ◇ Akio Ushida and Mamoru Tanaka, “Nonlinear Circuit Simulations,” Corona Publishing Co.
- ◇ S. Smale and M.W. Hirsch, “Differential Equations, Dynamical Systems, and Linear Algebra,” Academic Press.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169321>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Nishio (D-7, E-3F-South, +81-88-656-7470, nishio@ee.tokushima-u.ac.jp)

Advanced Theory of Electronic Circuits

2 units

Masaki Hashizume · PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING
Hiroyuki Yotsuyanagi · ASSOCIATE PROFESSOR / INTELLIGENT NETWORKS AND COMPUTER SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) The purpose of this lecture is to understand advanced theory and the state-of-the-art technology for the IC implementation.

Outline) Electronic circuits have been implemented as VLSIs. This lecture introduces advanced theories and the state-of-the-art technologies for the VLSI implementation. The following are the topics: 1. Analysis and synthesis of logic circuits, 2. Integrated digital circuits, 3. Analysis and synthesis of analog circuits, 4. Integrated analog circuits, 5. Low power digital circuits

Style) Lecture and exercise

Keyword) electronic circuits, IC implementation, integrated circuits, circuit design

Fundamental Lecture) “Electronic Circuits”(1.0), “Computer Circuits”(1.0)

Relational Lecture) “Advanced Lecture of Intelligent Information Processing”(0.5, ⇒p.69), “Advanced Theory of Integrated Circuits”(0.3, ⇒p.69)

Requirement) Familiarity with electric circuit and IC technology

Goal) To understand advanced theories and the state-of-the-art technologies for IC implementation of electronic circuits.

Schedule) **1.** Introduction of related topics **2.** estimation of power consumption **3.** low power design **4.** testing of logic circuit **5.** testing of SoC **6.** design for testability for logic circuit **7.** design for testability for SoC **8.** Advanced topics of system LSI **9.** design exercise (5wks) **10.** Examination **11.** The exposition about the examination

Evaluation Criteria) Attendance and presentation:30%; Final examination:70%

Textbook)

- ◇ STARC SoC design training courses text
- ◇ Exercises are introduced in the class

Reference) introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169456>

Student) Able to be taken by only specified class(es)

Contact)

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⇒ Yotsuyanagi (E 棟 3 階南 D-3, +81-88-656-9183, yanagi4@ee.tokushima-u.ac.jp) (Office Hour: 水・金 17:00~18:00)

⇒ Shimamoto (E 棟 3 階南 D-5, +81-88-656-7483, simamoto@ee.tokushima-u.ac.jp) (Office Hour: 年度毎に学科の掲示, あるいは居室前の掲示を参照すること)

⇒ Song (E D-4, +81-88-656-7484, tiansong@ee.tokushima-u.ac.jp)

Note) This lecture will be given in English.

Advanced Theory of Integrated Circuits

2 units

Shinsuke Konaka · PROFESSOR / INTELLIGENT NETWORKS AND COMPUTER SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) To understand the CMOS analog circuit designs for RF-CMOS integrated circuit applications. To understand the logic LSI design by introducing a case study of the previous development of high speed bipolar logic LSIs for a Gb/s optical Tx/Rx and a super-computers.

Outline) Main integrated circuit technologies are recently CMOS integrated circuits because of their low power dissipation, low voltage operation and high noise margin. Owing to the continuous scaling down, CMOS operation speed is improved to up to some GHz regions. The purposes of this lecture are to introduce CMOS analog circuit designs and a case study of the previous high speed logic LSIs for multi-Gb/s applications.

Style) Lecture and exercise

Keyword) analog circuits, CMOS, circuit design

Fundamental Lecture) “Advanced Theory of Electron Devices”(1.0, ⇒p.64)

Relational Lecture) “Advanced Theory of Electronic Circuits”(0.5, ⇒p.69)

Goal)

1. To understand MOS transistor models and device parameters for CMOS analog circuit design.
2. To understand CMOS single-ended amplifier, differential amplifier and current mirror circuits.
3. To understand high performance LSI designs by reviewing previous development samples of high speed logic LSIs

Schedule) **1.** A review of integrated circuits and basic MOS transistors **2.** CMOS process flow and second-order effects of MOS transistor **3.** MOS Circuit models and device parameters of MOS transistors **4.** Current-voltage characteristics of MOS transistor **5.** Common-source single stage MOS amplifier **6.** Common-source stage with source degeneration MOS amplifier **7.** Designing common-source stage MOS amplifier **8.** Common-gate stage MOS amplifier **9.** Common-drain stage MOS amplifier **10.** Differential MOS amplifier **11.** Gilbert cell circuit **12.** Current mirror circuit **13.** High speed logic LSI using differential circuits (development example) **14.** High speed macro-cell array logic LSI (development example) **15.** Example of system LSI **16.** Examination

Evaluation Criteria) Examination is 70% and reports are 30%. The passing score is not less than 60%.

Textbook) Design of Analog CMOS Integrated Circuits, Behzad Razavi, McGraw-Hill, ISBN 0-07-118815-0

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169395>

Contact)

⇒ Konaka (E 棟 3 階南 D-8, +81-88-656-7469, konaka@ee.tokushima-u.ac.jp)

Advanced Lecture of Intelligent Information Processing

2 units

Takashi Shimamoto · ASSOCIATE PROFESSOR / INTELLIGENT NETWORKS AND COMPUTER SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING
Tian Song · ASSISTANT PROFESSOR / INTELLIGENT NETWORKS AND COMPUTER SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) Understand the importance of utilizing the methodology of system LSI design to make function design, synthesis, timing design and layout design. Be able to make use of CAD tools for system LSI design

Outline) The methodology of system LSI design will be discussed together with some practical exercises concerning the function design, synthesis, timing design and layout design with CAD tools.

Style) Lecture and exercise

Keyword) System LSI, VLSI synthesis design, VLSI timing design, VLSI layout design

Fundamental Lecture) “Computer Algorithm and Data Structure”(1.0)

Relational Lecture) "Advanced Theory of Electronic Circuits"(0.5, =>p.69)

Goal) To understand the basic problems and methodology of system LSI design. Can make use of CAD tools for system LSI design.

Schedule) 1. Introduction of the system LSI 2. The design flow of system LSI 3. Main issues of system LSI design 4. Function design (3 weeks) 5. Synthesis design (3 weeks) 6. Timing design (3 weeks) 7. Layout design (3 weeks) 8. Examination

Evaluation Criteria) Unit evaluation contains examination 70% and exercise 30%.

Textbook)

- ◇ STARC SoC design training courses text
- ◇ Exercises are introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169439>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Shimamoto (E 棟 3 階南 D-5, +81-88-656-7483, simamoto@ee.tokushima-u.ac.jp) (Office Hour: 年度毎に学科の掲示, あるいは居室前の掲示を参照すること)
- ⇒ Song (E D-4, +81-88-656-7484, tiansong@ee.tokushima-u.ac.jp)
- ⇒ Hashizume (E 棟 3 階南 D-2, +81-88-656-7473, tume@ee.tokushima-u.ac.jp)
- ⇒ Yotsuyanagi (E 棟 3 階南 D-3, +81-88-656-9183, yanagi4@ee.tokushima-u.ac.jp) (Office Hour: 水・金 17:00~ 18:00)

Electrical and Electronic Engineering Seminar and Exercise

4 units
Teacher of course

Target) To get wide knowledge on your reaserach topics.

Outline) Students read scientific papers relating to your research and get wide knowledge on your reaserach topics.

Style) Lecture in combination with Portfolio

Keyword) reading references, presentation skill, discussion

Requirement) N/A

Goal)

1. To get skills to collect scientific references and knowledge relating your research topic
2. To get skills on discussion about a scientific topic
3. To get presentation skills

Schedule) 1. Continure the followings. 2. Select text books and/or collect references. 3. Summarize the contents of a reference and/or a text book and presnet them. 4. Discuss about the contents of the presentation.

Evaluation Criteria) Evaluated with portfolios and/or examinations

Textbook) Text books and references will be specified by your supervisors at the first class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169454>

Student) Able to be taken by only specified class(es)

Electrical and Electronic Engineering Labolatory

6 units
Teacher of course

Target) To obtain wide knowledge on your research topics by experiments.

Outline) Do experiments relating your Master Degree's thesis.

Style) Portfolio

Keyword) research skill, Acquisition of professional knowledge, presentation skill

Requirement) N/A

Notice) N/A

Goal)

1. To acquisite professional knowlege on your research topics by experiments
2. To get presentation skills

Systems Innovation Engineering — Information Science and Intelligent Systems

SYLLABUS OF SUBJECTS

● Integrated Subjects

Introduction to Intellectual Property ... Sakai · Osame · Fujii · Toyosu · Kubota 71

Management Theory of New Business ... Vice chairperson of School Affairs Committee , Faculty of Engineering · First-line men with experience of practical business 72

Management of Technology ... Yamanaka 72

Presentation Method (M) 72

Internship (M) 72

Venture Business (M) 73

Long-term Internship (M) ... Yamanaka 73

Advanced Lecture in Theory of Business Models ... Deguchi · Yasumuro · Touma · Yamaguchi · Nishii 73

● Common Subjects

Advanced Theory of Complex System Engineering ... Ueta · Kawakami 73

Advanced Theory of Electromagnetic Compatibility ... Kawada · Isaka 74

Advanced Lecture of E-business ... Kinouchi 74

● Basic Departmental Subjects

Topics of mathematical physics ... Nagamachi 74

Topics of Analysis for Mathematical Science ... Kohda 75

Methods for analysis of mathematical phenomena ... Imai · Jin 75

Quantum mechanics and advanced lecture in quantum physics ... Michihiro 75

● Applied Departmental Subjects

Language Modeling ... Kita · Shishibori 75

Integrated circuits design ... Akamatsu · Fukumi 75

Autonomous Intelligent Systems ... Ono · Mogami 76

Information and Communication Network ... Oohama · Tokushige 76

Applied Image Processing ... Oe · Terada · Ueta 76

Web Programming ... Shimomura · Ikeda 77

Natural Language Understanding ... Aoe · Fuketa · Morita 77

Intelligent CAI ... Yano · Kanenishi · Ogata · Mitsuahara · Matsuura · Ito 77

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● Specialized Exercise and Experiments

Advanced Lecture in Intelligent Science ... Fukumi 78

Seminar and Exercise in Information Science ... Kuroiwa · Shishibori · Sano · Tokushige · Terada · Ueta · Ikeda · Mogami · Fuketa · Ogata · Morita · Tsuge 78

Laboratory in Information Science ... Teacher of course 79

Introduction to Intellectual Property

2 units

Tohru Sakai · PART-TIME LECTURER / (財)工業所有権協カセンター, Juichiroh Osame · PART-TIME LECTURER
Akio Fujii · PART-TIME LECTURER / INTELLECTUAL PROPERTY OFFICE, Yasushi Toyosu · PART-TIME LECTURER, Kuniaki Kubota · PART-TIME LECTURER

Target › Understanding the basic systems and importance of protection and practical use of intellectual property based on some examples.

Outline › It is necessary for a working staff in a company, a university, etc., in a future. It is introduced the importance to protect and practical use of intellectual property at governments , industrial circles, universities and institutes in Japan using potential on scientific techniques. This lecture is treated the basic systems of protection and practical use of intellectual property particularly based on strategy and invasion of patent in an organization such as company, university, etc.

Style › Lecture

Keyword › Intellectual property, Patent Law, Protect and Use of Intellectual Property

Relational Lecture › “Introduction to Intellectual Property”(0.5)

Requirement › No requirement

Notice › It is necessary to be present at two concentrated lecture.

Goal ›

1. Understanding concept of intellectual property right.
2. Understand the Patent Act, the Trademark Act, the Design Act and the Copyright Act.
3. Understanding on basical practical use of intellectual property.

Schedule › **1.** Concept of intellectual property(Sakai) **2.** Outline of intellectual property(Patent and Trademark)(Sakai) **3.** Outline of intellectual property(Design and Copyright)(Sakai) **4.** Patent, invention and invasion of patent (Sakai) **5.** Management of intellectual property and use (Sakai) **6.** A way of research and development and intellectual property in a future(Sakai) **7.** The midterm examination and its comment for Target and **8.** History of system of intellectual property (Osame) **9.** International trend of system of intellectual property (Osame) **10.** Acquisition method of intellectual property right(Fujii) **11.** Use of intellectual property(Watanabe) **12.** Strategy of intellectual property on development of techniques(Y.Higuchi) **13.** Effective intellectual property in development of techniques (Kubota) **14.** Special lecture on a use of intellectual property by a chief executive officer(1) **15.** Special lecture on a use of intellectual property by a chief executive officer(2)

Evaluation Criteria › Passing mark is over 60% on the examinations and the reports for each reaching level, respectively.

Textbook › To be used textbooks made by lecturers.

Reference › Nobuhiro Nakayama: Titeki Shoyuken, Nikkan Kohgyo Shinbunsha

Contents › <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169432>

Student › For the course students and other graduate school students.

Contact ›

⇒ Sakai (+81-3-5600-2631,)

⇒ Mizuguchi (A501, +81-88-656-7349, mizuguch@ce.tokushima-u.ac.jp) (Office Hour: Monday, 11:00-12:30, 17:00-18:00)

Management Theory of New Business

2 units

Vice chairperson of School Affairs Committee, Faculty of Engineering
First-line men with experience of practical business · PART-TIME LECTURER

Target) New business is the word which means the business to make the most of technical knowledge, technology, the new idea and which is developed creatively, and that main bearer is the enterprise called a venture. There is a purpose of this class in providing the knowledge which is necessary, and know-how and a spirit so that a taking lecture student may establish a venture business.

Outline) The regeneration of the Japanese society with the vitality is being asked. Government enforced "a university venture 3 years 1000 companies plan" over Heisei 14-the 16th year. Though that goal was almost attained, it is very important to promote entrepreneur education continuously from now on. Tokushima Prefecture supports this class based on the recognition done like this, and it is established.

Requirement) The person whom the one with the classroom is constructed by the class start time in the person who doesn't learn the unit of "Introduction to new business" in the college, and a group are organized, and it is limited to the person with the intention to make a business plan, and taking lecture is recognized.

Notice) Being late and a whisper in class should be prohibited strictly. Be careful over and again because it should dispose of exit and future taking lecture may not be recognized when it is wicked.

Goal) Learning of the necessary knowledge to establish venture business, and the ability which can make a business plan.

Schedule) 1. Guidance 2. What is the new business? 3. Keynote lecture 4. Theory of a stand-alone version venture success 5. The law knowledge which is necessary for entrepreneur 6. Fund-raising and capital policy 7. Indirect finance 8. Direct finance 9. The basis of the company management 10. The elementary knowledge of the business accounting 11. The point of the business plan preparation 12. Management strategy and marketing 13. Product development and intellectual property 14. Business plan preparation practice 15. Examination 16. Business plan announcement meeting

Evaluation Criteria) It is evaluated by the presentation (40%) of the written examination (60%) and the business plan. And, the presentation of the written examination and the business plan is decided to be recognized only for the taking lecture student who attended it for 2/3 and more of the classes that it is opened.

Textbook) The summary is distributed every time.

Reference) Several are introduced in the school hours.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169469>

Student) he person who hasn't learned the unit of the new business outline that it is opened with this learning in all the students enrolled in the graduate school yet is made the target. The number of completion people may be restricted in the method such as a lottery in case of a taking lecture applicant many. As for the details, an applicant for taking lecture is to follow those directions because the notice which showed attention in taking lecture is done.

Contact)

⇒ Vice chairperson of School Affairs Committee, Faculty of Engineering

Note) The man of business that it is active in the forefront every time, and an adviser are invited as an instructor, and working knowledge is provided for theory plus practice in this class from the specialist's position. This class is the thing which is useful enough even if it is taken to the person who aims at a general enterprise and a laboratory, the employment to the self-governing body and so on.

Management of Technology

2 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) About the production management of the automobile industry, it is understood variously from the point of view such as "research and development", "production management", "purchasing" and "quality control" "marketing" and "cross-cultural management".

Outline) It learns about the production management. This time, "the automobile industry" specially takes up the production management of "Honda Motor Co.,Ltd. (following Honda)" even of that in the case, and the class to appreciate that importance with ranking of technology in management is taken.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business".

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of management is learned.
2. Ranking of the technology in management and that importance are appreciated.
3. It learns how to solve the various problems which always occur in the spot of the management through the case study and the business game.

Schedule) 1. Guidance 2. Lecture "What in Management of Technology?" 3. Case report "Research and development of Honda" 4. Case study "Plan an overseas factory." "A new car development order" 5. Lecture "Production management and purchasing" 6. Lecture "Quality control" 7. Case report "The production management of Honda"; "The supply chain management of Honda" 8. Case study "Plan an overseas factory." 9. Case report "The quality control of Honda" 10. Case study "Don't make material defects flare up again." 11. Lecture "Marketing strategy" 12. Lecture "Cross-cultural management" 13. Case report "Around the products project of Honda - the two-wheeled vehicle" 14. Case report "The path of internationalization of Honda" 15. Case report "The personnel management of Honda" 16. Summary and questions and answers

Evaluation Criteria) It is evaluated in the remark (20%) in class and the middle, end of a term report (80% in total).

Textbook) It doesn't specially use. The summary and so on is distributed every time.

Reference) Several are introduced in class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169348>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the doctor former term course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Note) This class invites seven Honda alumnuni who did work in "research and development", "production management", "purchasing", "quality control", "marketing", "cross-cultural management", and so on as an instructor, and it is the class to do case report. Even if it is seen nationwide, the trial done like this is very rare, and it is a precious class. And, an applicant for taking lecture is to attend it in the guidance to hold it in advance. A schedule is indicated separately.

Presentation Method (M)

2 units

Target) Poster and oral presentations, and journal publications are common means of appealing the research work in various scientific and technological disciplines. It's undoubtedly important for activating the research work. The lecture is intending for students to learn most efficient way to appeal their findings and discussions in scientific community.

Outline) Credits are acknowledged to the students who are supervised to give conference speech by themselves and do actually the lectures.

Goal) The lecture is aiming at having knowledge and experience of the presentaion in international conferences.

Evaluation Criteria) Students' achievement is evaluated by portfolios submitted showing the progress in preparation of international conferences as well as by presentation records.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169510>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Internship (M)

2 units

Target) This program is provided to increase knowledge and experience in the actual industrial technology in various fields. Through the practical experience, the program will allow students to become discerning and well-balanced researchers or engineers with deeper understanding of technological societies.

Outline) Credits are acknowledged to students who experienced the internship in companies and/or government offices. Their fulfillment is evaluated by activity reports during internship.

Goal)

1. Grasping internal systems of a company, management, action and strategy to achieve the company's goal. (2)
2. Understanding human relationship and communicative manner in a working society and a company.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by supervisors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169345>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Venture Business (M)

2 units

Target) Aims of the lecture are doing collaborative works with private enterprises and establishing venture businesses through such works.

Outline) The lecture is aiming at founding a venture business company as well as establishing collaborative research works with private enterprises. It's worth to apply their accomplishment to an actual society beyond the range of a laboratory work.

Goal) Objective of the lecture is to have experience and knowledge of collaborative works with private enterprises and to mature the works to venture businesses.

Evaluation Criteria) Credits are acknowledged in case of doing collaborative works with enterprises and/or maturing them to venture businesses. Handouts, reports, and presentation materials, etc. are evaluated to approve credits.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169332>

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Long-term Internship (M)

6 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This program is provided long-term internship in the actual industrial companies and so on, doing a joint study between companies and university on practical problems proposed by the company and practical experience of management of technologies. Through the long-term internship, the program will allow students to become an engineer with a core role in researches and companies

Outline) Credits are acknowledged to students who experienced the internship in companies or government offices of 270 hours during three months or more and presentation to executive officer of the company. Their fulfillment is evaluated by activity reports during internship and appraisal and interviewed report from a mentor.

Goal) Grasping abilities for practical engineers by studying activities in company and so on.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by mentors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169440>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Nishida (K409, +81-88-656-7630, nishida@kg.tokushima-u.ac.jp)
- ⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)
- ⇒ Morimoto (A407, +81-88-656-7619, emi.morimoto@kg.tokushima-u.ac.jp) (Office Hour: 月～木(10時～15時))

Note) Students who resister the coop-education program for "Pai-shape" engineers with sense for management of technology, are able to have a grant-in-aid for travel and so on. Ask committee members of long-term internship in your course or coordinators of this program.

Advanced Lecture in Theory of Business Models

2 units

Tatsuya Deguchi · PART-TIME LECTURER, Kenichi Yasumuro · PART-TIME LECTURER, Katsuo Touma · PART-TIME LECTURER
Takahide Yamaguchi · PART-TIME LECTURER, Shingou Nishii · PART-TIME LECTURER

Target) There is a purpose of this class in providing the knowledge which is necessary, and know-how so that students may achieve a business model in establishing enterprises based on the lecture of "Management Theory of New Business", and in making students understood the profit generating stream by studying on the frame work of companies in several business fields.

Outline) Business Model is a remarkable term in modern economic and organizational theories in these days but describes a broad range of definitions. In this lecture, Business Model is defined as "System which converts technology and know how into profit for the purpose of customers' satisfaction" and aims at providing the ability for the design of profitable system, by learning cost issues in establishing business strategies of companies.

Requirement) Finish " Introduction to new business " or " Advanced Lecture in management Theory of new business "

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of business model design is learned.
2. Understanding of the concept of business model by case study analysis are appreciated.
3. It learns forming ability of business plan through the case study on business models.

Schedule) 1. Guidance 2. Keynote lecture "Business Model Thinking" 3. Questions and answers, Discussions 4. Lecture "Theory of Business Models" 5. Lecture "Design principles of Business Models" 6. Lecture "Evaluation of Business Models" 7. Case Study "Business Model in a R&D company" 8. Case Study "Business Model in a manufacturing industrial company" 9. Case Study "Business Model in a company of service industry " 10. Case Study "Business Model in a company of information industry " 11. Business plan practice, Present situation analysis and alternatives. 12. Business plan practice, Concept ad design of business. 13. Business plan practice, Financial analysis . 14. Business plan practice, Concluding and submitting 15. Presentation(1) of Business plan practice. 16. Presentation(2) of Business plan practice, Comments and summary.

Evaluation Criteria) Participation in class(20%) Group work and its report(80%)

Textbook) Ken-ichi Amuro and Study Group of Business model "Case Book: Business Model Thinking" Bunshindo

Reference) Several are introduced in class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169656>

Student) The person who finished "Introduction to new business" or " Advanced Lecture in management Theory of new business " in all the students enrolled in the course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Contact)

- ⇒ Tatsuya Deguchi (Wakayama University)
- ⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

Note) This class is supported by Tokushima Prefecture Government

Advanced Theory of Complex System Engineering

2 units

Tetsushi Ueta · ASSOCIATE PROFESSOR / APPLIED INFORMATION MEDIA ENGINEERING, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING
Hiroshi Kawakami · EXECUTIVE DIRECTOR / THE UNIVERSITY OF TOKUSHIMA

Target) comprehension and application of complex systems by using engineering methodologies

Outline) Complex systems are defined as compound dynamical systems whose behavior and features cannot be predicted because of their nonlinearities and connecting conditions. This emergence of behavior is not possible for a single dynamical system, therefore, connection, coupling, compounding are keywords of this theory. Emergence of rhythm in biological systems, self organization, chaotic properties in high degrees of freedom, learning and associative memory are example features of complex systems. In this lecture,

based on physical systems which are ubiquitously found and treated by system engineering subjects, we study analytical methods to understand these phenomena, bifurcation theory of nonlinear and linear systems, applied extraction methods of valuable information from observed data, system design methods of compound dynamical systems.

Style) Lecture

Keyword) complex system, bifurcation, chaos, nonlinear phenomena

Fundamental Lecture) "Differential Equations (II)"(1.0), "Transient Analysis"(1.0), "Industrial Basic Physics"(1.0)

Relational Lecture) "Advanced Theory of System Analysis"(0.5, =>p.68), "Topics of mathematical physics"(0.5, =>p.74), "Advanced Electrical Control System"(0.5, =>p.66), "Advanced Theory of Electronic Circuits"(0.5, =>p.69)

Requirement) none

Goal)

1. understanding of the definition and target area of complex systems
2. understanding of qualitative approach for given dynamical system
3. understanding and application of bifurcation theory

Schedule) 1. examples of complex systems 2. relationship between bifurcation problems and complex systems 3. computation of bifurcation parameter values 4. chaos and bifurcation phenomenon 5. chaotic itinerary 6. emergence mechanism of spatio temporal chaos and its clustering 7. phase transition and synchronization 8. spatio temporal intermittency and emergence of patterns 9. chaos neural network 10. neuronal circuits as complex systems 11. bifurcations in emergence systems 12. analysis of social systems 13. survey on complex systems 14. exercise 1 15. exercise 2 16. questions and answers

Evaluation Criteria) The total grade is evaluated by homework reports (70 %) and attendance of the class. (30 %)

Textbook) specified every class.

Reference) Chaotic Scenario of Complex Systems, Asakura-Shoten, 1996 (in Japanese)

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169498>

Student) Able to be taken by only specified class(es)

Contact)

- => Ueta (Ait502, +81-88-656-7501, tetsushi@ait.tokushima-u.ac.jp) (Office Hour: Wednesday, afternoon)
- => Kawakami (E 棟 3 階北 C-7, +81-88-656-7465, hukugakk@honbu.tokushima-u.ac.jp)

Advanced Theory of Electromagnetic Compatibility

2 units

Masatake Kawada · ASSOCIATE PROFESSOR / ELECTRIC ENERGY ENGINEERING, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING
Katsuo Isaka · PART-TIME LECTURER / ELECTRIC ENERGY ENGINEERING, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) The purpose of this lecture is to help students understand (1) electromagnetic environments quantitatively, (2) their electrical effects on the industrial products and (3) their biological effects on humans.

Outline) (1) Fundamentals of electromagnetic theory, (2) Electromagnetic compatibility (EMC) of industrial products, (3) Guideline of protection of humans from environmental electromagnetic fields, and (4) Concept of EMC in 21st century.

Style) Lecture

Keyword) Electromagnetic field, Electromagnetic interference, Electromagnetic immunity

Fundamental Lecture) "Advanced Circuit Theory"(0.2, =>p.68), "Advanced Theory of Electronic Circuits"(0.2, =>p.69), "Advanced Biological Engineering"(0.2, =>p.68)

Relational Lecture) "Electric Power System"(0.2, =>p.66)

Requirement) Good understanding of electromagnetics theory.

Goal)

1. To be able to understand natural and artificial environments by the theoretical use of electromagnetic fields.
2. To be able to understand the practice of electromagnetic compatibility design of electric and electronic equipments.
3. To be able to understand the discussions of electromagnetic fields effects on living bodies by international agencies.

Schedule) 1. Electric field, magnetic field and Electromagnetic field (1). 2. Electric field, magnetic field and Electromagnetic field (2). 3. Electric field, magnetic field and Electromagnetic field (3). 4. Electromagnetic fields in natural environment. 5. Man-made low frequency electromagnetic fields. 6. Low frequency electromagnetic fields in residential and occupational environments. 7. Man-made High frequency electromagnetic fields. 8. Concept of electromagnetic compatibility. 9. Electromagnetic interference and immunity 10. Effects of environmental electromagnetic fields on electronic circuits. 11. Biological effects of electromagnetic fields. 12. Protection of humans from ionizing and non-ionizing electromagnetic fields. 13. Precautionary principle by World Health Organization. 14. Living environments in 21st century and EMC. 15. Review talk and discussions. 16. Examination.

Evaluation Criteria) Assignments count 30% and Examination 70%.

Textbook) None.

Reference) Will be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169457>

Student) Any students can attend the class.

Contact)

- => Kawada (E 棟 2 階北 B-10, +81-88-656-7460, kawada@ee.tokushima-u.ac.jp) (Office Hour: (水)(木) 16:00-17:00)

Notice) This lecture will be given in English.

Advanced Lecture of E-business

2 units

Yohsuke Kinouchi · PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) To master key technologies used in e-business and the principles.

Outline) Key technologies for e-business are introduced.

Style) Lecture

Keyword) e-business, internet

Requirement) none

Notice) none

Goal)

1. To get knowledge on e-business
2. To get skills for e-business

Schedule) 1. e-business 2. Internet and the mechanism 3. Mobile network and the mechanism 4. Network management 5. Security for e-business 6. typical e-business model 7. establishment of e-business 8. administration of e-business 9. accounting for e-business 10. customer management in e-business 11. complaints management in e-business 12. Examples of e-business in production areas 13. Examples of e-business in commercial areas 14. Examples of e-business in service areas 15. Example of e-business in social areas 16. Comments on reports

Evaluation Criteria) Evaluated by portfolios and/or examinations

Textbook) Printed materials

Reference) References will be introduced in the classes.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169304>

Student) Able to be taken by only specified class(es)

Contact)

- => Kinouchi (E 棟 3 階北 C-4, +81-88-656-7475, kinouchi@ee.tokushima-u.ac.jp)

Topics of mathematical physics

2 units

Shigeaki Nagamachi · PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) We study the quantum computing.

Outline) We study the elementary theory of numbers and group theory in order to understand RSA cryptography based on the difficulty of factorization for a big number. We study the theory of Hilbert spaces and their operators to understand Shor's fast factorization algorithm for quantum computers.

Goal) Understanding the principle of quantum computation

Schedule) 1. Group theory 1 2. Group theory 2 3. Number theory 1 4. Number theory 2 5. RSA cryptography 6. Shor's factorization algorithm 1 7. Hilbert space 8. Operators on Hilbert space 9. Quantum mechanics 1 10. Quantum mechanics 2 11. Quantum information 12. Quantum circuits 13. Quantum Fourier transformation 14. Shor's factorization algorithm 2 15. The complexity of Shor's factorization algorithm 16. Reserve day

Textbook) Mika Hirvensalo, Quantum Computing, Springer (2004)

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169409>

Topics of Analysis for Mathematical Science

2 units

Atsuhito Kohda · ASSOCIATE PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) Mathematical theory and technique for analysis of engineering phenomena

Outline) Mathematical theory to analyze problems in engineering and its application, mainly theory and technique of differential equations

Style) Lecture

Relational Lecture) "Advanced applied analysis"(0.2, ⇒p.8), "Differential Equations"(0.2, ⇒p.8)

Requirement) If you like undergraduate-level mathematics, it will be sufficient.

Goal) To be familiar with mathematical theory, that helps engineering study.

Schedule) 1. Theory of sets and maps 2. Cardinal numbers and bijection 3. Equivalence relations and cryptography 4. Linear space and tensor 5. Vector analysis and differential form 6. Cauchy's theorem and vector analysis 7. Differential form and Cauchy's theorem 8. Projective plane 9. Quadratic curves and projective plane 10. All quadratic curves are circles? 11. The index of vector fields 12. Applications of the index: fundamental theorem of algebra 13. Vector fields on the unit sphere 14. Why there is the north pole on the earth 15. Mathematics and computers 16. Summary

Webpage) <http://math1.pm.tokushima-u.ac.jp/lecture/>

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169403>

Contact)

⇒ Kohda (A211, +81-88-656-7546, kohda@pm.tokushima-u.ac.jp) (Office Hour: 月曜 12:00~ 13:00)

Methods for analysis of mathematical phenomena

2 units

Hitoshi Imai · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Cheng-Hai Jin · PROFESSOR / INTERNATIONAL STUDENT CENTER

Target) To learn the to analyze the mathematical phenomena.

Outline) Methods used in analysis of mathematical phenomena are introduced. Especially, those in numerical analysis are focused on.

Style) Lecture

Keyword) Mathematics, Numerical, Analysis

Fundamental Lecture) "Numerical Analysis"(1.0)

Requirement) Only the premise that have studied basic mathematics.

Goal) The adequacy of the two-dimensional boundary value problem governed by the Poisson equation can be understood by the finite difference method, etc.

Schedule) 1. Introduction to computer 2. Common sense in numerical computation 3. High-speed computation (Parallel computing) 4. Finite difference method I 5. Finite difference method II 6. Finite difference method III 7. Finite difference method IV 8. Finite element method I 9. Finite element method II 10. Finite element method III 11. Finite element method IV 12. Boundary element method I 13. Boundary element method II 14. Boundary element method III 15. Iterative method

Evaluation Criteria) Evaluation by the report.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169407>

Contact)

⇒ Imai(A220, +81-88-656-7541, The inquiry by means of the cellular phone or E-mail is not acceptable) (Office Hour: Office hours: Thursday 14:00-15:00)

Quantum mechanics and advanced lecture in quantum physics

2 units

Yoshitaka Michihiro · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces the quantum mechanics.

Outline) Basics of quantum mechanics are introduced.

Style) Lecture

Keyword) Quantum Mechanics

Goal) To understand the outline of quantum mechanics.

Schedule) 1. Introduction 2. Variational method 3. Lagrangian 4. Hamiltonian 5. Poisson's bracket expression 6. Quantization 7. Operator 8. Wavefunction 9. Expectation value 10. Schrödinger equation 11. Example (1) the square well potential 12. Example (2) the linear harmonic oscillator 13. Angular momentum 14. Example (3) hydrogen atom 15. Heisenberg equation 16. Field quantization

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169507>

Contact)

⇒ Yoshitaka Michihiro (A203)

Language Modeling

2 units

Kenji Kita · PROFESSOR / APPLIED INFORMATION MEDIA ENGINEERING, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Masami Shishibori · ASSOCIATE PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) The course introduces some probabilistic models of natural language.

Outline) Due to the availability of large text corpora, probabilistic approaches to modeling natural language text have become dominant in recent years. This lecture gives an overview of probabilistic modeling of natural language, including n-gram models, hidden Markov models, probabilistic grammars, and maximum entropy models, as well as their applications to natural language processing and information retrieval.

Style) Lecture in combination with Portfolio

Keyword) natural language, probabilistic model, n-gram model, probabilistic grammar

Fundamental Lecture) "Automata and Formal Languages"(1.0)

Relational Lecture) "Natural Language Understanding"(0.5, ⇒p.77), "Machine Translation"(0.5, ⇒p.78)

Goal) To acquire effective techniques for modeling natural language texts using probabilistic models.

Schedule) 1. Overview of the course 2. Modeling natural language 3. Estimation and evaluation of probabilistic models 4. N-gram model 5. Hidden Markov model 6. Maximum entropy model 7. Probabilistic grammar 8. Partitions of numbers and Young diagram 9. Symmetric group and its action on polynomials 10. Symmetric form and Young diagram 11. Bumping game 12. Sliding game 13. Product operations on Young tableaux 14. Word problem 15. Recent topics 16. Assignment

Evaluation Criteria) Assignment count 100%.

Textbook) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169363>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Kita (Dr503, +81-88-656-7496, kita@is.tokushima-u.ac.jp) (Office Hour: Tuesday 12:50 - 14:20)

Note) Invited talk by a part-time lecturer will be given.

Integrated circuits design

2 units

Norio Akamatsu · PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Minoru Fukumi · PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) The aim of this lecture is to explain the very large scale integrated circuits design for understanding artificial intelligence and future trend of computer system. Therefore, the computer architecture, VLSI design, and computer programming for artificial intelligence are lectured.

Outline) The design method is divided into a random logic and a structured logic. In this lecture the structured logic design using C-MOS transistor is explained. Further, a fabrication technology and a testing method are lectured. An application specific integrated circuits which are used in many fields are explained by showing practical examples. This lecture is based on physics and mathematics and related with fundamental engineering.

Style) Lecture

Keyword) very large scale integrated circuit, structured logic, computer architecture, C-MOS, memory

Fundamental Lecture) "Integrated circuits design"(1.0, ⇒p.75)

Relational Lecture) "Advanced Lecture in Intelligent Science"(1.0, ⇒p.78)

Requirement) In order to understand this lecture contents, it may be necessary to have a image of the electrical circuits, mathematics, and physics.

Notice) In this lecture, the personal computer may be used for design of integrated circuits.

Goal) to understand the design technology of very large scale integrated circuits

Schedule) 1. fundamental concepts of C-MOS integrated circuits 2. C-MOS inverter and NAND logic circuits 3. C-MOS NOR logic and XOR logic circuits 4. C-MOS process technology and device production 5. theory of evaluation of integrated circuits 6. design rule and reliability of integrated circuits 7. design technology of field work 8. design of system control 9. design of application specific integrated circuits 10. survey of digital signal processing device 11. design of programmable devices 12. static RAM and dynamic RAM 13. logic compiler and macro cell 14. abstract of input output interface 15. utilization intellectual property 16. survey of system-on-chip integrated circuits 17. testing and evaluation

Evaluation Criteria) In order to overcome the aim of this lecture, the actual system is designed and its performance is evaluated.

Textbook) Integrated Circuits Design

Reference) Introduction to VLSI design

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169394>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Akamatsu (D209, +81-88-656-7493, akamatsu@is.tokushima-u.ac.jp) (Office Hour: afternoon of Friday)

Autonomous Intelligent Systems

2 units

Norihiko Ono · PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Yoshio Mogami · ASSOCIATE PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) As effective design methods of autonomous intelligent systems, the reinforcement learning algorithms have received much attention that allow the systems to obtain appropriate decision policies by trial and error even in environments with delayed rewards. This class provides the basic concepts and theories concerning the algorithms as well as their application techniques.

Outline) While top-down approaches to intelligent systems design problems have exposed various limitations, bottom up approaches have been proposed and studied that allow intelligent systems to improve their own performance autonomously and incrementally during the course of interactions with the environments. This class covers those bottom-up approaches mainly focused upon the reinforcement learning algorithms.

Style) Lecture

Keyword) autonomous agents, emergent systems design, reinforcement learning, robotics, multi-agent systems

Fundamental Lecture) "Artificial Intelligence 2"(0.5), "Optimization Theory"(0.5)

Relational Lecture) "Machine Translation"(0.5, ⇒p.78), "Language Modeling"(0.5, ⇒p.75), "Natural Language Understanding"(0.5, ⇒p.77)

Goal) Recently, bottom-up approaches to the intelligent systems design problems have been proposed based on various reinforcement learning algorithms. This class aims at the understanding of the theory of the algorithms as well as their potentials and limitations through the applications to small-scale systems design problems.

Schedule) 1. Introduction 2. Reinforcement learning: basic concepts (1) 3. Reinforcement learning: basic concepts (2) 4. Basic reinforcement learning algorithms (1) 5. Basic reinforcement learning algorithms (2) 6. Basic reinforcement learning algorithms (3) 7. Reinforcement learning considering application to real-world tasks (1) 8. Reinforcement learning considering application to real-world tasks (2) 9. Reinforcement learning based on evolution strategies 10. Reinforcement learning based on evolutionary computation 11. Reinforcement learning based on genetic programming 12. Reinforcement learning and robotics (1) 13. Reinforcement learning and robotics (2) 14. Reinforcement learning and multi-agent systems (1) 15. Reinforcement learning and multi-agent systems (2)

Evaluation Criteria) Attendance (30%), report (70%)

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169397>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Ono (D106, +81-88-656-7509, ono@is.tokushima-u.ac.jp) (Office Hour: 金曜日 15:00~17:30)

⇒ Mogami (D102, +81-88-656-7505, moga@is.tokushima-u.ac.jp) (Office Hour: Tue. 17:00-18:00, Wed. 15:30-17:30 (Refer to the notice of the department in every year.))

Information and Communication Network

2 units

Yasutada Oohama · PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Hitoshi Tokushige · ASSOCIATE PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) This class provides the knowledge necessary for understanding architecture and fundamental techniques of information and communication network.

Outline) This lecture is focused on architecture of information and communication network and its fundamental technologies. Particularly, methods of multimedia data transmitting, network architecture and network security are explained in this lecture.

Style) Lecture

Keyword) Information and Communication Network, Digital data transmission, Network architecture, Network security

Requirement) 特になし

Notice) 特になし

Goal)

1. Architecture of Information and communication network can be learned

2. Fundamental techniques for Information and communication network can be learned

Schedule) 1. Information and communication systems 2. Fundamental technologies of data transmission 3. Digital data transmission (1) 4. Digital data transmission (2) 5. Error control 6. Network architecture 7. Communication line 8. Network security 9. Cryptography Algorithm 10. Digital signature 11. Communication security 12. Authentication protocol 13. Mobile communication systems (1) 14. Mobile communication systems (2) 15. Broadcast systems 16. Assignment

Evaluation Criteria) Result is decided by attendance(20%) and Assignment (80%).

Textbook) Printed synopses of lecture are distributed.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169396>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Oohama (C302, +81-88-656-9446, oohama@is.tokushima-u.ac.jp)

⇒ Tokushige (C303, +81-88-656-9447, tokushige@is.tokushima-u.ac.jp) (Office Hour: 月曜日, 火曜日 (17:00-18:00))

Applied Image Processing

2 units

Shunichiro Oe · PROFESSOR / APPLIED INFORMATION MEDIA ENGINEERING, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Kenji Terada · ASSOCIATE PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Tetsushi Ueta · ASSOCIATE PROFESSOR / APPLIED INFORMATION MEDIA ENGINEERING, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) This class provides the skills and the knowledge of basic and advanced image processing in the industrial field and the robot field.

Outline) This class introduces the techniques and applications of image processing necessary for control system and inspection system. This class explains the hardware and software about image I/O systems, high-speed image processing methods and robot vision.

Style) Lecture

Keyword) image processing, robot vision, inspection system

Fundamental Lecture) “Image Processing”(1.0), “Pattern Recognition”(1.0)

Goal) 工業用画像処理システムを構築する際に必要な実用的な技術とロボットの視覚技術等についての知識の習得

Schedule) 1. concept of industrial image processing 2. image acquisition system 3. principle of lens and light source device 4. hardware of image processing(1) 5. hardware of image processing(2) 6. three dimensional image feature extraction(1) 7. three dimensional image feature extraction(2) 8. shift and shape recognition(1) 9. shift and shape recognition(2) 10. inspection system(1) 11. inspection system(2) 12. robot vision 13. mobile robot 14. micro robot 15. trend of robotics 16. Report

Evaluation Criteria) Result is decided by attendance(20%) and reports(80%).

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169331>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Oe (C204, +81-88-656-7500, oe@is.tokushima-u.ac.jp)

Web Programming

2 units

Takao Shimomura · PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING
Kenji Ikeda · ASSOCIATE PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) This class provides the knowledge and skills necessary for efficiently developping Web applications in the Internet, and implementing the software of high quality.

Outline) This class introduces Web programming frameworks and Web programming techniques systematically necessary for efficiently developing Web applicatins of high quality, and then explains the development of some Web application systems as practical examples to teach the development skills such as Web design patterns.

Style) Lecture

Keyword) Java, Servlet, JSP, Web applications

Fundamental Lecture) “Programming Methodology 1”(1.0), “Programming Methodology 2”(1.0)

Relational Lecture) “System Administration”(0.5)

Requirement) Students are required to have a good understanding of undergraduate-level Java programming and related subjects.

Goal) To understand the system configuration of Web applications that consists clients and a server, and design flexible Web application systems

Schedule) 1. Web application 2. HTTP/Session 3. Database 4. JSP custom tags 5. Web services 6. Applets 7. JavaScript/AJAX 8. Flash/Flex 9. Web programming frameworks 10. BioPro 11. Internationalization 12. Web programming tips 13. Web programming design patterns 14. Introduction to NisWeb system 15. NisWeb system configuration 16. Assignment

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169307>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Shimomura (C402, +81-88-656-7503, simomura@is.tokushima-u.ac.jp) (Office Hour: Wed 15:00~18:00)

Natural Language Understanding

2 units

Jun-ichi Aoe · PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING
Masao Fuketa · ASSOCIATE PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING
Kazuhiro Morita · ASSOCIATE PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) This lecture is focused on methods of Natural Language Understanding for human-communication and intelligent text search applications. Particular, syntax analysis algorithms and semantic analysis technics for various kinds of applications are explained in this lecture.

Outline) Understanding is most important technics for the human-communication and the intelligent text search. Efficiency of the technics depend on the relationships between knowledge dictionaries and analysis algorithms. In this lecture, case-structure with semantic informations and case-analysis algorithms is explained. Moreover, the newest Natural Language Processing systems are introduced with detailed examples. Exercises include Trie structure for the semantic dictionary, understanding for formal document, and understanding for patent documents. This subject of lecture belongs to industrial field.

Style) Lecture in combination with Portfolio

Keyword) Dialogue Understanding, Intention Understanding, Knowledge Dictionary, Morphological Analysis, Patent Document

Fundamental Lecture) “Language Engineering 1”(1.0), “Language Engineering II”(1.0)

Relational Lecture) “Machine Translation”(0.5, ⇒p.78), “Language Modeling”(0.5, ⇒p.75)

Goal)

1. Technics of Natural Language Understanding, Dialogue Understanding and Intention Understanding can be learned.
2. Key search methods in Natural Language Processing can be learned.
3. Technics of Morphological Analysis and Kana-Kanji Translation can be learned.
4. How to describe technical document and patent document based on Language Understanding can be learned.

Schedule) 1. Introduction 2. Dialogue Understanding 3. Intention Understanding, Report 4. New Information on Composition 5. Design of Composition Structure, Report 6. Knowledge Dictionary 7. Key Search Algorithm 8. Trie Structure, Report 9. Morphological Analysis 10. Kana-Kanji Translation, Report 11. Understanding of Technical Document 12. Exercise for Understanding of Technical Document, Report 13. Understanding of Technical Document 14. Understanding of Patent Document 15. Exercise for Understanding of Patent Document, Report 16. Report

Evaluation Criteria) Result is decided by attendance(20%) and reports(80%).

Textbook) Printed synopsises of lecture are distributed.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169391>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Aoe (Dr604, +81-88-656-7486, aoe@is.tokushima-u.ac.jp) (Office Hour: 木曜日 14:00~17:00(年度ごとに学科の掲示を参照すること))

Intelligent CAI

2 units

Yoneo Yano · PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING
Kazuhide Kanenishi · ASSOCIATE PROFESSOR / APPLIED INFORMATION MEDIA ENGINEERING, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING
Hiroaki Ogata · ASSOCIATE PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING
Hiroyuki Mitsuhashi · ASSOCIATE PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING
Kenji Matsuura · ASSISTANT PROFESSOR / APPLIED INFORMATION MEDIA ENGINEERING, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING
Teruaki Ito · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This course aims to instruct the design methods for intelligent systems from the point of view of new Ergonomics and knowledge engineering.

Outline) Computers are being used in Education. In this course, we will instruct about intelligent CAI (Computer Assisted Instruction). Especially, we will talk about the difference between traditional CAI and intelligent one and the applications of ICAI, and user interfaces and teaching strategies based on theories and practices.

Style) Lecture

Keyword) Educational Technology, Learning Science

Fundamental Lecture) “Web Programming”(1.0, ⇒p.77), “Information and Communication Network”(1.0, ⇒p.76), “Autonomous Intelligent Systems”(1.0, ⇒p.76)

Relational Lecture) “Venture Business (D)”(0.5, ⇒p.95), “Natural Language Understanding”(0.5, ⇒p.77), “Presentation Method (D)”(0.5, ⇒p.95)

Goal) You will acquire how to design and implement the system of Intelligent CAI.

Schedule) 1. Overview of Intelligent CAI, History and theories of CAI 2. Intelligent CAI 3. ITS 4. Learner model, Tutoring model, Theories of CAI 5. Web Based Learning Environment 6. Adaptive Hypermedia, Personalization 7. WBL(Web Based Learning) e-Learning 8. CSCL(1) 9. CSCL(2) 10. Knowledge Management, SNS and Education Support System 11. Mobile Learning Environment(1) 12. Mobile Learning Environment(2) 13. Ubiquitous Learning Environment(1) 14. Ubiquitous Learning Environment(2) 15. Summery of Educational Technologies 16. examination

Evaluation Criteria) We will grade based on reports (30 points) and examinations (70 points). But this is subject to change.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169434>

Contact)

⇒ Yano (C511, +81-88-656-7495, yano@is.tokushima-u.ac.jp) (Office Hour: 火曜日 16 時 ~ 17 時, 水曜日 16 時 ~ 17 時, 金曜日 16 時 ~ 17 時)

⇒ Kanenishi (院生棟 506, +81-88-656-7285, marukin@cue.tokushima-u.ac.jp)

⇒ Ogata (C507, +81-88-656-7498, ogata@is.tokushima-u.ac.jp) (Office Hour: 月曜日 ~ 金曜日:午後 5 時 ~ 6 時)

Machine Translation

2 units

Fuji Ren · PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) As a research and development field, machine translation (MT) is among the oldest among the various subdisciplines and applications of computer science to the study of natural language. This lecture aims to understand the basic MT technologies and to learn the latest MT theory and new approaches to develop MT system.

Outline) This lecture teaches the theory of machine translation (MT) and the technologies of MT systems. Main items in the lecture are syntax analysis, semantic analysis, knowledge processing, world knowledge model, natural-language-processing function, super-function, multilingual processing, etc.

Style) Lecture

Keyword) Machine Translation, Syntax Analysis, Semantic Analysis, Super Function

Fundamental Lecture) “Language Engineering I”(1.0)

Relational Lecture) “Natural Language Understanding”(0.5, ⇒p.77)

Goal)

1. To understand the basic theory of machine translation (MT).
2. To Master the technique of developing a MT system.
3. To grasp the newest trend of machine translation research.

Schedule) 1. Introduction 2. Machine translation system 3. Morphological analysis I 4. Morphological analysis II 5. Syntax analysis I 6. Syntax analysis II 7. Semantic analysis I 8. Semantic analysis II 9. Semantic analysis III 10. Context analysis 11. Dictionary 12. Super-Function based MT I 13. Super-Function based MT II 14. Super-Function based MT III 15. Ontology and machine translation 16. Examination

Evaluation Criteria) Attendance (30%), report (30%), examination (40%)

Textbook) no special book

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169342>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Ren (C204, +81-88-656-9684, ren@is.tokushima-u.ac.jp) (Office Hour: 16:00-15:00 Tuesday, 16:00-17:00 Thursday)

Advanced Lecture in Intelligent Science

2 units

Minoru Fukumi · PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) This lecture aims to understand the latest topics in a field of Intelligent systems, and to obtain advanced knowledge and technologies.

Outline) This lecture teaches the advanced topics in intelligent systems. The main items in this lecture are softcomputing and human information processing, including face information processing and its computer practice.

Style) Lecture and exercise

Keyword) Softcomputing, Human Information Processing

Goal)

1. To understand the latest topics on Intelligent systems.
2. To learn the trend of a domestic and foreign research on Intelligent systems.

Schedule) 1. Topics in Advanced Intelligent Systems 2. Introduction to Human Information Processing 3. Topics in Advanced Softcomputing techniques 4. Topics in Advanced Biosignal Processing 5. Topics in Advanced Biometric Authentication 6. Topics in Advanced Face Information Processing 7. Another Topics in Advanced Human information Processing 8. Exercise in Advanced Intelligent Systems 9. Exercise in Advanced Intelligent Systems 10. Exercise in Softcomputing 11. Exercise in Softcomputing 12. Exercise in Human Information Processing 13. Exercise in Human Information Processing 14. Exercise in Human Information Processing 15. Exercise in Human Information Processing 16. Discussion

Evaluation Criteria) Attendance (30%), practice(10%), report (60%)

Textbook) no special book

Reference) 講義・演習中に指定する。

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169437>

Student) Able to be taken by only specified class(es)

Contact)

⇒ 金曜日, 15~18時

Note) ゲストスピーカーを招聘して講義・演習を行う場合がある。

Seminar and Exercise in Information Science

6 units

Shingo Kuroiwa · PROFESSOR / 千葉大学大学院 融合科学研究科

Masami Shishibori · ASSOCIATE PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Masahiko Sano · ASSOCIATE PROFESSOR / APPLIED INFORMATION MEDIA ENGINEERING, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Hitoshi Tokushige · ASSOCIATE PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Kenji Terada · ASSOCIATE PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Tetsushi Ueta · ASSOCIATE PROFESSOR / APPLIED INFORMATION MEDIA ENGINEERING, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Kenji Ikeda · ASSOCIATE PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Yoshio Mogami · ASSOCIATE PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Masao Fuketa · ASSOCIATE PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Hiroaki Ogata · ASSOCIATE PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Kazuhiro Morita · ASSOCIATE PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Satoru Tsuge · ASSOCIATE PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) Improve presentation skill, writing technique, discussion ability, and basic knowledge about the information technology.

Outline) (1) Students groups present the research theses of their research groups and basic of information related to them, (2)Each student introduces information technology and others in English, and (3) Each student presents his/her master's thesis.

Style) Practice, Exercise

Goal)

1. Development of knowledge of information technology.
2. Improvement of writing skill.
3. Improvement of presentation skill.

Schedule) 1. Orientation 2. Introduction to the research topics of each reaserach group (1) 3. Introduction to the research topics of each reaserach group (2) 4. Introduction to the research topics of each reaserach group (3) 5. Introduction to the research topics of each reaserach group (4) 6. Introduction to the research topics of each reaserach group (5) 7. Introduction to the research topics of each reaserach group (6) 8. Introduction to the research topics of each reaserach group (7) 9. Introduction to the

research topics of each reaserach group (8) **10.** Introduction to the research topics of each reaserach group (9) **11.** Introduction to the research topics of each reaserach group (10) **12.** Introduction to the research topics of each reaserach group (11) **13.** Introduction to the research topics of each reaserach group (12) **14.** Introduction to the research topics of each reaserach group (13) **15.** Introduction to the research topics of each reaserach group (14) **16.** Information technology on the reserach topics of each reaserch group (1) **17.** Information technology on the reserach topics of each reaserch group (2) **18.** Information technology on the reserach topics of each reaserch group (3) **19.** Information technology on the reserach topics of each reaserch group (4) **20.** Information technology on the reserach topics of each reaserch group (5) **21.** Information technology on the reserach topics of each reaserch group (6) **22.** Information technology on the reserach topics of each reaserch group (7) **23.** Information technology on the reserach topics of each reaserch group (8) **24.** Information technology on the reserach topics of each reaserch group (9) **25.** Information technology on the reserach topics of each reaserch group (10) **26.** Information technology on the reserach topics of each reaserch group (11) **27.** Information technology on the reserach topics of each reaserch group (12) **28.** Information technology on the reserach topics of each reaserch group (13) **29.** Information technology on the reserach topics of each reaserch group (14) **30.** Poster presentation of Master's thesis **31.** Orientation of English presentation **32.** English presentation (1) **33.** English presentation (2) **34.** English presentation (3) **35.** English presentation (4) **36.** English presentation (5) **37.** English presentation (6) **38.** English presentation (7) **39.** English presentation (8) **40.** English presentation (9) **41.** English presentation (10) **42.** English presentation (11) **43.** English presentation (12) **44.** English presentation (13) **45.** English presentation (14) **46.** Orientation of oral presentation of master's thesis **47.** Presentation of master's thesis (1) **48.** Presentation of master's thesis (2) **49.** Presentation of master's thesis (3) **50.** Presentation of master's thesis (4) **51.** Presentation of master's thesis (5) **52.** Presentation of master's thesis (6) **53.** Presentation of master's thesis (7) **54.** Presentation of master's thesis (8) **55.** Presentation of master's thesis (9) **56.** Presentation of master's thesis (10) **57.** Presentation of master's thesis (11) **58.** Presentation of master's thesis (12) **59.** Presentation of master's thesis (13) **60.** Presentation of master's thesis (14)

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169438>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Terada (Dr.802, +81-88-656-7499, terada@is.tokushima-u.ac.jp) (Office Hour: 月, 水曜日 15:00~ 17:00(年度ごとに学科の掲示を参照すること))

Laboratory in Information Science

10 units

Teacher of course

Target) To conduct research leading to the awarding of masters degrees.

Outline) To conduct research in the Natural Language Understanding, Document Processing, Multimedia Information Retrieval, Image Processing, Movie Image Processing, Voice Recognition, Autonomous Agents Design, Internet Security, Intelligent Software, etc (seminars, portfolios etc).

Style) Lecture in combination with Portfolio

Keyword) Information Science, Software Engineering

Notice) Course plan differs depending on the laboratory you choose.

Goal) To present the results of your research related conferences, departmental research meetings, etc.

Schedule) **1.** After the student selects the subjects, research can be carried out at the laboratory. However, the course contents are as shown below. **2.** 中韓機械翻訳におけるスーパー関数の構築について **3.** 音声による姓名漢字入力インタフェースに関する研究 **4.** WWW 画像検索システムにおける有害画像フィルタリング手法に関する研究 **5.** カラー画像からの標識の自動認識 **6.** 進化計算による多峰性関数最適化に関する研究 **7.** blog を対象とした探索収集に関する研究 **8.** Web カメラを用いた遠隔会議支援システムの開発 **9.** カラーヒストグラムの情報を用いたカラー画像の局所的な露出補正 **10.** デザインパターンに基づくリファクタリング方式の研究 **11.** Web ページの焦点分析技術に関する研究 **12.** 感情を表現する音声合成の韻律制御に関する研究 **13.** 時間変化を考慮した語彙と表現の傾向分析に関する研究 **14.** 競合的情報共有アプローチによる Web 教材オーサリングシステム **15.** 感性共有に基づく協調的音楽鑑賞支援に関する研究 **16.** ユビキタスゲーム型英語学習環境における問題文自動生成に関する研究

Textbook) None

Reference) Using papers for each research field.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169436>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Committee Member of School Affair

Systems Innovation Engineering — Optical Systems Engineering

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Introduction to Intellectual Property

2 units

Tohru Sakai · PART-TIME LECTURER / (助)工業所有権部センター, Juichiroh Osame · PART-TIME LECTURER
Akio Fujii · PART-TIME LECTURER / INTELLECTUAL PROPERTY OFFICE, Yasushi Toyosu · PART-TIME LECTURER, Kuniaki Kubota · PART-TIME LECTURER

Target) Understanding the basic systems and importance of protection and practical use of intellectual property based on some examples.

Outline) It is necessary for a working staff in a company, a university, etc., in a future. It is introduced the importance to protect and practical use of intellectual property at governments, industrial circles, universities and institutes in Japan using potential on scientific techniques. This lecture is treated the basic systems of protection and practical use of intellectual property particularly based on strategy and invasion of patent in an organization such as company, university, etc.

Style) Lecture

Keyword) Intellectual property, Patent Law, Protect and Use of Intellectual Property

Relational Lecture) “Introduction to Intellectual Property”(0.5)

Requirement) No requirement

Notice) It is necessary to be present at two concentrated lecture.

Goal)

1. Understanding concept of intellectual property right.
2. Understand the Patent Act, the Trademark Act, the Design Act and the Copyright Act.
3. Understanding on basical practical use of intellectual property.

Schedule) **1.** Concept of intellectual property(Sakai) **2.** Outline of intellectual property(Patent and Trademark)(Sakai) **3.** Outline of intellectual property(Design and Copyright)(Sakai) **4.** Patent, invention and invasion of patent (Sakai) **5.** Management of intellectual property and use (Sakai) **6.** A way of research and development and intellectual property in a future(Sakai) **7.** The midterm examination and its comment for Target and **8.** History of system of intellectual property (Osame) **9.** International trend of system of intellectual property (Osame) **10.** Acquisition method of intellectual property right(Fujii) **11.** Use of intellectual property(Watanabe) **12.** Strategy of intellectual property on development of techniques(Y.Higuchi) **13.** Effective intellectual property in development of techniques (Kubota) **14.** Special lecture on a use of intellectual property by a chief executive officer(1) **15.** Special lecture on a use of intellectual property by a chief executive officer(2)

Evaluation Criteria) Passing mark is over 60% on the examinations and the reports for each reaching level, respectively.

Textbook) To be used textbooks made by lecturers.

Reference) Nobuhiro Nakayama:Titeki Shoyuken, Nikkan Kohgyo Shinbunsha

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169432>

Student) For the course students and other graduate school students.

Contact)

⇒ Sakai (+81-3-5600-2631,)

⇒ Mizuguchi (A501, +81-88-656-7349, mizuguch@ce.tokushima-u.ac.jp) (Office Hour: Monday,11:00-12:30, 17:00-18:00)

Management Theory of New Business

2 units

Vice chairperson of School Affairs Committee , Faculty of Engineering
First-line men with experience of practical business -PART-TIME LECTURER

Target) New business is the word which means the business to make the most of technical knowledge, technology, the new idea and which is developed creatively, and that main bearer is the enterprise called a venture. There is a purpose of this class in providing the knowledge which is necessary, and know-how and a spirit so that a taking lecture student may establish a venture business.

Outline) The regeneration of the Japanese society with the vitality is being asked. Government enforced "a university venture 3 years 1000 companies plan" over Heisei 14-the 16th year. Though that goal was almost attained, it is very important to promote entrepreneur education continuously from now on. Tokushima Prefecture supports this class based on the recognition done like this, and it is established.

Requirement) The person whom the one with the classroom is constructed by the class start time in the person who doesn't learn the unit of "Introduction to new business" in the college, and a group are organized, and it is limited to the person with the intention to make a business plan, and taking lecture is recognized.

Notice) Being late and a whisper in class should be prohibited strictly. Be careful over and again because it should dispose of exit and future taking lecture may not be recognized when it is wicked.

Goal) Learning of the necessary knowledge to establish venture business, and the ability which can make a business plan.

Schedule) 1. Guidance 2. What is the new business? 3. Keynote lecture 4. Theory of a stand-alone version venture success 5. The law knowledge which is necessary for entrepreneur 6. Fund-raising and capital policy 7. Indirect finance 8. Direct finance 9. The basis of the company management 10. The elementary knowledge of the business accounting 11. The point of the business plan preparation 12. Management strategy and marketing 13. Product development and intellectual property 14. Business plan preparation practice 15. Examination 16. Business plan announcement meeting

Evaluation Criteria) It is evaluated by the presentation (40%) of the written examination (60%) and the business plan. And, the presentation of the written examination and the business plan is decided to be recognized only for the taking lecture student who attended it for 2/3 and more of the classes that it is opened.

Textbook) The summary is distributed every time.

Reference) Several are introduced in the school hours.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169469>

Student) he person who hasn't learned the unit of the new business outline that it is opened with this learning in all the students enrolled in the graduate school yet is made the target. The number of completion people may be restricted in the method such as a lottery in case of a taking lecture applicant many. As for the details, an applicant for taking lecture is to follow those directions because the notice which showed attention in taking lecture is done.

Contact)

⇒ Vice chairperson of School Affairs Committee , Faculty of Engineering

Note) The man of business that it is active in the forefront every time, and an adviser are invited as an instructor, and working knowledge is provided for theory plus practice in this class from the specialist's position. This class is the thing which is useful enough even if it is taken to the person who aims at a general enterprise and a laboratory, the employment to the self-governing body and so on.

Management of Technology

2 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) About the production management of the automobile industry, it is understood variously from the point of view such as "research and development", "production management", "purchasing" and "quality control" "marketing" and "cross-cultural management".

Outline) It learns about the production management. This time, "the automobile industry" specially takes up the production management of "Honda Motor Co.,Ltd. (following Honda)" even of that in the case, and the class to appreciate that importance with ranking of technology in management is taken.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business" .

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of management is learned.

2. Ranking of the technology in management and that importance are appreciated.

3. It learns how to solve the various problems which always occur in the spot of the management through the case study and the business game.

Schedule) 1. Guidance 2. Lecture "What in Management of Technology?" 3. Case report "Research and development of Honda" 4. Case study "Plan an overseas factory." "A new car development order" 5. Lecture "Production management and purchasing" 6. Lecture "Quality control" 7. Case report "The production management of Honda"; "The supply chain management of Honda" 8. Case study "Plan an overseas factory." 9. Case report "The quality control of Honda" 10. Case study "Don't make material defects flare up again." 11. Lecture "Marketing strategy" 12. Lecture "Cross-cultural management" 13. Case report "Around the products project of Honda - the two-wheeled vehicle" 14. Case report "The path of internationalization of Honda" 15. Case report "The personnel management of Honda" 16. Summary and questions and answers

Evaluation Criteria) It is evaluated in the remark (20%) in class and the middle, end of a term report (80% in total).

Textbook) It doesn't specially use. The summary and so on is distributed every time.

Reference) Several are introduced in class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169348>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the doctor former term course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Note) This class invites seven Honda alumnuni who did work in "research and development", "production management", "purchasing", "quality control", "marketing", "cross-cultural management", and so on as an instructor, and it is the class to do case report. Even if it is seen nationwide, the trial done like this is very rare, and it is a precious class. And, an applicant for taking lecture is to attend it in the guidance to hold it in advance. A schedule is indicated separately.

Presentation Method (M)

2 units

Target) Poster and oral presentations, and journal publications are common means of appealing the research work in various scientific and technological disciplines. It's undoubtedly important for activating the research work. The lecture is intending for students to learn most efficient way to appeal their findings and discussions in scientific community.

Outline) Credits are acknowledged to the students who are supervised to give conference speech by themselves and do actually the lectures.

Goal) The lecture is aiming at having knowledge and experience of the presentation in international conferences.

Evaluation Criteria) Students' achievement is evaluated by portfolios submitted showing the progress in preparation of international conferences as well as by presentation records.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169510>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Internship (M)

2 units

Target) This program is provided to increase knowledge and experience in the actual industrial technology in various fields. Through the practical experience, the program will allow students to become discerning and well-balanced researchers or engineers with deeper understanding of technological societies.

Outline) Credits are acknowledged to students who experienced the internship in companies and/or government offices. Their fulfillment is evaluated by activity reports during internship.

Goal)

1. Grasping internal systems of a company, management, action and strategy to achieve the company's goal. (2)
2. Understanding human relationship and communicative manner in a working society and a company.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by supervisors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169345>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Venture Business (M)

2 units

Target) Aims of the lecture are doing collaborative works with private enterprises and establishing venture businesses through such works.

Outline) The lecture is aiming at founding a venture business company as well as establishing collaborative research works with private enterprises. It's worth to apply their accomplishment to an actual society beyond the range of a laboratory work.

Goal) Objective of the lecture is to have experience and knowledge of collaborative works with private enterprises and to mature the works to venture businesses.

Evaluation Criteria) Credits are acknowledged in case of doing collaborative works with enterprises and/or maturing them to venture businesses. Handouts, reports, and presentation materials, etc. are evaluated to approve credits.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169332>

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Long-term Internship (M)

6 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This program is provided long-term internship in the actual industrial companies and so on, doing a joint study between companies and university on practical problems proposed by the company and practical experience of management of technologies. Through the long-term internship, the program will allow students to become an engineer with a core role in researches and companies

Outline) Credits are acknowledged to students who experienced the internship in companies or government offices of 270 hours during three months or more and presentation to executive officer of the company. Their fulfillment is evaluated by activity reports during internship and appraisal and interviewed report from a mentor.

Goal) Grasping abilities for practical engineers by studying activities in company and so on.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by mentors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169440>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Nishida (K409, +81-88-656-7630, nishida@kg.tokushima-u.ac.jp)

⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

⇒ Morimoto (A407, +81-88-656-7619, emi.morimoto@kg.tokushima-u.ac.jp) (Office Hour: 月～木(10時～15時))

Note) Students who resister the coop-education program for "Pai-shape" engineers with sense for management of technology, are able to have a grant-in-aid for travel and so on. Ask committee members of long-term internship in your course or coordinators of this program.

Advanced Lecture in Theory of Business Models

2 units

Tatsuya Deguchi · PART-TIME LECTURER, Kenichi Yasumuro · PART-TIME LECTURER, Katsuo Touma · PART-TIME LECTURER

Takahide Yamaguchi · PART-TIME LECTURER, Shingou Nishii · PART-TIME LECTURER

Target) There is a purpose of this class in providing the knowledge which is necessary, and know-how so that students may achieve a business model in establishing enterprises based on the lecture of "Management Theory of New Business", and in making students understood the profit generating stream by studying on the frame work of companies in several business fields.

Outline) Business Model is a remarkable term in modern economic and organizational theories in these days but describes a broad range of definitions. In this lecture, Business Model is defined as "System which converts technology and know how into profit for the purpose of customers' satisfaction" and aims at providing the ability for the design of profitable system, by learning cost issues in establishing business strategies of companies.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business"

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of business model design is learned.
2. Understanding of the concept of business model by case study analysis are appreciated.
3. It learns forming ability of business plan through the case study on business models.

Schedule) 1. Guidance 2. Keynote lecture "Business Model Thinking" 3. Questions and answers, Discussions 4. Lecture "Theory of Business Models" 5. Lecture "Design principles of Business Models" 6. Lecture "Evaluation of Business Models" 7. Case Study "Business Model in a R&D company" 8. Case Study "Business Model in a manufacturing industrial company" 9. Case Study "Business Model in a company of service industry" 10. Case Study "Business Model in a company of information industry" 11. Business plan practice, Present situation analysis and alternatives. 12. Business plan practice, Concept ad design of business. 13. Business plan practice, Financial analysis. 14. Business plan practice, Concluding and submitting 15. Presentation(1) of Business plan practice. 16. Presentation(2) of Business plan practice, Comments and summary.

Evaluation Criteria) Participation in class(20%) Group work and its report(80%)

Textbook) Ken-ichi Amuro and Study Group of Business model "Case Book: Business Model Thinking" Bunshindo

Reference) Several are introduced in class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169656>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Contact)

⇒ Tatsuya Deguchi (Wakayama University)

⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

Note) This class is supported by Tokushima Prefecture Government

Advanced Theory of Complex System Engineering

2 units

Tetsushi Ueta · ASSOCIATE PROFESSOR / APPLIED INFORMATION MEDIA ENGINEERING, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Hiroshi Kawakami · EXECUTIVE DIRECTOR / THE UNIVERSITY OF TOKUSHIMA

Target) comprehension and application of complex systems by using engineering methodologies

Outline) Complex systems are defined as compound dynamical systems whose behavior and features cannot be predicted because of their nonlinearities and connecting conditions. This emergence of behavior is not possible for a single dynamical system, therefore, connection, coupling, compounding are keywords of this theory. Emergence of rhythm in biological systems, self organization, chaotic properties in high degrees of freedom, learning and associative memory are example features of complex systems. In this lecture, based on physical systems which are ubiquitously found and treated by system engineering subjects, we study analytical methods to understand these phenomena, bifurcation theory of nonlinear and linear systems, applied extraction methods of valuable information from observed data, system design methods of compound dynamical systems.

Style) Lecture

Keyword) complex system, bifurcation, chaos, nonlinear phenomena

Fundamental Lecture) “Differential Equations (II)”(1.0), “Transient Analysis”(1.0), “Industrial Basic Physics”(1.0)

Relational Lecture) “Advanced Theory of System Analysis”(0.5, ⇒p.68), “Topics of mathematical physics”(0.5, ⇒p.74), “Advanced Electrical Control System”(0.5, ⇒p.66), “Advanced Theory of Electronic Circuits”(0.5, ⇒p.69)

Requirement) none

Goal)

1. understanding of the definition and target area of complex systems
2. understanding of qualitative approach for given dynamical system
3. understanding and application of bifurcation theory

Schedule) 1. examples of complex systems 2. relationship between bifurcation problems and complex systems 3. computation of bifurcation parameter values 4. chaos and bifurcation phenomenon 5. chaotic itinerary 6. emergence mechanism of spatio temporal chaos and its clustering 7. phase transition and synchronization 8. spatio temporal intermittency and emergence of patterns 9. chaos neural network 10. neuronal circuits as complex systems 11. bifurcations in emergence systems 12. analysis of social systems 13. survey on complex systems 14. exercise 1 15. exercise 2 16. questions and answers

Evaluation Criteria) The total grade is evaluated by homework reports (70 %) and attendance of the class. (30 %)

Textbook) specified every class.

Reference) Chaotic Scenario of Complex Systems, Asakura-Shoten, 1996 (in Japanese)

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169498>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Ueta (Ait502, +81-88-656-7501, tetsushi@ait.tokushima-u.ac.jp) (Office Hour: Wednesday, afternoon)
 ⇒ Kawakami (E 棟 3 階北 C-7, +81-88-656-7465, hukugakk@honbu.tokushima-u.ac.jp)

Advanced Theory of Electromagnetic Compatibility

2 units

Masatake Kawada · ASSOCIATE PROFESSOR / ELECTRIC ENERGY ENGINEERING, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING
 Katsuo Isaka · PART-TIME LECTURER / ELECTRIC ENERGY ENGINEERING, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) The purpose of this lecture is to help students understand (1) electromagnetic environments quantitatively, (2) their electrical effects on the industrial products and (3) their biological effects on humans.

Outline) (1) Fundamentals of electromagnetic theory, (2) Electromagnetic compatibility (EMC) of industrial products, (3) Guideline of protection of humans from environmental electromagnetic fields, and (4) Concept of EMC in 21st century.

Style) Lecture

Keyword) Electromagnetic field, Electromagnetic interference, Electromagnetic immunity

Fundamental Lecture) “Advanced Circuit Theory”(0.2, ⇒p.68), “Advanced Theory of Electronic Circuits”(0.2, ⇒p.69), “Advanced Biological Engineering”(0.2, ⇒p.68)

Relational Lecture) “Electric Power System”(0.2, ⇒p.66)

Requirement) Good understanding of electromagnetics theory.

Goal)

1. To be able to understand natural and artificial environments by the theoretical use of electromagnetic fields.
2. To be able to understand the practice of electromagnetic compatibility design of electric and electronic equipments.
3. To be able to understand the discussions of electromagnetic fields effects on living bodies by international agencies.

Schedule) 1. Electric field, magnetic field and Electromagnetic field (1). 2. Electric field, magnetic field and Electromagnetic field (2). 3. Electric field, magnetic field and Electromagnetic field (3). 4. Electromagnetic fields in natural environment. 5. Man-made low frequency electromagnetic fields. 6. Low frequency electromagnetic fields in residential and occupational environments. 7. Man-made High frequency electromagnetic fields. 8. Concept of electromagnetic compatibility. 9. Electromagnetic interference and immunity 10. Effects of environmental electromagnetic fields on electronic circuits. 11. Biological effects of electromagnetic fields. 12. Protection of humans from ionizing and non-ionizing electromagnetic fields. 13. Precautionary principle by World Health Organization. 14. Living environments in 21st century and EMC. 15. Review talk and discussions. 16. Examination.

Evaluation Criteria) Assignments count 30% and Examination 70%.

Textbook) None.

Reference) Will be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169457>

Student) Any students can attend the class.

Contact)

⇒ Kawada (E 棟 2 階北 B-10, +81-88-656-7460, kawada@ee.tokushima-u.ac.jp) (Office Hour: (水)(木) 16:00-17:00)

Note) This lecture will be given in English.

Advanced Lecture of E-business

2 units

Yohsuke Kinouchi · PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) To master key technologies used in e-business and the principles.

Outline) Key technologies for e-business are introduced.

Style) Lecture

Keyword) e-business, internet

Requirement) none

Note) none

Goal)

1. To get knowledge on e-business
2. To get skills for e-business

Schedule) 1. e-business 2. Internet and the mechanism 3. Mobile network and the mechanism 4. Network management 5. Security for e-business 6. typical e-business model 7. establishment of e-business 8. administration of e-business 9. accounting for e-business 10. customer management in e-business 11. complaints management in e-business 12. Examples of e-business in production areas 13. Examples of e-business in commercial areas 14. Examples of e-business in service areas 15. Example of e-business in social areas 16. Comments on reports

Evaluation Criteria) Evaluated by portfolios and/or examinations

Textbook) Printed materials

Reference) References will be introduced in the classes.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169304>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Kinouchi (E 棟 3 階北 C-4, +81-88-656-7475, kinouchi@ee.tokushima-u.ac.jp)

Advanced Lecture on Semiconductor Nanotechnology

2 units

Toshiro Isu · PROFESSOR / INSTITUTE OF TECHNOLOGY AND SCIENCE, Takahiro Kitada · ASSOCIATE PROFESSOR / INSTITUTE OF TECHNOLOGY AND SCIENCE

Target) This class introduces basic principles of the semiconductor nanotechnology and their application to the quantum devices.

Outline) Basics of semiconductor physics and quantum mechanics are introduced to understand material properties of quantum confined nanostructures. Recent progress in fabrication techniques and device applications of semiconductor nanostructures (quantum wells, wires and dots) will be reviewed.

Style) Lecture

Keyword) Quantum confined nanostructures, Semiconductor nanoscience, Electron devices, Photonic devices

Requirement) None.

Notice) None.

Goal) To understand basic properties of semiconductor nanostructures and quantum devices.

Schedule) 1. Introduction to semiconductor nanostructures 2. Electronic states in quantum confined structures 3. Electrical properties of superlattices 4. Fabrication technique of quantum wires and wells 5. Characterization of heterointerfaces 6. Characterization of nanostructures 7. High-speed electron devices 8. Optical properties of quantum wells 9. Semiconductor laser diodes 10. Quantum effect devices 11. Fabrication technique of quantum dots 12. Quantum dot devices 13. Device application of quantum nano structures 14. Recent topics of semiconductor nanotechnology (1) 15. Recent topics of semiconductor nanotechnology (2)

Evaluation Criteria) Assignments count 100%

Textbook) None.

Reference) Will be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169477>

Student) Any students can attend the class.

Contact)

⇒ Isu (A224, +81-88-656-7670, t.isu@frc.tokushima-u.ac.jp) (Office Hour: Tue -Thu 10:00-14:00)
 ⇒ Kitada (A224, +81-88-656-7671, kitada@frc.tokushima-u.ac.jp) (Office Hour: Mon. 10:00-14:00)

Superconductivity and superconducting materials

2 units

Yutaka Kishimoto · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) To understand basics and recent developments in superconductivity.

Outline) This class reviews quantum mechanics and introduces superconductivity and recent superconducting materials.

Style) Lecture

Keyword) superconductivity, Cooper pair, superconducting energy gap, density of states, anisotropic superconductivity

Goal) To understand the outline of superconductivity.

Schedule) 1. Introduction to superconductivity 2. Review of quantum mechanics (1), Schrödinger equation and wave function 3. Review of quantum mechanics (2), operators and expected values 4. Review of quantum mechanics (3), perturbation theory 5. Free electron model of metals 6. Phenomenological theory of superconductivity 7. To understand Meissner effect on the basis of quantum mechanics 8. Formation of Cooper pair 9. Formation of superconducting energy gap 10. Density of states, and energy gap at finite temperatures 11. Introduction to Nuclear Magnetic Resonance method 12. Frontier of superconductivity (1), strong coupling superconductor 13. Frontier of superconductivity (2), heavy Fermion superconductor 14. Frontier of superconductivity (3), copper oxide high Tc superconductor 15. Summary

Evaluation Criteria) Reports on several subjects in the class.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169443>

Contact)

⇒ Yutaka Kishimoto (A202)

Topics of mathematical physics

2 units

Shigeaki Nagamachi · PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) We study the quantum computing.

Outline) We study the elementary theory of numbers and group theory in order to understand RSA cryptography based on the difficulty of factorization for a big number. We study the theory of Hilbert spaces and their operators to understand Shor's fast factorization algorithm for quantum computers.

Goal) Understanding the principle of quantum computation

Schedule) 1. Group theory 1 2. Group theory 2 3. Number theory 1 4. Number theory 2 5. RSA cryptography 6. Shor's factorization algorithm 1 7. Hilbert space 8. Operators on Hilbert space 9. Quantum mechanics 1 10. Quantum mechanics 2 11. Quantum information 12. Quantum circuits 13. Quantum Fourier transformation 14. Shor's factorization algorithm 2 15. The complexity of Shor's factorization algorithm 16. Reserve day

Textbook) Mika Hirvensalo, Quantum Computing, Springer (2004)

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169411>

Methods for analysis of mathematical phenomena

2 units

Hitoshi Imai · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
 Cheng-Hai Jin · PROFESSOR / INTERNATIONAL STUDENT CENTER

Target) To learn the to analyze the mathematical phenomena.

Outline) Methods used in analysis of mathematical phenomena are introduced. Especially, those in numerical analysis are focused on.

Style) Lecture

Keyword) Mathematics, Numerical, Analysis

Fundamental Lecture) "Numerical Analysis"(1.0)

Relational Lecture) "Advanced Computational Science"(0.5, ⇒p.52)

Requirement) Only the premise that have studied basic mathematics.

Goal) The adequacy of the two-dimensional boundary value problem governed by the Poisson equation can be understood by the finite difference method, etc.

Schedule) 1. Introduction to computer 2. Common sense in numerical computation 3. High-speed computation (Parallel computing) 4. Finite difference method I 5. Finite difference method II 6. Finite difference method III 7. Finite difference method IV 8. Finite element method I 9. Finite element method II 10. Finite element method III 11. Finite element method IV 12. Boundary element method I 13. Boundary element method II 14. Boundary element method III 15. Iterative method

Evaluation Criteria) Evaluation by the report.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169408>

Contact)

⇒ Imai(A220, +81-88-656-7541, The inquiry by means of the cellular phone or E-mail is not acceptable) (Office Hour: Office hours: Thursday 14:00-15:00)

Advanced Computational Science

2 units

Toshiki Takeuchi · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class provides the basic technology for numerical calculation for the differential equation.

Outline) The numerical calculation methods for the differential equation are introduced.

Style) Lecture

Keyword) Numerical analysis, Numerical computation, Differential equation

Fundamental Lecture) "Numerical Analysis"(1.0), "Basic Mathematics/微分積分学 I"(1.0), "Basic Mathematics/微分積分学 II"(1.0)

Relational Lecture) "Methods for analysis of mathematical phenomena"(1.0), "Numerical Analysis"(1.0)

Requirement) Students have to understand basic mathematics of undergraduate-level.

Goal) To understand principle of numerical calculation methods.

Schedule) 1. Introduction to numerical simulation 2. Mathematical model 3. Lagrange interpolation 4. Spline interpolation 5. Least squares method 6. Finite difference method 7. Arbitrary precision formula 8. Application to ordinary differential equation 9. Application to partial differential equation 10.

Gauss-Seidel method **11.** Successive Over-Relaxation method **12.** Explicit method **13.** Implicit method
14. Crank-Nicolson method **15.** Numerical instabilities

Evaluation Criteria) Assignments count 100%

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169358>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Takeuchi (A206, +81-88-656-7544, takeuchi@pm.tokushima-u.ac.jp) (Office Hour: 木曜日 14:00-15:00)

Optical properties of materials

2 units

Masuo Fukui · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Masanobu Haraguchi · ASSOCIATE PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) To understand the principle of optical response of atoms, molecules and crystals. To develop ability to apply such optical phenomena to applications.

Outline) With quantum mechanics, we lecture optical process of materials. This course will cover the following topics: optical properties of materials for engineering, classical electromagnetic theory and optical property, optical transitions and optical process of atoms, molecules and semiconductors.

Style) Lecture

Keyword) Quantum mechanics, condensed matter, optical process, semiconductor

Relational Lecture) “Advanced Optical and Optoelectronic Devices”(0.5, ⇒p.85), “Lecture in Optical Materials and Devices, Part 1”(0.5, ⇒p.87)

Requirement) Students should have fundamental knowledges of quantum mechanics.

Goal)

1. Students can explain the optical processes of atoms and molecules.
2. Students can explain the optical processes in semiconductors.

Schedule) **1.** Introduction **2.** Optical response described by classical electro-magnetic theory **3.** Schrodinger equation and wave function **4.** Hydrogen atom model **5.** spin angular momentum **6.** Quantum mechanics of light **7.** Transition induced by interaction between electron state and light **8.** Light absorption and emission **9.** Electron transition in atoms and molecules **10.** Optical spectra of atoms and molecules **11.** Optical spectra of organic molecules **12.** Energy bands in condensed matters **13.** Optical processes in semiconductors **14.** Optical spectra of impurity atoms in a crystal **15.** Optical process of P-N junction **16.** Final Examination

Evaluation Criteria) Activity: 20%, Reports: 40% and Final Exam.:40%

Textbook) 中澤, 鎌田著, 光物性・デバイス工学の基礎, 培風館 1999

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169494>

Contact)

⇒ Haraguchi (Opt.209, +81-88-656-9411, haraguti@opt.tokushima-u.ac.jp) (Office Hour: 16:05-18:00)
 ⇒ Fukui (Opt.208, +81-88-656-9410, fukui@opt.tokushima-u.ac.jp)

Advanced Optical and Optoelectronic Devices

2 units

Masuo Fukui · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Masanobu Haraguchi · ASSOCIATE PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) To understand the principle of the current optoelectronic devices, e.g., Light Emitting Diodes, Laser Diodes and so on. To develop ability to solve various problems in device application.

Outline) This course will cover topics on current optical and optoelectronic devices. Topics treated include Light Emitting Diode, Laser Diode, Optical Modulator, Nonlinear Optical Devices and Liquid Crystal Devices.

Style) Lecture

Keyword) optoelectronic device, optical device, Light Emitting Diode, Laser Diode, Optical modulator

Relational Lecture) “Optical properties of materials”(0.5, ⇒p.85), “Lecture in Optical Materials and Devices, Part 1”(0.5, ⇒p.87)

Requirement) Students should have fundamental knowledges about semiconductor physics and devices for undergraduate students.

Goal)

1. Students can explain the principle and structures for light emitting devices and photodetectors.
2. Students can explain the principle and structures for liquid crystal devices.
3. Students can explain the principle and applications for electrooptic and magneto-optic effects.

Schedule) **1.** Introduction **2.** Interaction between Light and dielectric materials **3.** Interaction between Light and magnetic materials **4.** Luminescence **5.** Phosphors **6.** Stimulated Emission and Laser **7.** Photoconductor Cells **8.** Photocopy and Image orthicon **9.** Light Emitting Devices **10.** Photodetectors **11.** Solar cell and amorphous-semiconductor optoelectronic devices **12.** Electrooptic devices **13.** Nonlinear optical devices **14.** Magneto-optic devices **15.** Liquid Crystal Devices **16.** Final Examination

Evaluation Criteria) Activity: 20%, Reports: 40% and Final Exam.:40%

Textbook) 中澤, 鎌田著, 光物性・デバイス工学の基礎, 培風館 1999

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169491>

Contact)

⇒ Haraguchi (Opt.209, +81-88-656-9411, haraguti@opt.tokushima-u.ac.jp) (Office Hour: 16:05-18:00)
 ⇒ Fukui (Opt.208, +81-88-656-9410, fukui@opt.tokushima-u.ac.jp)

Advanced Lecture in Statistical Mechanics and Thermodynamics

2 units

Atsushi Mori · ASSOCIATE PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) Learn to apply the statistical mechanics and thermodynamics.

Outline) Concerning the mechanisms and phenomena in materials processing, lectures are given in method for analyzing the results on the basis of the statistical mechanics and thermodynamics and computer simulation on the atomic scale.

Style) Lecture

Goal)

1. points of view in statistical mechanics and thermodynamics.
2. applying statistical mechanics and thermodynamics to the practical problem.

Schedule) **1.** item 1 (to be announced on the bulletin board and trough web page) **2.** item 2 (to be announced on the bulletin board and trough web page) **3.** item 3 (to be announced on the bulletin board and trough web page) **4.** item 4 (to be announced on the bulletin board and trough web page) **5.** item 5 (to be announced on the bulletin board and trough web page) **6.** item 6 (to be announced on the bulletin board and trough web page) **7.** item 7 (to be announced on the bulletin board and trough web page) **8.** examination **9.** item 8 (to be announced on the bulletin board and trough web page) **10.** item 9 (to be announced on the bulletin board and trough web page) **11.** item 10 (to be announced on the bulletin board and trough web page) **12.** item 11 (to be announced on the bulletin board and trough web page) **13.** item 12 (to be announced on the bulletin board and trough web page) **14.** item 13 (to be announced on the bulletin board and trough web page) **15.** item 14 (to be announced on the bulletin board and trough web page) **16.** examination

Evaluation Criteria) to be announced

Textbook) to be announced

Reference) to be announced

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169384>

Advanced Lecture in Crystal Growth

2 units

Nobuo Goto · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) The function of optical device is strongly dependent on the quality of crystals. It is important to understand the growth mechanism in order to grow high quality crystals. The purposes of this lecture are to teach the various techniques for crystal growing and relation between the crystal quality and growth condition in connection with the growth mechanism.

Outline) 各種環境相 (融液, 溶液, 気相) から結晶が成長する機構について述べ, 主たる光学結晶がどのようにして作成されるかを講義する. また光学結晶には高品質が要求されるのでそのための育成技術についてさらにエピタキシャル法による高品質単結晶膜の作成について講述する. 以上のように, この授業は工業に関する科目である.

Keyword) optical crystal, crystal growing technique, crystal perfection, epitaxial growth, characterization of crystals

Fundamental Lecture) “Management of Technology”(1.0, ⇒p.81)

Relational Lecture) “Advanced Lecture in Statistical Mechanics and Thermodynamics”(0.5, ⇒p.85), “Lecture in Optical Materials and Devices, Part 2”(0.5, ⇒p.88), “Advanced Optical and Optoelectronic Devices”(0.5, ⇒p.85)

Goal)

1. to understand the mechanism of crystal growth
2. to understand various techniques for crystal growth
3. to understand the relationship between the growth condition and crystal perfection

Schedule) 1. Epitaxial growth (1) (vacuum epitaxial) 2. Epitaxial growth (2) (chemical vapor epitaxial) 3. Epitaxial growth (3) (liquid phase epitaxial) 4. Growth of optical crystals(- compounds) 5. Growth of Si crystal (1) 6. Growth of Si crystal (2) 7. Growth of oxide crystals (1) 8. Growth of oxide crystals (2) 9. Mid-term examination 10. Growth of halide crystals 11. Defects of crystals (1) 12. Defects of crystals (2) 13. Defect generation in crystal growth 14. Characterization of crystals (1) 15. Characterization of crystals (2) 16. Term end examination

Evaluation Criteria) Midterm examination (40%), Term end examination (40%), Attitude(20%)

Textbook) Teaching materials

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169361>

Student) Able to be taken by student of other department

Contact)

⇒ Goto (opt408, +81-88-656-9415, goto@opt.tokushima-u.ac.jp) (Office Hour: 8:30-17:00)

Macromolecular Design

2 units

Hitoshi Tanaka · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) This class introduces the generation and functionality of natural and synthetic polymers, in molecular scale, with a view to designing a functional polymer precisely.

Outline) Chemical macromolecular (polymer) design at an advanced level will be covered in this course. Emphasis is on the analysis, in atomic scale, of the factors which fulfill the unique polymerizations and the speciality of polymers on the basis of the recognition of polymerization-polymer microstructure-polymer functionality relationships. Application of the analytical information to macromolecular design and recent topics in the design will also be provided in this course.

Keyword) macromolecular design, polymer chemistry, functional polymer

Relational Lecture) “Lecture in Optical Materials and Devices, Part 3”(0.5, ⇒p.88)

Requirement) Students are required to have a good understanding of undergraduate-level polymer chemistry

Goal)

1. To understand the control of polymerization and polymer structure
2. To understand the characterization and functionality of polymer

Schedule) 1. Introduction to macromolecular design 2. Generation and functionality of natural polymers (1) 3. Generation and functionality of natural polymers (2) 4. Generation and functionality of natural polymers (3) 5. Preparation and functionality of synthetic polymers (1): optical polymers 6. Preparation and functionality of synthetic polymers (2): optical polymers 7. Preparation and functionality of synthetic polymers (3): photo and biodegradable polymers 8. Preparation and functionality of synthetic polymers (4): photo and biodegradable polymers 9. Preparation and functionality of synthetic polymers (5): magnetic polymers 10. Preparation and functionality of synthetic polymers (6): magnetic polymers 11. Nanomaterials (1) 12. Nanomaterials (2) 13. Topics in macromolecular design (1) 14. Topics in macromolecular design (2) 15. Topics in macromolecular design (3)

Evaluation Criteria) Evaluation by a term paper.

Textbook) To be introduced in the class

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169372>

Contact)

⇒ H. Tanaka (Opti. Build. Room 211, Phone & Fax: 088-656-9420, E-mail: tanaka@opt.tokushima-u.ac.jp)

Advanced Materials Chemistry

2 units

Yoshihiko Tezuka · ASSOCIATE PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) This course intends to develop the knowledge of materials in physics, chemistry, crystallography, polymer, and semiconductors, which has been acquired in undergraduate, through the rearrangement of these knowledge in terms of the electronic states, constituting atoms and molecules, and interactions between them. The objective of the course is to develop ability to understand materials from the viewpoints of various fields.

Outline) Structures, properties, functions and synthesis of various materials will be explained in term of chemistry to understand materials chemistry which constitutes one of the bases of materials science. Fullerenes and their derivatives will be taken up as recent topics to explain the relationship between molecular structures and physical properties.

Goal)

1. to enable a student to develop applications of materials by the estimation of their properties from the atoms and molecules constituting them.
2. to enable a student to develop applications of materials by the estimation of their electric and electronic properties from the electronic states.

Schedule) 1. Introduction to materials and chemistry 2. Classification of materials according to their crystalline states and molecular aggregation states 3. Crystalline materials 4. Amorphous materials (glass, silicone, metals) 5. Molecular aggregate (micelle, liquid crystalline, gels) 6. Classification of materials according to their electronic states 7. Experimental methods for the evaluation of electric properties of materials 8. Dielectric materials (1): ceramics 9. Dielectric materials (2): polymers 10. Electrochemical properties of semiconductors (1): inorganic semiconductors 11. Electrochemical properties of semiconductors (2): organic semiconductors 12. Electronic interactions between metals and semiconductors 13. Electronic interactions between semiconductors and redox species in solutions 14. Carbon materials: molecular structures and electronic states of fullerenes 15. Carbon nanotubes 16. A term examination

Evaluation Criteria) Reports worth a total of 50% of the course grade will be given. A term examination (50%) will be given as in-class closed-book examination.

Textbook) will be introduced in the lecture.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169499>

Contact)

⇒ Tezuka (Opt.307, +81-88-656-9423, ytezuka@opt.tokushima-u.ac.jp)

Electronic diplay

2 units

Shiro Suyama · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) To understand the history of developments, technical trends, and technologies of electronic display.

Outline) This course will cover the history of developments, technical trends, recent topics, and technologies of an electronic display. This course is related to industries.

Style) Lecture

Notice) 光の性質、光学的な現象については、既知とする。

Goal)

1. To understand fundamental technologies of an electronic display
2. To understand fundamental technologies of devices for an electronic display
3. To understand a technical trend of an electronic display

Schedule) 1. 電子ディスプレイの概要、最近の動向 2. 電子ディスプレイおよび画像システムの概要 3. 直視型: 陰極線管(ブラウン管, CRT), テレビジョン 4. 直視型: 液晶の概要と液晶ディスプレイ(LCD)の基本動作 5. 直視型: 各種の液晶ディスプレイと特性改善 6. 直視型: プラズマディスプレイ(PDP) 7. 直視型: エレクトロルミネッセンス(EL)ディスプレイ 8. 直視型: フィールドエミッションディスプレイ(FED) 9. 超大型: 投射型ディスプレイ 10. 超大型: 最新の投射型ディスプレイ, 屋外用大型LEDディスプレイ 11. 電子ディスプレイの画質と視覚特性 12. 電子ディスプレイの画質とその評価 13. 立体ディスプレイ: 概要 14. 立体ディスプレイ: 2眼/多眼方式 15. 立体ディスプレイ: 超多眼方式などの最新の動向

Evaluation Criteria) Evaluation with report

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169445>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Suyama (opt409, +81-88-656-9425, suyama.shiro@opt.tokushima-u.ac.jp) (Office Hour: 17:00~ 18:00)

Optical computing

2 units

Shiro Suyama · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) To understand analog optical computing. To understand digital optical computing. To understand optoelectronic computing.

Outline) We study fundamental technologies of architectures, implementation, and packaging in analog and digital optical processing, and prototype system developed with these technologies. We also study recent technologies in related photonics, electronics, and other technologies.

Style) Lecture

Goal)

1. To understand optical computing
2. To create new information photonics

Schedule) 1. Fundamentals of optical computing (1) 2. Fundamentals of optical computing (2) 3. Fundamentals of optical computing (3) 4. Light source and detector in optical computing 5. Optical modulator in optical computing 6. Analog optical computing (1) 7. Analog optical computing (2) 8. Digital optical computing (1) 9. Digital optical computing (2) 10. Optica memory 11. Optica communication 12. Recent optical computing technology (1) 13. Recent optical computing technology (3) 14. Recent optical computing technology (3) 15. Recent optical computing technology (4)

Evaluation Criteria) Evaluated with reports

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169483>

Student) Able to be taken by only specified class(es)

Virtual Reality

2 units

Noboru Niki · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) Introduction to the fundamental concepts of virtual reality.

Outline) Virtual Reality is a combination of human interface, graphics, sensor technology, high performance computing, and networking. It allows the user to interact with an artificial environment created by computers. Using these technologies, one has the feeling of total immersion in a new environment. Here, these technologies and several VR simulations are described.

Requirement) It is desired to finish a course of digital signal processing, image processing, and pattern recognition .

Goal)

1. To understand fundamentals of virtual reality.
2. To understand various techniques for realizing virtual environments.

Schedule) 1. 1. Introduction 2. Mathematical Fundamentals (Image Processing) 3. Mathematical Fundamentals (Pattern Recognition) 4. Computer Graphics 5. Three-dimensional Coordinate System 6. Geometrical Modeling 7. Hidden Line and Surface Removal Methods 8. Advanced Rendering Topics 9. Real Time Computer Graphics 10. Image Processing of Motion Pictures 11. Image Sensing Technology 12. Virtual Reality Systems 13. Augmented Reality Systems 14. Advanced Applications of Virtual Reality 1 15. Advanced Applications of Virtual Reality 2 16. Final Examination

Evaluation Criteria) Project Report 60%, Final Examination 40%

Textbook) Reference books are introduced to each topic.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169472>

Imaging Technology

2 units

Yoshiki Kawata · ASSOCIATE PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) Introduce the fundamental concepts of imaging systems.

Outline) This course is intended to introduce the fundamentals of the imaging technology which produces cross-sectional images of an object from transmission, reflection, emission, and diffraction data collected by illuminating the object from many different directions. The class begins with a brief overview of the various technologies used to obtain medical and industrial images. The focus then shift to in-depth descriptions of individual techniques, beginning with a description of the mathematical technique of computed tomography. This will be followed by discussions of imaging modalities such as X-ray Computer Tomography, Single Photon Emission Computed Tomography, Positron Emission Tomography, Magnetic Resonance Imaging, and Optical Computed Tomography.

Keyword) Imaging Technology, Imaging systems, X-ray Computer Tomography, Magnetic Resonance Imaging, Emission CT

Relational Lecture) “Virtual Reality”(0.5, ⇒p.87)

Requirement) It is desired to finish a course of digital signal processing, image processing, and programming (C or C++).

Goal)

1. To understand fundamentals of imaging technology.
2. To understand various imaging technologies used to obtain medical and industrial images.

Schedule) 1. Introduction to Imaging Technology 2. Signal Processing Fundamentals 3. Image Processing Fundamentals 4. Image Quality 5. Radiography Fundamentals 6. Computed Tomography 7. Image Reconstruction (1) 8. Image Reconstruction (2) 9. Nuclear Medical Imaging 10. Emission Computed Tomography 11. Ultrasound Imaging 12. Magnetic Resonance Imaging(1) 13. Magnetic Resonance Imaging(2) 14. Micro Computed Tomography 15. Advanced CT Application

Evaluation Criteria) Computer Project Report 100%

Textbook) Reference books are introduced to each topic.

Reference)

- ◇ Principles of Computerized Tomographic Imaging, A.C. Kak, M. Slaney, 1988
- ◇ 画像処理アルゴリズム, 齋藤恒雄, 近代科学社,1992
- ◇ Medical Imaging Signals and Systems, J.L. Prince, J.M. Links, 2006

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169306>

Contact)

⇒ Kawata (Opt.508, +81-88-656-9431, kawata@opt.tokushima-u.ac.jp)

Note) The computer projects should be done in C or C++.

Lecture in Optical Materials and Devices, Part 1

1 unit

Masuo Fukui · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING, Part-time Lecturer

Target) To understand the current trends of the optical and/or optoelectronic materials and devices.

Outline) This course will cover several topics on the current trends of the optical and/or optoelectronic materials and devices. Topics treated are focused on the latest fabrication technology and the research for the device application.

Style) Lecture

Keyword) semiconductor, LED, Laser Diode

Relational Lecture) “Advanced Optical and Optoelectronic Devices”(0.5, ⇒p.85), “Optical properties of materials”(0.5, ⇒p.85)

Requirement) Students must have enough knowledges of semiconductor physics comparable to contents in lectures on semiconductor physics for undergraduate students.

Goal)

1. To understand advantages of Nitride semiconductors compared with other semiconductors.
2. To understand the outline of technologies for fabrication process of optoelectronic devices
3. To understand trends of developments and researches for optoelectronic devices

Schedule) 1. guidance 2. semiconductor materials for optoelectronic devices 3. Advantages of Nitride semiconductor 4. Fabrication of optoelectronic devices by Nitride semiconductor 5. Principle of light emitting diode and laser diode 6. History of development for semiconductor light emitting deices 7. Trends on the development of high power light emitting diode 8. Trends on the development of UV

light emitting diode 9. Trends on the development of UV and Blue laser diodes 10. Applications of light emitting diode 11. Applications of laser diode 12. 予備日

Evaluation Criteria) Activity and attendance 40%, reports 60%

Textbook) no text

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169479>

Contact)

⇒ Fukui (Opt.208, +81-88-656-9410, fukui@opt.tokushima-u.ac.jp)

Lecture in Optical Materials and Devices, Part 2

1 unit

Nobuo Goto · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) 光学結晶の結晶成長について最近の話題や今後の展望について理解させる

Outline) Recent topics about the crystal growth of key materials are lectured. This lecture has a concern with the engineering of optics.

Style) Lecture

Keyword) crystal growth, optical crystals, crystal growing techniques, crystal perfection, epitaxial growth

Fundamental Lecture) “Advanced Lecture in Crystal Growth”(1.0, ⇒p.85)

Relational Lecture) “Advanced Lecture in Crystal Growth”(0.5, ⇒p.85), “Advanced Lecture in Statistical Mechanics and Thermodynamics”(0.5, ⇒p.85), “Advanced Optical and Optoelectronic Devices”(0.5, ⇒p.85)

Goal) To understand the recent topics about crystal growth of optical materials

Schedule) 1. History of crystal growth 2. Growth method of Si crystal 3. Defects in Si crystal 4. Crystal growth of semiconductor compounds (1) 5. Crystal growth of semiconductor compounds (2) 6. Crystal growth of oxides 7. Crystal growth of organic materials 8. Examination

Evaluation Criteria) Examination (20%), Attitude(20%)

Textbook) Distribution of teaching materials

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169480>

Student) Able to be taken by student of other faculty and university

Contact)

⇒ Goto (opt408, +81-88-656-9415, goto@opt.tokushima-u.ac.jp) (Office Hour: 8:30-17:00)

Lecture in Optical Materials and Devices, Part 3

1 unit

Hitoshi Tanaka · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) This class addresses the recognition of the optical materials and devices from a chemical point of view.

Outline) This course will focus on the fundamentals and current topics in chemical preparation, reaction, structure, and functionality of the optical materials and devices.

Keyword) photo-functional materials

Relational Lecture) “Macromolecular Design”(0.5, ⇒p.86)

Requirement) Students are required to have a good understanding of undergraduate-level photochemistry.

Goal)

1. To understand the exact nature of the optical properties of materials.
2. To understand the precise procedure to design and evaluate the optical materials and devices.

Schedule) 1. Introduction to optical materials and devices for this class 2. Photo and thermal reactions 3. Photochemical process 4. Photophysical chemistry 5. Interaction between light and media (1) 6. Interaction between light and media (2) 7. Interaction between light and media (3) 8. Final test, summary

Evaluation Criteria) Final test: 100%

Textbook) Hikarikinoubunshi no Kagaku ed. by K. Horie and H. Ushiki (Kodansha)

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169482>

Contact)

⇒ H. Tanaka (Opti. Build. Room 211, Phone & Fax: 088-656-9420, E-mail: tanaka@opt.tokushima-u.ac.jp)

Lecture in Optical Information Systems, Part 1

1 unit

Shiro Suyama · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING, Undecided

Target) Introduction to recent topics on optical information processing.

Outline) This course introduces recent technical information on optical information processing and the required future technology.

Keyword) Information photonics, Optical computing

Goal)

1. To understand the recent topics of optical information systems
2. To consider a next generation of optical information systems

Schedule) 1. History of the development of optical information systems 2. Recent topics of optical disk systems (1) 3. Recent topics of optical disk systems (2) 4. Recent topics of optical disk systems (3) 5. Recent topics of optical disk systems (4) 6. Recent topics of display systems (1) 7. Recent topics of display systems (2) 8. Recent topics of display systems (3) 9. Recent topics of display systems (4) 10. Recent topics of optical information systems (1) 11. Recent topics of optical information systems (2) 12. Recent topics of optical information systems (3) 13. Recent topics of optical information systems (4) 14. Next generation of optical information systems (1) 15. Next generation of optical information systems (2)

Evaluation Criteria) Report 100%

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169489>

Lecture in Optical Information Systems, Part 2

1 unit

Noboru Niki · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) Introduction to recent topics on imaging technologies and intelligent image processing.

Outline) This course introduces recent technical information on imaging technologies and intelligent image processing and describes their future directions.

Keyword) Imaging technologies, Intelligent image processing

Relational Lecture) “Imaging Technology”(0.5, ⇒p.87), “Virtual Reality”(0.5, ⇒p.87)

Goal) To understand the recent topics on imaging technologies and intelligent image processing.

Schedule) 1. Recent topics of three-dimensional CT technologies (1) 2. Recent topics of three-dimensional CT technologies (2) 3. Recent topics of three-dimensional CT technologies (3) 4. Recent topics of three-dimensional CT technologies (4) 5. Recent topics of three-dimensional CT technologies (5) 6. Recent topics of MR imaging technologies (1) 7. Recent topics of MR imaging technologies (2) 8. Recent topics of MR imaging technologies (3) 9. Recent topics of MR imaging technologies (4) 10. Recent topics of MR imaging technologies (5) 11. Recent topics of intelligent image processing (1) 12. Recent topics of intelligent image processing (2) 13. Recent topics of intelligent image processing (3) 14. Recent topics of intelligent image processing (4) 15. Recent topics of intelligent image processing (5)

Evaluation Criteria) Report 100%

Textbook) Reference books are introduced to each topic.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169490>

lecture in optical system engineering

1 unit

Part-time Lecturer

Target) topics in optical technology

Outline) Lecture on the trend in optical technologies such as nano-technology, bio-technology, and information communication, and medical science.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169488>

Practice of presentation

1 unit

Teacher of course

Target) Learning a skill of presentation

Outline) Fundamental skills for the presentation are learned such as (1) to explain the contents of research, (2) to adjust the contents with audience's level, (3) to create the original drawing, and (4) the way of answering against a question etc.

Keyword) oral presentation

Goal) Learning a fundamental skill for presentation

Schedule) 1. Presentation (1) 2. Presentation (2) 3. Presentation (3) 4. Presentation (4) 5. Presentation (5) 6. Presentation (6) 7. Presentation (7) 8. Presentation (8) 9. Presentation (9) 10. Presentation (10) 11. Presentation (11) 12. Presentation (12) 13. Presentation (13) 14. Presentation (14) 15. Presentation (15)

Evaluation Criteria) Presentation skill (80%), Attitude(20%)

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169511>

Student) Able to be taken by only specified class(es)

Intellectual Production Technology Seminar

1 unit

Target) To master skills for novel intellectual production

Outline) As one of technique for novel intellectual production, practice methods those are the combination of brainstorming and KJ method

Goal)

1. To understand what is intellectual production technology
2. To use an intellectual production technology that is combination of brainstorming and KJ method

Schedule) 1. necessary 2. How to practice 3. what is brainstorming 4. practice of brainstorming 5. case studies 6. what is KJ method 7. practice of KJ method 8. practice of KJ method 9. practice of KJ method 10. case studies 11. practice of KJ method 12. practice of KJ method 13. practice of KJ method 14. case studies 15. presentation 16. 予備日

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169435>

Optical System Engineering Seminar, Part 1

2 units

Teacher of course

Target) Through seminars concerning the theme of the master's thesis, to learn the wide culture and professional knowledge, to have interest in unknown area, and to obtain ability to learn spontaneously knowledges which are lacked.

Outline) To discuss on the paper concerning the theme of the master's thesis in a seminar with professors, and make presentation on those contents and results under development in student's research work.

Goal)

1. to master wide varieties in culture in optical system engineering and ability to apply them
2. to master professional knowledges in optical system engineering and ability to apply them
3. to have interest in unknown area in optical system engineering and spontaneously learn knowledges which are lacked

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169486>

Optical System Engineering Seminar, Part 2

4 units

Teacher of course

Target) Through seminars concerning the theme of the master's thesis, to learn the professional knowledges and skills, to obtain the ability to apply them, to obtain ability to learn spontaneously knowledges which are lacked, and furthermore to develop the communication and roles in the research work, and to obtain the ability to make management in collaboration project.

Outline) To discuss on the paper concerning the theme of the master's thesis, and make presentation in the student's research group.

Goal)

1. to master professional knowledges and skills in optical system engineering and ability to apply them
2. to learn knowledges which are lacked in optical system engineering
3. to develop the communication and role in the research work and to manage the collaboration project

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169487>

Optical System Engineering Laboratory

6 units

Teacher of course

Outline) Experiment concerning master's thesis.

Goal)

1. to master knowledges and skills in engineering and ability to apply them
2. ability to find problems, set up, analyze, and solve
3. spontaneously learn knowledges if lacked

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169485>

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Intelligent Structures and Mechanics Systems Engineering — Civil and Environmental Engineering

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Earthquake Resistant Design ...Mikami	99
Advanced Materials for Civil Works ...Mizuguchi・Ueda	100
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Advance Lecture of Political Simulation ...Kondo・Hirose	100
Advanced Lecture in Social Risk Engineering ...Kozuki	100
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● Specialized Exercise and Experiments

Advanced Exercise on Civil and Environmental Engineering ...Teacher of course	101
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Human Factors

2 units
Atsuya Yoshida・PART-TIME LECTURER/FACULTY OF INTEGRATED ARTS AND SCIENCES

Target) The objective of this class is to provide students with sufficiently thorough appreciation of the many facets of the human factors discipline so that they may make use of it to their own doctoral works.

Outline) This class offers a broad and comprehensive overview of the human factors/ergonomics discipline with four areas of emphasis, (1) historical review of human factors research, (2) human physical, perceptual and cognitive capabilities and limitations, (3) application of human factors research data in design, especially in the interface design of computer-based systems, and (4) discussion about the relationship between the designed system (technology) and people.

Schedule) 1. What is Human Factors 2. Historical Overview of Human Factors 3. Multi-Disciplinary Aspect of Human Factors 4. Health and Safty Issue of Human Factors 5. Human Psychological Capability 6. Task Analysis 7. Human Error 8. Universal Design 9. Cognitive Artifact 10. Visibility and Affordance 11. Human-Computer Interaction 12. Human Information Processing 13. Knowledge and Mental Model 14. Usability Paradigms and Principles 15. Evaluation and Testing 16. Making system that makes us smart

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169608>

Life Science

2 units
Hiroshi Takagi・PART-TIME LECTURER/FUKUI PREFECTURAL UNIVERSITY
Akihiko Tsuji・PROFESSOR/BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) Understanding of significance of protein in biotechnology

Outline) Basics of structure, function and application of protein are introduced

Style) Lecture

Keyword) Protein, Enzyme, Biotechnology

Goal)

1. Understanding of multiple functions of proteins
2. Understanding of principle of protein engineering and its application

Schedule) 1. Introduction of life science 2. History of life science 3. Structure and function of DNA and RNA 4. mRNA is a template of protein 5. Duplication of DNA 6. Regulation of protein expression 7. Human Genetics 8. Genetic disease 9. DNA diagnosis 10. Structure and function of protein 11. Principle of gene technology (1) 12. Principle of gene technology (2) 13. Protein engineering 14. Future of life science (1) 15. Future of life science (2) 16. Preparation of report

Evaluation Criteria) Evaluation by report

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169586>

Contact)

⇒ Tsuji (G710, +81-88-656-7526, tsuji@bio.tokushima-u.ac.jp) (Office Hour: Monday 16:20-17:50)

Social Science

2 units
Shuzo Goto・PART-TIME LECTURER/SHIROKUNI UNIVERSITY

Target) The mutual relationship of economic activities, the structure and function of economic society, and the concept and technique of mathematical programming modelling are lectured.

Outline) Not only the mutual relationship of economic activities is explained from domestic and international points of view, but also the technique of case studies by application of mathematical programming models is taught using the various kinds of materials and examples.

Keyword) Economic activities, Structure and function, Mathematical programming model

Goal) To understand the mutual relationship of economic activities, empirically explain them using the mathematical programming model and evaluate the model.

Schedule) 1. Guidance and purpose of this subject 2. Examples of economic activities 1 3. Examples of economic activities 2 4. Examples of economic activities 3 5. Change in structure of economic society 1 6. Change in structure of economic society 2 7. Function of economic society 1 8. Function of economic society 2 9. Mutual relationship of economic activities 1 10. Mutual relationship of economic activities 2 11. Concept of mathematical programming model 12. Technique of model construction 13. Modelling of economic activities 1 14. Modelling of economic activities 2 15. Evaluation of modelling

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169569>

Contact)

⇒ Kondo (ECO602, +81-88-656-7339, kondo@eco.tokushima-u.ac.jp)

Science and Technology Studies

Kunio Goto · PART-TIME LECTURER / MOMOYAMA GAKUIN UNIVERSITY

Target) Students are expected to learn the minimum essentials of science and technology studies and their functions in contemporary society.

Outline) Science and technology studies deal with science and technology research and its outcomes by means of various methods of social sciences and humanities. They have emerged in 1930s when social importance of science and technology became evident. Since 1970s, the science and technology studies have developed as mission oriented learning for government policy, business administrations and civic activity. In the first half of this lecture, the outline of the science technology studies is given. The involved topics are philosophy, history, sociology, and economics of science and technology.

Style) Lecture

Goal)

1. Understanding of the minimum essentials of the science and technology studies
2. Understanding of the social meaning of each student's research

Schedule) 1. Introduction: A brief history of the science and technology studies since 1930s 2. Philosophical understanding of science: (1) From Greek Classics to German Classical Philosophy 3. Philosophical understanding of science: (2) Rise of the philosophy of science the early twentieth century 4. Historical investigation of science and technology : (1) Emergence of the modern Western science 5. Historical investigation of science and technology : (2) From the Power Revolution of the Medieval West to the modern the Industrial Revolution 6. Sociology of science and technology: (1) Normative structure and Paradigm 7. Sociology of science and technology: (2) Social constructivism and Laboratory life analysis 8. Economics and science and technology : (1) Market and planning economies 9. Economics and science and technology : (2) Innovation and economic policy 10. The 1950s model of science and technology policy in the Cold War 11. Knowledge industrial society since 1970s: (1) Environmental problem and energy problem 12. Knowledge industrial society since 1970s: (2) Computer science and Information society 13. Policy issues in the transform of industrial structure and role of university 14. Science and technology in the global economy since 1990s 15. Concluding remark: Science, technology and society in the future

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169536>

Contact)

⇒ Kawamura (410 Chem Bldg, +81-88-656-7401, kawamura@chem.tokushima-u.ac.jp)

Management Theory of New Business

2 units

Vice chairperson of School Affairs Committee , Faculty of Engineering
First-line men with experience of practical business · PART-TIME LECTURER

Target) New business is the word which means the business to make the most of technical knowledge, technology, the new idea and which is developed creatively, and that main bearer is the enterprise called a venture. There is a purpose of this class in providing the knowledge which is necessary, and know-how and a spirit so that a taking lecture student may establish a venture business.

Outline) The regeneration of the Japanese society with the vitality is being asked. Government enforced "a university venture 3 years 1000 companies plan" over Heisei 14-the 16th year. Though that goal was almost attained, it is very important to promote entrepreneur education continuously from now on. Tokushima Prefecture supports this class based on the recognition done like this, and it is established.

Requirement) The person whom the one with the classroom is constructed by the class start time in the person who doesn't learn the unit of "Introduction to new business" in the college, and a group are organized, and it is limited to the person with the intention to make a business plan, and taking lecture is recognized.

Notice) Being late and a whisper in class should be prohibited strictly. Be careful over and again because it should dispose of exit and future taking lecture may not be recognized when it is wicked.

Goal) Learning of the necessary knowledge to establish venture business, and the ability which can make a business plan.

Schedule) 1. Guidance 2. What is the new business? 3. Keynote lecture 4. Theory of a stand-alone version venture success 5. The law knowledge which is necessary for entrepreneur 6. Fund-raising and capital policy 7. Indirect finance 8. Direct finance 9. The basis of the company management 10. The elementary knowledge of the business accounting 11. The point of the business plan preparation 12. Management strategy and marketing 13. Product development and intellectual property 14. Business plan preparation practice 15. Examination 16. Business plan announcement meeting

Evaluation Criteria) It is evaluated by the presentation (40%) of the written examination (60%) and the business plan. And, the presentation of the written examination and the business plan is decided to be recognized only for the taking lecture student who attended it for 2/3 and more of the classes that it is opened.

Textbook) The summary is distributed every time.

Reference) Several are introduced in the school hours.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169607>

Student) he person who hasn't learned the unit of the new business outline that it is opened with this learning in all the students enrolled in the graduate school yet is made the target. The number of completion people may be restricted in the method such as a lottery in case of a taking lecture applicant many. As for the details, an applicant for taking lecture is to follow those directions because the notice which showed attention in taking lecture is done.

Contact)

⇒ Vice chairperson of School Affairs Committee , Faculty of Engineering

Note) The man of business that it is active in the forefront every time, and an adviser are invited as an instructor, and working knowledge is provided for theory plus practice in this class from the specialist's position. This class is the thing which is useful enough even if it is taken to the person who aims at a general enterprise and a laboratory, the employment to the self-governing body and so on.

Introduction to Intellectual Property

2 units

Tohru Sakai · PART-TIME LECTURER / (助) 工業所有権部局センター, Juichiroh Osame · PART-TIME LECTURER

Akio Fujii · PART-TIME LECTURER / INTELLECTUAL PROPERTY OFFICE, Yasushi ToyosU · PART-TIME LECTURER, Kuniaki Kubota · PART-TIME LECTURER

Target) Understanding the basic systems and importance of protection and practical use of intellectual property based on some examples.

Outline) It is necessary for a working staff in a company, a university, etc., in a future. It is introduced the importance to protect and practical use of intellectual property at governments , industrial circles, universities and institutes in Japan using potential on scientific techniques. This lecture is treated the basic systems of protection and practical use of intellectual property particularly based on strategy and invasion of patent in an organization such as company, university, etc.

Style) Lecture

Keyword) Intellectual property, Patent Law, Protect and Use of Intellectual Property

Relational Lecture) "Introduction to Intellectual Property"(0.5)

Requirement) No requirement

Notice) It is necessary to be present at two concentrated lecture.

Goal)

1. Understanding concept of intellectual property right.
2. Understand the Patent Act, the Trademark Act, the Design Act and the Copyright Act.
3. Understanding on basical practical use of intellectual property.

Schedule) 1. Concept of intellectual property(Sakai) 2. Outline of intellectual property(Patent and Trademark)(Sakai) 3. Outline of intellectual property(Design and Copyright)(Sakai) 4. Patent, invention and invasion of patent (Sakai) 5. Management of intellectual property and use (Sakai) 6. A way of research and development and intellectual property in a future(Sakai) 7. The midterm examination and its comment for Target and 8. History of system of intellectual property (Osame) 9. International trend of system of intellectual property (Osame) 10. Acquisition method of intellectual property right(Fujii) 11. Use of intellectual property(Watanabe) 12. Stetragy of intellectual property on development of techniques(Y.Higuchi) 13. Effective intellectual property in development of techniques (Kubota) 14. Special lecture on a use of intellectual property by a chief executive officer(1) 15. Special lecture on a use of intellectual property by a chief executive officer(2)

Evaluation Criteria) Passing mark is over 60% on the examinations and the reports for each reaching level, respectively.

Textbook) To be used textbooks made by lecturers.

Reference) Nobuhiro Nakayama:Titeki Shoyuken, Nikkan Kohgyo Shinbunsha

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169591>

Student) For the course students and other graduate school students.

Contact)

- ⇒ Sakai (+81-3-5600-2631,)
- ⇒ Mizuguchi (A501, +81-88-656-7349, mizuguch@ce.tokushima-u.ac.jp) (Office Hour: Monday,11:00-12:30, 17:00-18:00)

Presentation Method (D)

2 units

Target) Poster and oral presentations, and journal publications are common means of appealing the research work in various scientific and technological disciplines. It's undoubtedly important for activating the research work. The lecture is intending for students to learn most efficient way to appeal their findings and discussions in scientific community.

Outline) Credits are acknowledged to the students who are supervised to give conference speech by themselves and do actually the lectures.

Goal) The lecture is aiming at having knowledge and experience of the presentaion in international conferences.

Evaluation Criteria) Students' achievement is evaluated by portfolios submitted showing the progress in preparation of international conferences as well as by presentation records.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169628>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Internship (D)

2 units

Target) This program is provided to increase knowledge and experience in the actual industrial technology in various fields. Through the practical experience, the program will allow students to become discerning and well-balanced researchers or engineers with deeper understanding of technological societies.

Outline) Credits are acknowledged to students who experienced the internship in companies and/or government offices. Their fulfilment is evaluated by activity reports during internship.

Goal)

1. Grasping internal systems of a company, management, action and strategy to achieve the company's goal. (2)
2. Understanding human relationship and communicative manner in a working society and a company.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by supervisors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169542>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Venture Business (D)

2 units

Target) Aims of the lecture are doing collaborative works with private enterprises and establishing venture businesses through such works.

Outline) The lecture is aiming at founding a venture business company as well as establishing collaborative research works with private enterprises. It's worth to apply their accomplishment to an actual society beyond the range of a laboratory work.

Goal) Objective of the lecture is to have experience and knowledge of collaborative works with private enterprises and to mature the works to venture businesses.

Evaluation Criteria) Credits are acknowledged in case of doing collaborative works with enterprises and/or maturing them to venture businesses. Handouts, reports, and presentation materials, etc. are evaluated to approve credits.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169539>

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Long-term Internship (D)

6 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This program is provided long-term internship in the actual industrial companies and so on, doing a joint study between companies and university on practical problems proposed by the company and practical experience of management of technologies. Through the long-term internship, the program will allow students to become a engineer with a core role in researches and companies

Outline) Credits are acknowledged to students who experienced the internship in companies or government offices of 270 hours during three months or more and presentation to executive officer of the company. Their fulfillment is evaluated by activity reports during internship and appraisal and interviewed report from a mentor.

Goal) Grasping abilities for practical engineers by studying activities in company and so on.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by mentors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169697>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Nishida (K409, +81-88-656-7630, nishida@kg.tokushima-u.ac.jp)
- ⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示版を参照のこと)
- ⇒ Morimoto (A407, +81-88-656-7619, emi.morimoto@kg.tokushima-u.ac.jp) (Office Hour: 月～木(10時～15時))

Note) Students who resister the coop-education program for "Pai-shape" engineers with sense for management of technology, are able to have a grant-in-aid for travel and so on. Ask committee members of long-term internship in your course or coordinators of this program.

Advanced Lecture in Theory of Business Models

2 units

Tatsuya Deguchi · PART-TIME LECTURER, Kenichi Yasumuro · PART-TIME LECTURER, Katsuo Touma · PART-TIME LECTURER
Takahide Yamaguchi · PART-TIME LECTURER, Shingou Nishii · PART-TIME LECTURER

Target) There is a purpose of this class in providing the knowledge which is necessary, and know-how so that students may achieve a business model in establishing enterprises based on the lecture of "Management Theory of New Business", and in making students understood the profit generating stream by studying on the frame work of companies in several business fields.

Outline) Business Model is a remarkable term in modern economic and organizational theories in these days but describes a broad range of definitions. In this lecture, Business Model is defined as "System which converts technology and know how into profit for the purpose of customers' satisfaction" and aims at providing the ability for the design of profitable system, by learning cost issues in establishing business strategies of companies.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business"

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of business model design is learned
2. Understanding of the concept of business model by case study analysis are appreciated
3. It learns forming ability of business plan through the case study on business models

Schedule) 1. Guidance 2. Keynote lecture "Business Model Thinking" 3. Questions and answers, Discussions 4. Lecture "Theory of Business Models" 5. Lecture "Design principles of Business Models" 6. Lecture "Evaluation of Business Models" 7. Case Study "Business Model in a R&D company" 8. Case Study "Business Model in a manufacturing industrial company" 9. Case Study "Business Model in a company of service industry" 10. Case Study "Business Model in a company of information industry" 11. Business plan practice, Present situation analysis and alternatives. 12. Business plan practice, Concept ad design of business. 13. Business plan practice, Financial analysis . 14. Business plan practice, Concluding and submitting 15. Presentation(1) of Business plan practice. 16. Presentation(2) of Business plan practice, Comments and summary.

Evaluation Criteria) Participation in class(20%) Group work and its report(80%)

Textbook) Ken-ichi Amuro and Study Group of Business model "Case Book: Business Model Thinking" Bunshindo

Reference) Several are introduced in class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169696>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Contact)

⇒ Tatsuya Deguchi (Wakayama University)

⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

Note) This class is supported by Tokushima Prefecture Government

Management of Technology

2 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) About the production management of the automobile industry, it is understood variously from the point of view such as "research and development", "production management", "purchasing" and "quality control" "marketing" and "cross-cultural management".

Outline) It learns about the production management. This time, "the automobile industry" specially takes up the production management of "Honda Motor Co.,Ltd. (following Honda)" even of that in the case, and the class to appreciate that importance with ranking of technology in management is taken.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business" .

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of management is learned.
2. Ranking of the technology in management and that importance are appreciated.
3. It learns how to solve the various problems which always occur in the spot of the management through the case study and the business game.

Schedule) 1. Guidance 2. Lecture "What in Management of Technology?" 3. Case report "Research and development of Honda" 4. Case study "Plan an overseas factory." "A new car development order" 5. Lecture "Production management and purchasing" 6. Lecture "Quality control" 7. Case report "The production management of Honda"; "The supply chain management of Honda" 8. Case study "Plan an overseas factory." 9. Case report "The quality control of Honda" 10. Case study "Don't make material defects flare up again." 11. Lecture "Marketing strategy" 12. Lecture "Cross-cultural management" 13. Case report "Around the products project of Honda - the two-wheeled vehicle" 14. Case report "The path of internationalization of Honda" 15. Case report "The personnel management of Honda" 16. Summary and questions and answers

Evaluation Criteria) It is evaluated in the remark (20%) in class and the middle, end of a term report (80% in total).

Textbook) It doesn't specially use. The summary and so on is distributed every time.

Reference) Several are introduced in class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169698>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the doctor former term course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Note) This class invites seven Honda alumnuni who did work in "research and development", "production management", "purchasing", "quality control", "marketing", "cross-cultural management", and so on as an instructor, and it is the class to do case report. Even if it is seen nationwide, the trial done like this is very rare, and it is a precious class. And, an applicant for taking lecture is to attend it in the guidance to hold it in advance. A schedule is indicated separately.

Engineering of Correlated Electron Matter

2 units

Yutaka Kishimoto · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING
Yu Kawasaki · ASSOCIATE PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) In many solid-state materials, new phenomena evolve due to strong electron interactions. In this Lecture, review will be given on some advanced topics and their applications, including high temperature superconductivity, metal-insulator transition and strongly correlated electronics.

Outline) New types of superconducting and magnetic phenomena emerge in correlated electron matters. The term "correlated electron" represents the state of matter where many electrons are strongly interacting with each other. After an introductory talk on magnetism and superconductivity, review will be given on some advanced topics, including high temperature superconductivity, metal-insulator transition and colossalmagneto resistance. Potential application of correlated electron matters to technology is also presented focusing on spintronics or strongly correlated electronics.

Style) Lecture

Keyword) strongly correlated electron systems, Mott insulator, colossalmagneto resistance, high temperature superconductor

Goal) To understand basic concepts of correlated electron matter and its application

Schedule) 1. Introduction to correlated electron matters 2. Perspectives of magnetism and superconductivity in correlated electron matters 3. Electronic states of atoms and ions 4. Magnetic ions in crystal electric field 5. Introduction to superconductivity 6. How to probe rich properties in correlated electron matters 7. Mott insulator and metal-insulator transition 8. Spin, charge and orbital in transition metal oxides 9. Colossalmagneto resistance in transition metal oxides 10. Application of transition metal oxides with correlated electrons 11. High temperature superconductivity 12. Heavy-fermion superconductivity 13. Electronic states of organic conductors 14. Application of superconductors with correlated electrons 15. Towards strongly correlated electronics

Evaluation Criteria) Reports on several subjects in lecture

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169544>

Contact)

⇒ Kishimoto (A202, +81-88-656-7548, yutaka@pm.tokushima-u.ac.jp) (Office Hour: 金曜日 16:00-17:30)
 ⇒ Kawasaki (A217, +81-88-656-9878, yu@pm.tokushima-u.ac.jp)

Quantum Theory of Materials

2 units

Yoshitaka Michihiro · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces the advanced quantum mechanics and quantum field theory.

Outline) Basics of advanced quantum mechanics and quantum field theory are introduced.

Style) Lecture

Keyword) Quantum Mechanics, Quantum Field Theory

Goal) To understand the outline of advanced quantum mechanics and quantum field theory.

Schedule) 1. Introduction 2. Quantum mechanics (1) 3. Quantum mechanics (2) 4. Hartree-Fock approximation 5. Koopman's theorem 6. Density functional theory 7. Kohn-Sham equation 8. Local density approximation 9. Perturbation (1) 10. Perturbation (2) 11. Quantum field theory 12. Creation operator and annihilation operator 13. Field quantization (1) 14. Field quantization (2) 15. Phonon 16. Electron gas

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169647>

Contact)

⇒ Yoshitaka Michihiro (A203)

Simulation Aided Mathematical Sciences

2 units

Hitoshi Imai · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Toshiki Takeuchi · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class provides the basic technology for advanced numerical simulation.

Outline) Basic technology for advanced numerical simulation is introduced.

Style) Lecture

Keyword) Numerical simulation, Advanced

Fundamental Lecture) "Numerical Analysis"(1.0)

Relational Lecture) "Methods for analysis of mathematical phenomena"(0.5, ⇒p.21), "Advanced Computational Science"(0.5, ⇒p.52)

Requirement) Students have to understand basic mathematics of undergraduate-level.

Goal) To understand principle of Infinite-Precision Numerical Simulation.

Schedule) 1. Introduction of computer science 2. Multiple precision arithmetic 1 3. Multiple precision arithmetic 2 4. Iteration method 1 5. Iteration method 2 6. Parallel computing 1 7. Parallel computing 2 8. Spectral method 1 9. Spectral method 2 10. Infinite-Precision Numerical Simulation 1 11. Infinite-Precision Numerical Simulation 2 12. Numerical simulation of free boundary problem 1 13. Numerical simulation of free boundary problem 2 14. Numerical simulation of inverse problem 1 15. Numerical simulation of inverse problem 2

Evaluation Criteria) Assignments count 100%.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169568>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Imai(A220, +81-88-656-7541, The inquiry by means of the cellular phone or E-mail is not acceptable) (Office Hour: Office hours: Thursday 14:00-15:00)
 ⇒ Takeuchi (A206, +81-88-656-7544, takeuchi@pm.tokushima-u.ac.jp) (Office Hour: 木曜日 14:00-15:00)

Nonlinear Analysis

2 units

Nobuyoshi Fukagai · ASSOCIATE PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
 Atsuhito Kohda · ASSOCIATE PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) Introduction to nonlinear functional analysis.

Outline) Methods of nonlinear analysis; fundamental mathematical theories and techniques of ordinary and partial differential equations.

Style) Lecture

Goal) To be familiar with mathematical concepts, ideas and tools involved in doing nonlinear mathematics.

Schedule) 1. Introduction 2. Mathematical modelling 1 3. Mathematical modelling 2 4. Mathematical modelling 3 5. General topology 6. Function space 1 7. Function space 2 8. Function space 3 9. Integral operator 10. Contraction mapping theorem 11. Example 12. Variational methods 1 13. Variational methods 2 14. Variational methods 3 15. Minimax principles

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169619>

Contact)

⇒ 工学部数学教室 (A棟211室, 219室)

Watershed Hydrologic Engineering

2 units

Takao TAMURA · ASSISTANT PROFESSOR / ENVIRONMENTAL CONSERVATION ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) The purpose of this subject is to learn models and theories on hydrological and chemical cycles in a river watershed.

Outline) Watershed hydrologic system. Watershed hydrologic processes. Evaporation and transpiration processes. Lumped and distributed rainfall-runoff models. Canopy interception tank model. Heat-pulse transpiration model. Mathematical models of solute runoff process for forested watersheds. Water and solute budgets for forested watersheds. Management system of flood, water resources, and watershed environment.

Style) Lecture

Goal)

1. Understand models and theories on hydrological cycles
2. Understand models and theories on chemical solute cycles

Schedule) 1. Hydrologic Cycle in a River Watershed 2. Rainfall Interception Process in a Forest Watershed 3. Transpiration Process in a Forest Watershed 4. Runoff Process in a Forest Watershed 5. Modeling of Overland flow 6. Distributed Runoff Models 7. Modeling of Hydrologic Cycle in a River Watershed (1) 8. Modeling of Hydrologic Cycle in a River Watershed (2) 9. Evaluation Index of Hydrologic Cycle in a River Watershed 10. Formation Process of Streamwater Chemistry in a Forest Watershed 11. Runoff Process of Chemical Solutes in Streamwater 12. Inference of Forest Change to Streamwater Chemistry 13. Mathematical Model of Solute Runoff in Streamwater (1) 14. Mathematical Model of Solute Runoff in Streamwater (2) 15. Modeling of Water and Solute Cycles in a River Watershed 16. Water and Solute Budgets in a River Watershed

Evaluation Criteria) Reports

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169643>

Ecological Hydroengineering

2 units

Takeshi Okabe · PROFESSOR / ENVIRONMENTAL CONSERVATION ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
 Susumu Nakano · ASSOCIATE PROFESSOR / ENVIRONMENTAL CONSERVATION ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
 Mahito Kamada · ASSOCIATE PROFESSOR / ENVIRONMENTAL CONSERVATION ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) Methods for conserving and improving riparian and coastal ecosystems in an actual way are developed, both from hydraulic and ecological perspectives.

Outline) Hydrodynamics of open-channel flow and wave in river, estuary. Mechanics of sediment transport by open-channel flow and wave. Theoretical and numerical analysis of hydro-geomorphic process. Influence of physical condition on ecological system. Interactive dynamics between hydro-geomorphic process and plant communities. Ecological assessment and restoration of riparian ecosystems. Landscape management in an ecological way.

Style) Lecture in combination with Portfolio, Portfolio

Keyword) ecosystem, river, estuary, watershed, landscape management

Fundamental Lecture) "Advanced Environmental Ecology"(1.0, ⇒p.10), "Applied Fluid Dynamics"(1.0, ⇒p.6)

Relational Lecture) "Advanced mitigation engineering"(0.5, ⇒p.132), "Watershed Hydrologic Engineering"(0.5, ⇒p.97)

Requirement) not specified

Notice) not specified

Goal)

1. Students understand mechanism and analysis technique for flow and sediment transport in the middle and upper reaches of a river.
2. Students understand analysis technique for flow and material transport in estuary, and are able to evaluate correctly the relation between physical phenomena and estuarine ecosystem.
3. Students have knowledge to evaluate ecosystem value, and are able to apply for ecosystem improvement.

Schedule) 1. Governing equation of hydro-geomorphic process 2. Numerical analysis of hydro-geomorphic process 3. Statistical analysis of hydro-geomorphic process 4. Interaction between hydro-geomorphic process and vegetation, report(1) 5. Flow analysis in estuary 6. Flow analysis in coastal zone 7. Wave analysis in coastal zone 8. Evaluation model of ecosystem in coastal zone, report(2) 9. Finding the limiting factors of ecosystem distribution 10. Mechanism for sustaining ecosystems 11. Pattern and process of ecosystem change 12. Mechanism of ecosystem alteration in relation to human activities 13. Ecological management of landscape and landscape ecology 1 14. Ecological management of landscape and landscape ecology 2 15. Ecological engineering for ecosystem management, report(3)

Evaluation Criteria) marks of report (1) , (2) and (3) are summed with the weights of 3 ,3 and 4, respectively, and the passing mark is 60%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169633>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Okabe (A309, +81-88-656-7329, okabetak@ce.tokushima-u.ac.jp) (Office Hour: 学科の掲示板を参照.)
- ⇒ Kamada (A306, +81-88-656-9134, kamada@ce.tokushima-u.ac.jp) (Office Hour: 年度ごとに学科の掲示板を参照すること.)
- ⇒ Nakano (A310, +81-88-656-7330, nakano@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと.)

Geoenvironmental Design Theory

2 units

Takuo Yamagami · PROFESSOR / GEOTECHNICAL AND GEOENVIRONMENTAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Hisashi Suzuki · ASSOCIATE PROFESSOR / GEOTECHNICAL AND GEOENVIRONMENTAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Jing-Cai Jiang · ASSISTANT PROFESSOR / GEOTECHNICAL AND GEOENVIRONMENTAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) The purpose of this course is to present state-of-the-art theories of geomechanics which contribute to the well-balanced development and conservation of the geoenvironment. The course consists of two main parts: stability analyses and deformation theories of earth structures.

Outline) In the stability analyses, theories of limit equilibrium methods, limit analysis methods and slip line methods, as well as their applications to stability, bearing capacity and earth pressure problems are addressed. In the deformation theories, the original Cam Clay Model and the latest developments in critical state soil mechanics together with finite element methods are described.

Style) Lecture

Keyword) Stability problem, Deformation problem

Fundamental Lecture) "Advanced Geomechanics"(1.0, ⇒p.9), "Advanced Soil Mechanics"(1.0, ⇒p.10)

Relational Lecture) "Geoenvironment Control Engineering"(0.5, ⇒p.98)

Goal)

1. To understand strength theories of earthen structures
2. To understand deformation theories of geo- materials

Schedule) 1. Introduction of stability problems 2. Limit equilibrium method (part 1) 3. Limit equilibrium method (part 2) 4. Limit analysis (part 1) 5. Limit analysis (part 2) 6. Slip line method (part 1) 7. Slip line method (part 2) 8. Progressive failure analysis of stability problems 9. Introduction of deformation problems and growth of Cam-clay theory 10. Existence of Critical State Line 11. Existence of Roscoe Surface 12. Existence of Hvorslev Surface 13. Elasto-plastic theory of saturated clay 14. Associate flow rule for yield surface of soil 15. Equation for State Boundary Surface of Cam-clay Model

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169567>

Student) Able to be taken by only specified class(es)

Contact)

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Geoenvironment Control Engineering

2 units

Akitoshi Mochizuki · PROFESSOR / GEOTECHNICAL AND GEOENVIRONMENTAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Katsutoshi Ueno · ASSOCIATE PROFESSOR / GEOTECHNICAL AND GEOENVIRONMENTAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This unit aims to cover basic concepts and technologies related to development and control of geoenvironment and ground-structure system for protection against natural and human-caused disasters. Interactive behaviours of over and under-ground structures under earthquake conditions as well as static conditions will be addressed employing results from numerical and physical models as well as those from field-observation data.

Outline) i)Learn framework of experimental apparatus and instruments for in-situ investigation and so forth. Then understand their basic principle, modification and basic concepts. ii)practice of the method how to review technical papers

Keyword) Constitutive equation, Centrifuge model test, True triaxial compression test, Direct shear test

Goal) To understand methodology of engineering, i.e. experiments, site investigation, and their verification by analysis, and to develop basic ability in development of experimental equipments and instruments.

Schedule) 1. General 2. Aims of model test, similarity rule(1) 3. Similarity rule(2) 4. Aim and purpose of centrifuge model test 5. Examples of centrifuge model test (1) 6. Examples of centrifuge model test (1) 7. True triaxial compression test apparatus and constitutive equation(1) 8. True triaxial compression test apparatus and constitutive equation(1) 9. True triaxial compression test apparatus and constitutive equation(1) 10. Direct shear apparatus and creep test(1) 11. Direct shear apparatus and creep test(2) 12. Preparation on English paper(1)-1 13. Preparation on English paper(1)-2 14. Preparation on English paper(2)-1 15. Preparation on English paper(2)-2

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169566>

Contact)

- ⇒ Mochizuki (A405, +81-88-656-9721, motizuki@ce.tokushima-u.ac.jp)
- ⇒ Ueno (A504, +81-88-656-7342, ueno@ce.tokushima-u.ac.jp) (Office Hour: 学科の掲示板を参照のこと)

Urban System Analysis

2 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Susumu Namerikawa · ASSOCIATE PROFESSOR / STRUCTURAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) Basic theories on modeling analysis for land use, transportation and environment systems in urban and regional areas. Design, planning, construction, and management systems for regions.

Outline) Yamanaka: Modeling, analysis methods, design and planning method for land use, transportation, and environment systems in urban/ regional areas. Namerikawa: Analysis models, building, management and maintenance methods for infrastructure and environment systems in urban/ regional areas

Style) Portfolio

Keyword) Landuse Analysis, Transport Model, Environment Protection

Fundamental Lecture) "City and Transport System Planning"(1.0, ⇒p.10), "Urban and Regional Planning"(1.0, ⇒p.12), "Project Management"(1.0, ⇒p.7)

Relational Lecture) “Advance Lecture of Political Simulation”(0.5, ⇒p.131), “Advanced Lecture in Social Risk Engineering”(0.5, ⇒p.131), “Social Science”(0.5, ⇒p.93)

Goal)

1. To understand the theories of modeling method for the analysis of landuse, transport, environments system in urban nad regional areas.
2. To understand project management system in regional developments.

Schedule) 1. Discussion on chosing topics 1 2. Discussion on chosing topics 2 3. Review on related researches 1 4. Review on related researches 2 5. Review on related researches 3 6. Review on related researches 4 7. Review on related researches 5 8. Review on related researches 6 9. Case study using a analysis method 1 10. Case study using a analysis method 2 11. Case study using a analysis method 3 12. Case study using a analysis method 4 13. Case study using a analysis method 5 14. Discussion on summary of case study 1 15. Discussion on summary of case study 2

Evaluation Criteria) No paper is required. The portforio of learning records and submitted reports are required to be evaluated.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169605>

Student) Able to be taken by student of other department

Contact)

- ⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示版を参照のこと)
- ⇒ Namerikawa (A412, +81-88-656-9877, namerikawa@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示を参照すること)

Wind Engineering

2 units

Fumiaki Nagao · PROFESSOR / STRUCTURAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
 Minoru Noda · ASSOCIATE PROFESSOR / STRUCTURAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) To understand the properties of strong wind, outline of structural behavior in strong wind and wind resistant design in civil engineering

Outline) Local strong wind; Occurrence mechanism and effect of geographic and topographic factors. Characteristics of fluctuating wind velocity. Steady and unsteady aerodynamic forces exerted on thin and bluff bodies. Aerodynamic response analyses of structures such as cables, tower-like structures, cable stayed bridges and suspension bridges. Rain-wind induced vibration. Effect of gusty wind on structural response. Wind resistant design in civil engineering; A state of the art and perspective.

Style) Lecture

Keyword) properties of strong wind, structural behavior in strong wind, wind resistant design

Fundamental Lecture) “Advanced Structural Dynamics”(1.0, ⇒p.6), “Advanced Structural Design”(1.0, ⇒p.12)

Goal) To understand the outline of structural behavior in strong wind and wind resistant design in civil engineering

Schedule) 1. Introduction 2. Occurrence mechanism of Local strong wind 3. Effect of geographic and topographic factors on Local Strong wind 4. Characteristics of fluctuating wind velocity 5. Steady aerodynamic forces exerted on thin and bluff bodies 6. Unsteady aerodynamic forces exerted on thin and bluff bodies 7. Aerodynamic response of structures, Part 1 8. Aerodynamic response of structures, Part 2 9. Aerodynamic response analyses of cables 10. Aerodynamic response analyses of tower-like structures 11. Aerodynamic response analyses of cable stayed bridges 12. Aerodynamic response analyses of suspension bridges 13. Effect of gusty wind on structural response 14. Wind resistant design in civil engineering 15. A state of the art and perspective

Evaluation Criteria) evaluated by attitude in class (50%) and reports (50%)

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169538>

Contact)

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- ⇒ Noda (A514, +81-88-656-7323, tarda@ce.tokushima-u.ac.jp) (Office Hour: 年度ごとに学科の掲示を参照すること)

Advanced Structural Analysis

2 units

Yoshifumi Nariyuki · PROFESSOR / STRUCTURAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) Method of non-linear analysis of framed structures subjected to static and dynamic loads is studied.

Outline) Not only geometrical and material non-linear problems in structural analysis and analytical method of non-linear behavior of framed structures, but also computation of ultimate strength and stability of framed structures subjected to static load and dynamic load are discussed in portfolio.

Style) Portfolio

Keyword) Structural analysis of frames, Material non-linear, Geometrical non-linear, Ultimate strength

Fundamental Lecture) “Advanced Fracture and Structural Mechanics”(0.8, ⇒p.6)

Requirement) Students are required to have a good understanding of structural mechanics.

Goal) To obtain the fundamental knowledge of non-linear analytical method of plane framed structures.

Schedule) 1. Guidance and purpose of this subject 2. Outline of analytical method of framed structures 3. Geometrical non-linear problems 1 4. Geometrical non-linear problems 2 5. Geometrical non-linear problems 3 / Report 1 6. Material non-linear problems 1 7. Material non-linear problems 2 8. Material non-linear problems 3 9. Material non-linear problems 4 10. Material non-linear problems 5 / Report 2 11. Combined non-linear problems 1 12. Combined non-linear problems 2 13. Combined non-linear problems 3 14. Combined non-linear problems 4 / Report 3 15. Discussion on assignments

Evaluation Criteria) Assignments count 100%

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169612>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Nariyuki (A510, +81-88-656-7326, nariyuki@ce.tokushima-u.ac.jp) (Office Hour: Monday 16:20~ 17:50)

Earthquake Resistant Design

2 units

Atsushi Mikami · PROFESSOR / GEOTECHNICAL AND GEOENVIRONMENTAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) To acquire methods of solving problems in seismic design of structures

Outline) Choose and discuss a topic from the problems including fault characterization, site response, attenuation relations, soil-structure interaction, seismic design of buildings/bridges, etc

Style) Portfolio

Keyword) earthquake resistant design, earthquake ground motions, simulation of earthquake ground motions

Relational Lecture) “Advanced Structural Analysis”(0.5, ⇒p.99)

Requirement) Non

Notice) Non

Goal) To acquire the method for resolving problems in earthquake resisting design of civil engineering structures.

Schedule) 1. To search topics in earthquake resistant design of civil engineering structures(1-3). 2. To investigate some themes out of the topics by references(4-12). 3. To prepare and submit the reports on the themes(13-15).

Evaluation Criteria) Evaluate 100% by report.

Textbook) To be introduced in the class.

Reference) Proceedings of World Conference on Earthquake Engineering

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169589>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Mikami (A308, +81-88-656-9193, amikami@ce.tokushima-u.ac.jp) (Office Hour: 8:40-10:10, 18:00-19:30)

Advanced Materials for Civil Works

2 units

Hiroyuki Mizuguchi · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Takao Ueda · ASSOCIATE PROFESSOR / STRUCTURAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) Acquisition of recent technique on concrete engineering particularly new concrete such as high performance concrete, eco-concrete, etc., and maintenance engineering in civil works, in the view point of sustainable material cycling society.

Outline) Characteristics and performance of important materials used for civil works to construction infrastructure facilities and to manage environment. A concept of environment conscious materials and environmentally friendly concrete. Characteristics and designing method of environmentally mitigative concrete and organism adaptable concrete, such as porous concrete including many continuous voids and big holes, used for concrete structures and environmentally friendly materials to realize sustainable development.

Style) Lecture in combination with Portfolio

Keyword) Sustainable Society, Material Cycling Society, Materials for Civil Works

Relational Lecture) "Flow Mechanism and Control for Fresh Concrete"(0.5, ⇒p.100)

Requirement) No requirement.

Notice) This class is constituted of some lectures, some reporting for subjects and presentation and discussion class on the reports

Goal)

1. Understanding on a concept of sustainable material cycling society in civil works.
2. Understanding on materials having low environmental impact in civil works.

Schedule) 1. Guidance 2. Definition of eco-concrete 3. Properties of porous concrete(1) 4. Properties of porous concrete(2) 5. Proportioning method of porous concrete 6. Application example of porous concrete 7. Properties of recycled aggregate concrete(1) 8. Properties of recycled aggregate concrete(2) 9. Landscape of concrete structures 10. Properties of concrete admixing fly ash (1) 11. Properties of concrete admixing fly ash (2) 12. Properties of concrete admixing blast furnace slag 13. Durability of concrete admixing industrial by-products 14. Durability design and life cycle design (1) 15. Durability design and life cycle design (2)

Evaluation Criteria) Estimation using presentation and reports.

Textbook) Using photo copying materials, etc.

Webpage) <http://www.ce.tokushima-u.ac.jp/ksys/mizuguchi/>

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169570>

Student) Able to be taken by student of other department and faculty

Contact)

⇒ Mizuguchi (A501, +81-88-656-7349, mizuguch@ce.tokushima-u.ac.jp) (Office Hour: Monday, 11:00-12:30, 17:00-18:00)

⇒ Ueda (A502, +81-88-656-2153, ueda@ce.tokushima-u.ac.jp) (Office Hour: 年度ごとに学科の掲示を参照すること)

Flow Mechanism and Control for Fresh Concrete

2 units

Chikanori Hashimoto · PROFESSOR / STRUCTURAL ENGINEERING, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) The objective of this subject is to understand the recent technology on consistency of fresh concrete in process of mixing or flowing in the construction machine, such as concrete mixer, concrete pump or concrete agitator.

Outline) Mechanical behavior of concrete materials in process of mixing, conveying and compacting using the visualization technique of fresh concrete. Application of the rheology to fresh concrete. Design of self-compacting concrete and eco-concrete. Concept for construction design, which is the performance-based design. Basic concept for new types of structure such as partially prestressed concrete structures.

Style) Lecture in combination with Portfolio

Keyword) Visualization technique of fresh concrete, Application of visualized analysis on fresh concrete, Deformed pipe, Agitator drum, Diaphragm wall, Consistency test, Bi-axial forced mixing type mixer, Vertical continuous mixer with gravity

Requirement) It is necessary for students to learn the basic attainments on the concrete engineering.

Goal)

1. The purpose is to understand the visualization technique of fresh concrete.

2. The purpose is to understand the application of flow analysis in process of mixing or flowing in the construction machine.

Schedule) 1. Guidance 2. Visualization technique of fresh concrete (historical development). 3. Visualization technique of fresh concrete (materials used). 4. Visualization technique of fresh concrete (method of image analysis). 5. Visualization technique of fresh concrete (scale effect of model concrete). 6. Visualization technique of fresh concrete (problem to be solved). 7. Application of visualized analysis on fresh concrete flowing through the tapered pipe. 8. Application of visualized analysis on fresh concrete flowing through the bend pipe or bifurcated pipe. 9. Application of visualized analysis on fresh concrete discharging of agitator drum. 10. Application of visualized analysis on fresh concrete mixing in agitator drum. 11. Application of visualized analysis on fresh concrete placing for diaphragm wall. 12. Application of visualized analysis on fresh concrete flowing in the vessel of consistency test. 13. Application of visualized analysis on self-compacting concrete casting in the slab form. 14. Application of visualized analysis on fresh concrete in process of mixing in bi-axial forced mixing type mixer. 15. Application of visualized analysis on fresh concrete in process of mixing in vertical continuous mixer with gravity. 16. Preliminary

Evaluation Criteria) Evaluate by reports or presentations or each subject.

Textbook) Handout of phot copying materials for each subject.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169645>

Advance Lecture of Political Simulation

2 units

Akio Kondo · PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Yoshinobu Hirose · ASSOCIATE PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) The technique of modelling of regional and environmental systems, and the concept and application method of prediction and evaluation models to political simulation are studied.

Outline) Not only the technique of modelling, but also the application method of prediction and evaluation models to political simulation is discussed in portfolio.

Style) Portfolio

Keyword) Political Simulation, Technique of Modelling, Prediction and Evaluation

Requirement) 特になし

Notice) 特になし

Goal) To obtain the knowledge of the technique of modelling and application method of prediction and evaluation models, apply them to political simulation.

Schedule) 1. Guidance and purpose of this subject 2. Systems of political simulation 3. Technique of modelling 1 4. Technique of modelling 2 5. Application of model : Prediction 1 6. Application of model : Prediction 2 7. Application of model : Evaluation of policy 1 8. Application of model : Evaluation of policy 2 9. Example of political simulation : Population policy 10. Example of political simulation : Urban transport policy 11. Example of political simulation : Landuse policy 12. Example of political simulation : Social policy 13. Example of political simulation : Environment policy 14. The technique of political simulation in the future 15. Regional policies in the 21st Century

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Webpage) <http://www.eco.tokushima-u.ac.jp/w3/kondo/top/index.htm>

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169581>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Kondo (ECO602, +81-88-656-7339, kondo@eco.tokushima-u.ac.jp) (Office Hour: 月曜日9-10校時)

Note) 特になし

Advanced Lecture in Social Risk Engineering

2 units

Yasunori Kozuki · PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To understand concept of risk, to cultivate ability of measures how to reduce , avoid, compensate for various risks. the reducing, the evading of the risk, the compensation for it.

Outline) Technique of risk assessment and its communication for various social risks on risk management is lecterd.

Style) Lecture in combination with Portfolio

Keyword) Social Risks, Risk Management, Crisis Management

Goal) To obtain the knowledge of risk management and application method of various social risks.

Schedule) 1. Guidance and purpose of this subject 2. Sources of various social risks 3. Evaluation of social risk(1) 4. Evaluation of social risk(2) 5. Risk management (1.risik perception) 6. Risk management(2.risik communication) 7. Risk management(3.evaluation standard) 8. Example of risk management(1.evacuation for natural disaster) 9. Example of risik manegement(2.evacuation for natural disaster) 10. Example of risik manegement(3.evacuation for natural disaster) 11. Example of risik manegement(4.avoidance of risik and insurance) 12. Presentaion and discusion for social risk(1) 13. Presentaion and discusion for social risk(2) 14. Presentaion and discusion for social risk(3) 15. Summary

Evaluation Criteria) Assignments Count 100%

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169572>

Student) To be limited to the students of the course

Contact)
⇒ Murakami . (Office Hour: Monday 16:20-17:50)

Advanced mitigation engineering

2 units

Hideki Ueshima · PROFESSOR / GRADUATE SCHOOL OF ENGINEERING

Target) To obtain the abilities to find and solve environmental problems using for application of mitigation technique

Outline) To surveying of the latest news of mitigation and to understand its concept and examine the technique to mitigate the deterioration environment

Style) Lecture in combination with Portfolio

Keyword) District Improvement Plan for Disaster Mitigation, coastal environment

Fundamental Lecture) “Advanced Lecture in Social Risk Engineering”(1.0), “Advance Lecture of Political Simulation”(1.0)

Goal) To design and assess the mitigation plan for deterioration coastal environment

Schedule) 1. Guidance of this subject 2. Current topics about mitigation 1 3. Current topics about mitigation 2 4. Current topics about mitigation 3 5. Current topics about mitigation 4 6. Current topics about mitigation 5 7. Current topics about mitigation 6 8. Current topics about mitigation 7 9. Current topics about mitigation 8 10. Current topics about mitigation 9 11. Current topics about mitigation 10 12. Discussion on research theme1 13. Discussion on research theme2 14. Discussion on research theme3 15. Presentation

Evaluation Criteria) Assignments count 100%

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169638>

Contact)
⇒ Ueshima (National Institute of Advanced Industrial Science and Technology, +81-823-72-1901, h-ueshima@aist.go.jp)

Advanced Exercise on Civil and Environmental Engineering

2 units

Teacher of course

Target) This subject is especially provided in order to deepen the study, and must be taken under the guidance of a faculty in major field of study.

Outline) Exercises related to research theme are performed.

Style) Portfolio

Keyword) Exercise, Civil and Environmental Engineering

Goal) To obtain deeper knowledge regarding research theme.

Schedule) 1. Guidance 2. Exercise 3. Report

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169550>

Student) Able to be taken by only specified class(es)

Contact)
⇒ Mizuguchi (A501, +81-88-656-7349, mizuguch@ce.tokushima-u.ac.jp) (Office Hour: Monday 11:00 ~ 12:30)

Advanced Research on Civil and Environmental Engineering

2 units

Teachers in other colleges or departments

Target) To obtain broad information on recent engineering

Outline) To research a theme in a technology, which is different form the main technology in your field.

Style) Portfolio, Lecture, Lecture in combination with Portfolio

Keyword) Engineering, Technology, Different field

Requirement) N/A

Notice) N/A

Goal) To learn a recent technology, which is different from the main technology in your field.

Schedule) Choose a theme on technology or engineering, which is different from that in your field.

Evaluation Criteria) Evaluated with portfolio or examination

Textbook) Ask to teachers.

Reference) Prints

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169652>

Student) Able to be taken by only specified class(es)

Contact)
⇒ Kamada (A306, +81-88-656-9134, kamada@ce.tokushima-u.ac.jp) (Office Hour: Friday 11:55~ 12:50)

Intelligent Structures and Mechanics Systems Engineering — Mechanical Engineering

SYLLABUS OF SUBJECTS

• Integrated Subjects

Human Factors ...Yoshida	102
Life Science ...Takagi · Tsuji	102
Social Science ...Goto	103
Science and Technology Studies ...Goto	103
Management Theory of New Business ...Vice chairperson of School Affairs Committee , Faculty of Engineering · First-line men with experience of practical business	103
Introduction to Intellectual Property ... Sakai · Osame · Fujii · Toyosu · Kubota	103
Presentation Method (D)	104
Internship (D)	104
Venture Business (D)	104
Long-term Internship (D) ...Yamanaka	104
Advanced Lecture in Theory of Business Models ...Deguchi · Yasumuro · Touma · Yamaguchi · Nishii	105
Management of Technology ...Yamanaka	105

• Specialized Subjects

Quantum Theory of Materials ...Michihiro	105
Radio Frequency Solid State Physics ...Ohno · Nakamura	105
Controlling Physical Properties of Crystalline Materials ...Okada	106
Material Applications ...Yoshida · Nishino · Takagi	106
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Fluid Energy Control ...Fukutomi	107
Thermal Energy Control ...Suekane · Kiyota	107
Multiphase Fluids Transport ...Ousaka	107
Energy and Environment Engineering ...Ishihara · Ichimiya	107
Mechanical Systems Design ...Hino	108
Instrument and Control Engineering ...Miwa	108
Design of Dynamic Systems ...Konishi	108
Advanced Production Technology ...Kaieda · Masuda · Tada	109
Micro-Nano Engineering ...Hanabusa · Iwata	109
Materials Surface Performance Control ...Murakami · Yonekura	109
Intelligent Information Systems ...Yano · Kanenishi · Ogata · Ito · Mitsuahara	110
Visual pattern processing ...Oe · Terada	110
Advanced conversion systems of resource energy ...Kidoguchi	110
Advanced Micro-Nano Engineering ...Ooie · Tanaka	110

• Specialized Exercise and Experiments

Advanced Exercise on Mechanical Engineering ...All teachers	111
Advanced Research on Mechanical Engineering ...Teachers in other colleges or departments	111

Human Factors

2 units
Atsuya Yoshida · PART-TIME LECTURER / FACULTY OF INTEGRATED ARTS AND SCIENCES

Target) The objective of this class is to provide students with sufficiently thorough appreciation of the many facets of the human factors discipline so that they may make use of it to their own doctoral works.

Outline) This class offers a broad and comprehensive overview of the human factors/ergonomics discipline with four areas of emphasis, (1) historical review of human factors research, (2) human physical, perceptual and cognitive capabilities and limitations, (3) application of human factors research data in design, especially in the interface design of computer-based systems, and (4) discussion about the relationship between the designed system (technology) and people.

Schedule) 1. What is Human Factors 2. Historical Overview of Human Factors 3. Multi-Disciplinary Aspect of Human Factors 4. Health and Safty Issue of Human Factors 5. Human Psychological Capability 6. Task Analysis 7. Human Error 8. Universal Design 9. Cognitive Artifact 10. Visibility and Affordance 11. Human-Computer Interaction 12. Human Information Processing 13. Knowledge and Mental Model 14. Usability Paradigms and Principles 15. Evaluation and Testing 16. Making system that makes us smart

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169608>

Life Science

2 units
Hiroshi Takagi · PART-TIME LECTURER / FUKUI PREFECTURAL UNIVERSITY
Akihiko Tsuji · PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) Understanding of significance of protein in biotechnology

Outline) Basics of structure, function and application of protein are introduced

Style) Lecture

Keyword) Protein, Enzyme, Biotechnology

Goal)

1. Understanding of multiple functions of proteins
2. Understanding of principle of protein engineering and its application

Schedule) 1. Introduction of life science 2. History of life science 3. Structure and function of DNA and RNA 4. mRNA is a template of protein 5. Duplication of DNA 6. Regulation of protein expression 7. Human Genetics 8. Genetic disease 9. DNA diagnosis 10. Structure and function of protein 11. Principle of gene technology (1) 12. Principle of gene technology (2) 13. Protein engineering 14. Future of life science (1) 15. Future of life science (2) 16. Preparation of report

Evaluation Criteria) Evaluation by report

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169586>

Contact)

⇒ Tsuji (G710, +81-88-656-7526, tsuji@bio.tokushima-u.ac.jp) (Office Hour: Monday 16:20-17:50)

Social Science

2 units

Shuzo Goto · PART-TIME LECTURER / SHIKOKU UNIVERSITY

Target) The mutual relationship of economic activities, the structure and function of economic society, and the concept and technique of mathematical programming modelling are lectured.

Outline) Not only the mutual relationship of economic activities is explained from domestic and international points of view, but also the technique of case studies by application of mathematical programming models is taught using the various kinds of materials and examples.

Keyword) Economic activities, Structure and function, Mathematical programming model

Goal) To understand the mutual relationship of economic activities, empirically explain them using the mathematical programming model and evaluate the model.

Schedule) 1. Guidance and purpose of this subject 2. Examples of economic activities 1 3. Examples of economic activities 2 4. Examples of economic activities 3 5. Change in structure of economic society 1 6. Change in structure of economic society 2 7. Function of economic society 1 8. Function of economic society 2 9. Mutual relationship of economic activities 1 10. Mutual relationship of economic activities 2 11. Concept of mathematical programming model 12. Technique of model construction 13. Modelling of economic activities 1 14. Modelling of economic activities 2 15. Evaluation of modelling

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169569>

Contact)

⇒ Kondo (ECO602, +81-88-656-7339, kondo@eco.tokushima-u.ac.jp)

Science and Technology Studies

Kunio Goto · PART-TIME LECTURER / MOMOYAMA GAKUIN UNIVERSITY

Target) Students are expected to learn the minimum essentials of science and technology studies and their functions in contemporary society.

Outline) Science and technology studies deal with science and technology research and its outcomes by means of various methods of social sciences and humanities. They have emerged in 1930s when social importance of science and technology became evident. Since 1970s, the science and technology studies have developed as mission oriented learning for government policy, business administrations and civic activity. In the first half of this lecture, the outline of the science technology studies is given. The involved topics are philosophy, history, sociology, and economics of science and technology.

Style) Lecture

Goal)

1. Understanding of the minimum essentials of the science and technology studies
2. Understanding of the social meaning of each student's research

Schedule) 1. Introduction: A brief history of the science and technology studies since 1930s 2. Philosophical understanding of science: (1) From Greek Classics to German Classical Philosophy 3. Philosophical understanding of science: (2) Rise of the philosophy of science the early twentieth century 4. Historical investigation of science and technology : (1) Emergence of the modern Western science 5. Historical investigation of science and technology : (2) From the Power Revolution of the Medieval West to the modern the Industrial Revolution 6. Sociology of science and technology: (1) Normative structure and Paradigm 7. Sociology of science and technology: (2) Social constructivism and Laboratory life analysis 8. Economics and science and technology : (1) Market and planning economies 9. Economics and science and technology : (2) Innovation and economic policy 10. The 1950s model of science and technology policy in the Cold War 11. Knowledge industrial society since 1970s: (1) Environmental problem and energy problem 12. Knowledge industrial society since 1970s: (2) Computer science and Information society 13. Policy issues in the transform of industrial structure and role of university 14. Science and technology in the global economy since 1990s 15. Concluding remark: Science, technology and society in the future

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169536>

Contact)

⇒ Kawamura (410 Chem Bldg, +81-88-656-7401, kawamura@chem.tokushima-u.ac.jp)

Management Theory of New Business

2 units

Vice chairperson of School Affairs Committee , Faculty of Engineering
First-line men with experience of practical business · PART-TIME LECTURER

Target) New business is the word which means the business to make the most of technical knowledge, technology, the new idea and which is developed creatively, and that main bearer is the enterprise called a venture. There is a purpose of this class in providing the knowledge which is necessary, and know-how and a spirit so that a taking lecture student may establish a venture business.

Outline) The regeneration of the Japanese society with the vitality is being asked. Government enforced "a university venture 3 years 1000 companies plan" over Heisei 14-the 16th year. Though that goal was almost attained, it is very important to promote entrepreneur education continuously from now on. Tokushima Prefecture supports this class based on the recognition done like this, and it is established.

Requirement) The person whom the one with the classroom is constructed by the class start time in the person who doesn't learn the unit of "Introduction to new business" in the college, and a group are organized, and it is limited to the person with the intention to make a business plan, and taking lecture is recognized.

Notice) Being late and a whisper in class should be prohibited strictly. Be careful over and again because it should dispose of exit and future taking lecture may not be recognized when it is wicked.

Goal) Learning of the necessary knowledge to establish venture business, and the ability which can make a business plan.

Schedule) 1. Guidance 2. What is the new business? 3. Keynote lecture 4. Theory of a stand-alone version venture success 5. The law knowledge which is necessary for entrepreneur 6. Fund-raising and capital policy 7. Indirect finance 8. Direct finance 9. The basis of the company management 10. The elementary knowledge of the business accounting 11. The point of the business plan preparation 12. Management strategy and marketing 13. Product development and intellectual property 14. Business plan preparation practice 15. Examination 16. Business plan announcement meeting

Evaluation Criteria) It is evaluated by the presentation (40%) of the written examination (60%) and the business plan. And, the presentation of the written examination and the business plan is decided to be recognized only for the taking lecture student who attended it for 2/3 and more of the classes that it is opened.

Textbook) The summary is distributed every time.

Reference) Several are introduced in the school hours.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169607>

Student) he person who hasn't learned the unit of the new business outline that it is opened with this learning in all the students enrolled in the graduate school yet is made the target. The number of completion people may be restricted in the method such as a lottery in case of a taking lecture applicant many. As for the details, an applicant for taking lecture is to follow those directions because the notice which showed attention in taking lecture is done.

Contact)

⇒ Vice chairperson of School Affairs Committee , Faculty of Engineering

Note) The man of business that it is active in the forefront every time, and an adviser are invited as an instructor, and working knowledge is provided for theory plus practice in this class from the specialist's position. This class is the thing which is useful enough even if it is taken to the person who aims at a general enterprise and a laboratory, the employment to the self-governing body and so on.

Introduction to Intellectual Property

2 units

Tohru Sakai · PART-TIME LECTURER / (財)工業所有権協カセンター, Juichiroh Osame · PART-TIME LECTURER
Akio Fujii · PART-TIME LECTURER / INTELLECTUAL PROPERTY OFFICE, Yasushi Toyosu · PART-TIME LECTURER, Kuniaki Kubota · PART-TIME LECTURER

Target) Understanding the basic systems and importance of protection and practical use of intellectual property based on some examples.

Outline) It is necessary for a working staff in a company, a university, etc., in a future. It is introduced the importance to protect and practical use of intellectual property at governments , industrial circles, universities and institutes in Japan using potential on scientific techniques. This lecture is treated the basic systems of protection and practical use of intellectual property particularly based on strategy and invasion of patent in an organization such as company, university, etc.

Style) Lecture

Keyword) Intellectual property, Patent Law, Protect and Use of Intellectual Property

Relational Lecture) "Introduction to Intellectual Property"(0.5)

Requirement) No requirement

Notice) It is necessary to be present at two concentrated lecture.

Goal)

1. Understanding concept of intellectual property right.
2. Understand the Patent Act, the Trademark Act, the Design Act and the Copyright Act.
3. Understanding on basical practical use of intellectual property.

Schedule) 1. Concept of intellectual property(Sakai) 2. Outline of intellectual property(Patent and Trademark)(Sakai) 3. Outline of intellectual property(Design and Copyright)(Sakai) 4. Patent, invention and invasion of patent (Sakai) 5. Management of intellectual property and use (Sakai) 6. A way of research and development and intellectual property in a future(Sakai) 7. The midterm examination and its comment for Target and 8. History of system of intellectual property (Osame) 9. International trend of system of intellectual property (Osame) 10. Acquisition method of intellectual property right(Fujii) 11. Use of intellectual property(Watanabe) 12. Stragry of intellectual property on development of techniques(Y.Higuchi) 13. Effective intellectual property in development of techniques (Kubota) 14. Special lecture on a use of intellectual property by a chief executive officer(1) 15. Special lecture on a use of intellectual property by a chief executive officer(2)

Evaluation Criteria) Passing mark is over 60% on the examinations and the reports for each reaching level, respectively.

Textbook) To be used textbooks made by lecturers.

Reference) Nobuhiro Nakayama:Titeki Shoyuken, Nikkan Kohgyo Shinbunsha

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169591>

Student) For the course students and other graduate school students.

Contact)

- ⇒ Sakai (+81-3-5600-2631,)
- ⇒ Mizuguchi (A501, +81-88-656-7349, mizuguch@ce.tokushima-u.ac.jp) (Office Hour: Monday,11:00-12:30, 17:00-18:00)

Presentation Method (D)

2 units

Target) Poster and oral presentations, and journal publications are common means of appealing the research work in various scientific and technological disciplines. It's undoubtedly important for activating the research work. The lecture is intending for students to learn most efficient way to appeal their findings and discussions in scientific community.

Outline) Credits are acknowledged to the students who are supervised to give conference speech by themselves and do actually the lectures.

Goal) The lecture is aiming at having knowledge and experience of the presentaion in international conferences.

Evaluation Criteria) Students' achievement is evaluated by portfolios submitted showing the progress in preparation of international conferences as well as by presentation records.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169628>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Internship (D)

2 units

Target) This program is provided to increase knowledge and experience in the actual industrial technology in various fields. Through the practical experience, the program will allow students to become discerning and well-balanced researchers or engineers with deeper understanding of technological societies.

Outline) Credits are acknowledged to students who experienced the internship in companies and/or government offices. Their fulfilment is evaluated by activity reports during internship.

Goal)

1. Grasping internal systems of a company, management, action and strategy to achieve the company's goal. (2)
2. Understanding human relationship and communicative manner in a working society and a company.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by supervisors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169542>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Venture Business (D)

2 units

Target) Aims of the lecture are doing collaborative works with private enterprises and establishing venture businesses through such works.

Outline) The lecture is aiming at founding a venture business company as well as establishing collaborative research works with private enterprises. It's worth to apply their accomplishment to an actual society beyond the range of a laboratory work.

Goal) Objective of the lecture is to have experience and knowledge of collaborative works with private enterprises and to mature the works to venture businesses.

Evaluation Criteria) Credits are acknowledged in case of doing collaborative works with enterprises and/or maturing them to venture businesses. Handouts, reports, and presentation materials, etc. are evaluated to approve credits.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169539>

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Long-term Internship (D)

6 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This program is provided long-term internship in the actual industrial companies and so on, doing a joint study between companies and university on practical problems proposed by the company and practical experience of management of technologies. Through the long-term internship, the program will allow students to become a engineer with a core role in researches and companies

Outline) Credits are acknowledged to students who experienced the internship in companies or government offices of 270 hours during three months or more and presentation to executive officer of the company. Their fulfilment is evaluated by activity reports during internship and appraisal and interviewed report from a mentor.

Goal) Grasping abilities for practical engineers by studying activities in company and so on.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by mentors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169697>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Nishida (K409, +81-88-656-7630, nishida@kg.tokushima-u.ac.jp)
- ⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)
- ⇒ Morimoto (A407, +81-88-656-7619, emi.morimoto@kg.tokushima-u.ac.jp) (Office Hour: 月～木(10時～15時))

Note) Students who resister the coop-education program for "Pai-shape" engineers with sense for management of technology, are able to have a grant-in-aid for travel and so on. Ask committee members of long-term internship in your course or coordinators of this program.

Advanced Lecture in Theory of Business Models

2 units

Tatsuya Deguchi · PART-TIME LECTURER, Kenichi Yasumuro · PART-TIME LECTURER, Katsuo Touma · PART-TIME LECTURER
Takahide Yamaguchi · PART-TIME LECTURER, Shingou Nishii · PART-TIME LECTURER

Target) There is a purpose of this class in providing the knowledge which is necessary, and know-how so that students may achieve a business model in establishing enterprises based on the lecture of "Management Theory of New Business", and in making students understood the profit generating stream by studying on the frame work of companies in several business fields.

Outline) Business Model is a remarkable term in modern economic and organizational theories in these days but describes a broad range of definitions. In this lecture, Business Model is defined as "System which converts technology and know how into profit for the purpose of customers' satisfaction" and aims at providing the ability for the design of profitable system, by learning cost issues in establishing business strategies of companies.

Requirement) Finish " Introduction to new business " or " Advanced Lecture in management Theory of new business "

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of business model design is learned
2. Understanding of the concept of business model by case study analysis are appreciated
3. It learns forming ability of business plan through the case study on business models

Schedule) 1. Guidance 2. Keynote lecture "Business Model Thinking" 3. Questions and answers, Discussions 4. Lecture "Theory of Business Models" 5. Lecture "Design principles of Business Models" 6. Lecture "Evaluation of Business Models" 7. Case Study "Business Model in a R&D company" 8. Case Study "Business Model in a manufacturing industrial company" 9. Case Study "Business Model in a company of service industry " 10. Case Study "Business Model in a company of information industry " 11. Business plan practice, Present situation analysis and alternatives. 12. Business plan practice, Concept ad design of business. 13. Business plan practice, Financial analysis . 14. Business plan practice, Concluding and submitting 15. Presentation(1) of Business plan practice. 16. Presentation(2) of Business plan practice, Comments and summary.

Evaluation Criteria) Participation in class(20%) Group work and its report(80%)

Textbook) Ken-ichi Amuro and Study Group of Business model "Case Book: Business Model Thinking" Bunshindo

Reference) Several are introduced in class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169696>

Student) The person who finished "Introduction to new business" or " Advanced Lecture in management Theory of new business " in all the students enrolled in the course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Contact)

⇒ Tatsuya Deguchi (Wakayama University)

⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

Note) This class is supported by Tokushima Prefecture Government

Management of Technology

2 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) About the production management of the automobile industry, it is understood variously from the point of view such as "research and development", "production management", "purchasing" and "quality control" "marketing" and "cross-cultural management".

Outline) It learns about the production management. This time, "the automobile industry" specially takes up the production management of "Honda Motor Co.,Ltd. (following Honda)" even of that in the case, and the class to appreciate that importance with ranking of technology in management is taken.

Requirement) Finish " Introduction to new business " or " Advanced Lecture in management Theory of new business " .

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of management is learned.
2. Ranking of the technology in management and that importance are appreciated.
3. It learns how to solve the various problems which always occur in the spot of the management through the case study and the business game.

Schedule) 1. Guidance 2. Lecture "What in Management of Technology?" 3. Case report "Research and development of Honda" 4. Case study "Plan an overseas factory." "A new car development order" 5. Lecture " Production management and purchasing" 6. Lecture "Quality control" 7. Case report "The production management of Honda";"The supply chain management of Honda" 8. Case study "Plan an overseas factory;" 9. Case report "The quality control of Honda" 10. Case study "Don't make material defects flare up again." 11. Lecture "Marketing strategy" 12. Lecture "Cross-cultural management" 13. Case report "Around the products project of Honda - the two-wheeled vehicle " 14. Case report "The path of internationalization of Honda" 15. Case report "The personnel management of Honda" 16. Summary and questions and answers

Evaluation Criteria) It is evaluated in the remark (20%) in class and the middle, end of a term report (80% in total).

Textbook) It doesn't specially use.The summary and so on is distributed every time.

Reference) Several are introduced in class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169698>

Student) The person who finished "Introduction to new business" or " Advanced Lecture in management Theory of new business " in all the students enrolled in the doctor former term course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Note) This class invites seven Honda alumnuni who did work in "research and development", "production management", "purchasing", "quality control", "marketing" , "cross-cultural management", and so on as an instructor, and it is the class to do case report. Even if it is seen nationwide, the trial done like this is very rare, and it is a precious class. And, an applicant for taking lecture is to attend it in the guidance to hold it in advance.A schedule is indicated separately.

Quantum Theory of Materials

2 units

Yoshitaka Michihiro · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces the advanced quantum mechanics and quantum field theory.

Outline) Basics of advanced quantum mechanics and quantum field theory are introduced.

Style) Lecture

Keyword) Quantum Mechanics, Quantum Field Theory

Goal) To understand the outline of advanced quantum mechanics and quantum field theory.

Schedule) 1. Introduction 2. Quantum mechanics (1) 3. Quantum mechanics (2) 4. Hartree-Fock approximation 5. Koopman's theorem 6. Density functional theory 7. Kohn-Sham equation 8. Local density approximation 9. Perturbation (1) 10. Perturbation (2) 11. Quantum field theory 12. Creation operator and annihilation operator 13. Field quantization (1) 14. Field quantization (2) 15. Phonon 16. Electron gas

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169646>

Contact)

⇒ Yoshitaka Michihiro (A203)

Radio Frequency Solid State Physics

2 units

Takashi Ohno · PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING
Koichi Nakamura · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces basis of NMR and applications to studies on superconductivity, magnetism and ionic diffusion in solid.

Outline) The spectrum, spin-lattice relaxation, spin-spin relaxation, chemical shift etc., which are obtained by NMR measurements, are introduced and discussed in connection with various physical properties of solids.

Keyword) Nuclear Magnetic Resonance, Superconductivity, Magnetism, Diffusion

Goal)

1. To understand basis of NMR.
2. To understand relationship between various problems in solid state physics and relaxation phenomena observed using NMR.

Schedule) 1. Introduction 2. Spin-echo and NMR spectrum 3. Equipments 4. Dipole interaction 5. Hyperfine interaction and spectrum 6. Chemical shift 7. Quadrupole interaction and quadrupole resonance 8. Spin-lattice relaxation 9. Internal magnetic field in ferro and antiferro magnets 10. Spin-lattice relaxation in metals 11. NMR studies on superconducting state 12. NMR studies on High T_c superconductors 13. Diffusion in solid and spin-lattice relaxation 14. NMR studies on lithium ionic conductors 15. NMR studies on protonic conductors 16. Summary

Evaluation Criteria) Report 100%

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169599>

Contact)

- ⇒ Ohno (A201, +81-88-656-7549, ohno@pm.tokushima-u.ac.jp)
- ⇒ Nakamura (A216, +81-88-656-7577, koichi@pm.tokushima-u.ac.jp)

Controlling Physical Properties of Crystalline Materials

2 units

Tatsuya Okada · ASSOCIATE PROFESSOR / MECHANICAL SCIENCE, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) Geometrical theories of grain boundary character in polycrystalline materials are described. Various methods to describe textures are also introduced.

Outline) Various geometric theories of grain boundaries and textures are introduced.

Style) Portfolio

Keyword) grain boundary, geometrical theory, texture

Fundamental Lecture) “Material Applications”(1.0, ⇒p.10)

Goal)

1. CSL theory of geometrical character of grain boundaries must be understood.
2. Various methods to describe textures must be understood.

Schedule) 1. Dislocation theory of small angle grain boundaries 2. Dislocation theory of general boundaries 3. Extension of geometrical theory to interphase interfaces 4. O-lattice theory 5. CSL theory 6. Calculation of grain boundary dislocations 7. Miller indices and stereographic projection 8. Pole figure and inverse pole figure 9. Euler angles to describe crystallographic orientation 10. Orientation distribution function 11. Experimental analysis of textures 12. Deformed textures 13. Recrystallized textures 14. Textures and physical properties 1 15. Textures and physical properties 2

Evaluation Criteria) Evaluation is based on term papers.

Reference)

- ◇ Forwood and Clarebrough: Electron Microscopy of Interfaces in Metals and Alloys (Adam Hilger)
- ◇ Randle: Microstructure Determination and its Applications (The Institute of Materials)

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169548>

Contact)

- ⇒ Okada (M616, +81-88-656-7362, t-okada@me.tokushima-u.ac.jp)

Material Applications

2 units

Kenichi Yoshida · PROFESSOR / MECHANICAL SCIENCE, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Hideo Nishino · ASSOCIATE PROFESSOR / MECHANICAL SCIENCE, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Hitoshi Takagi · PROFESSOR / INTELLIGENT MACHINES, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class acquires importance of the material evaluation using acoustic emission method and guided wave method that are prospective as advanced material evaluation methods in more serious environment. Also it acquires the development and the prospective trend since now of the green composite materials with natural fibers and biodegraded resin as one of the advanced composites.

Outline) Non-destructive methods are more important in the material evaluation methods that have been performed widely since then. This class introduces the measuring fundamentals and the analysis using the acoustic emission method and guided wave detecting method, and also the characteristics and the up-to-date development trend of green composites with less environmental burden.

Style) Lecture

Keyword) acoustic emission(AE), guided wave analysis, green composite

Fundamental Lecture) “Material Engineering”(0.2, ⇒p.22), “Physical properties of materials”(0.2, ⇒p.20)

Requirement) Students are required to have a good understanding of fundamental knowledge of materials engineering.

Goal)

1. To make clear the deformation and fracture dynamics of advanced materials by analysis of obtained AE signals.
2. To identify various types of defects and search for a plant life prediction using the guided wave propagating through materials.
3. To understand the high-performed and high-qualified green composite as one of the advanced materials with less environmental burden.

Schedule) 1. Introduction of AE method 2. AE source characterization 3. AE behavior during deformation in advanced materials and its deformation mechanism 4. AE behavior due to microcracking in advanced materials and its fracture prediction technology 5. Up-to-date trend of material evaluation technology with AE method 6. Propagation theory of ultrasonics in materials with viscoelasticity, anisotropy, piezoelectricity and non-linearity 7. Propagation simulation of ultrasonics 8. Fundamentals of guided wave with SH mode plate wave 9. Guided wave to circumferential and axial directions 10. Up-to-date research trend of guided wave 11. Concept of advanced composite materials 12. Classification of advanced composite materials and its application 13. Characteristics of advanced composite materials 14. Advanced composite materials and global environment 15. Development trend of green composite

Evaluation Criteria) Assignments count 100%

Textbook) Not used

Reference) Will be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169556>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Yoshida (M619, +81-88-656-7358, yoshida@me.tokushima-u.ac.jp) (Office Hour: Thursday and Friday, 17:00 to 18:00)

Material and Computational Mechanics

2 units

Katsutoshi Yamada · PROFESSOR / MECHANICAL SCIENCE, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Atsuya Oishi · ASSOCIATE PROFESSOR / MECHANICAL SCIENCE, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Takuo Nagamachi · ASSOCIATE PROFESSOR / INTELLIGENT MACHINES, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) To understand both theory and computing system for computational mechanics of solving physical phenomena for natural and artificial objects

Outline) From theoretical aspects deformation theory of solids, FEM and numerical methods are discussed. From aspects of computing system, algorithm and high performance procedure are given of large scale computing system for designs and working of material, machine and structures, and controls.

Style) Lecture

Keyword) Nonlinear problem of solid mechanics, Large scale system of computational mechanics

Fundamental Lecture) “Solid Mechanics”(1.0, ⇒p.21)

Relational Lecture) “Advanced Exercise on Mechanical Engineering”(0.5, ⇒p.111), “Advanced Production Technology”(0.5, ⇒p.109)

Goal)

1. To understand mathematical theory and physics for nonlinear problems for solid
 2. To construct large scale computing system and to simulate using them and understand of their results.
Schedule) 1. Tensor analysis 2. Weighted residual method and variational principles 3. Non-linear material problems 4. Geometrically non-linear problems 5. Time depending problems 6. Application to non-structural problems 7. Environment for parallel processing 8. Algorithm for parallel processing FEM analysis 9. Implementation of parallel processing FEM analysis 10. Basic theory of soft computing 11. Soft computing for CAE 12. Implicit method for statics 13. Explicit method for dynamics 14. Constitutive equations for non-iron-metals 15. Method of high speed computing 16. Recent high precision method of FEM simulations

Evaluation Criteria) Assignments count 100%

Textbook) 矢川・吉村著, 有限要素法, 培風館

Reference) O. C. ツイエンキーヴィッツ, マトリックス有限要素法, 培風館

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169557>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Yamada (M621, +81-88-656-7364, yamada@me.tokushima-u.ac.jp) (Office Hour: Friday 17:00-18:00)

⇒ Oishi (M622, +81-88-656-7365, oishi@me.tokushima-u.ac.jp)

⇒ Nagamachi (M524, ngmch@me.tokushima-u.ac.jp) (Office Hour: 毎週水曜日 17 時 ~ 18 時)

Fluid Energy Control

2 units

Junichiro Fukutomi · PROFESSOR / MECHANICAL SYSTEMS, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces hydrodynamic characteristics of turbomachinery, behavior of internal flow and problems with it.

Outline) Advanced concepts of fluid energy control and energy conversion. Performance characteristics, internal flow conditions and anomalous phenomena in fluid machinery. Performance improvement and noise reduction of turbo-machinery by flow control. Utilization of renewable fluid sources such as hydro-dams, wind, wave and tides.

Keyword) Energy conversion, Turbomachinery, Internal flow

Fundamental Lecture) “Fluids Energy Conversion Engineering”(1.0, ⇒p.22)

Goal) To understand hydrodynamic characteristics of turbomachinery, behavior of internal flow and problems with it.

Schedule) 1. Theory of centrifugal turbomachinery 1 2. Theory of centrifugal turbomachinery 2 3. Theory of axial turbomachinery 1 4. Theory of axial turbomachinery 5. Quasi three-dimensional flow analysis of turbomachinery 6. Turbulence modeling and numerical flow simulation 1 7. Turbulence modeling and numerical flow simulation 2 8. Mid-term test 9. Characteristics of turbocharger for automobile 10. Noise of turbomachinery 1 11. Noise of turbomachinery 2 12. Anomalous phenomena of turbomachinery 1 (cavitation, water hammer) 13. Anomalous phenomena of turbomachinery 2 (surging, rotating stall) 14. Application technology of natural flow energy 1 (wind turbine) 15. Application technology of natural flow energy 1 (small hydro turbine) 16. Term test

Evaluation Criteria) As mid-term test of 50 points and term test of 50 points, it is made to be passing over sum total of 60 points.

Textbook) Not used

Reference) Will be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169644>

Contact)

⇒ Fukutomi (M519, +81-88-656-7367, fukutomi@me.tokushima-u.ac.jp)

Thermal Energy Control

2 units

Tetsuya Suekane · PROFESSOR / MECHANICAL SYSTEMS, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
 Masanori Kiyota · ASSOCIATE PROFESSOR / MECHANICAL SYSTEMS, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) Aiming at the permanent use of resources and energy, basic principles of thermal energy, heat transmission, and characteristics of energy control devices and working fluid are discussed. Various usages of thermal energy flow are analyzed with energy method.

Outline) Principle and characteristic about thermal energy, the control system, practical method and efficiency evaluation of thermal energy control. Energy flow analysis with heat, physical and chemical exergy.

Keyword) thermal energy, energy conversion

Goal) To use thermal energy effectively and to apply to environmental problems

Schedule) 1. Basics and characteristic of thermal energy 1 2. Basics and characteristic of thermal energy 2 3. Basics and characteristic of thermal energy 3, report problem 4. Characteristic of thermal energy control 1 5. Characteristic of thermal energy control 2 6. Characteristic of thermal energy control 3, report problem 7. Control elements of thermal energy 1 8. Control elements of thermal energy 2 9. Control elements of thermal energy 3, report problem 10. Control units of thermal energy 1 11. Control units of thermal energy 2 12. Control units of thermal energy 3, report problem 13. Evaluation of thermal energy control 1 14. Evaluation of thermal energy control 2 15. Evaluation of thermal energy control 3, report problem 16. Final test, oral examination

Evaluation Criteria) Scores of reports and final oral examination are used

Textbook) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169610>

Student) Course students only

Contact)

⇒ Suekane (M521, +81-88-656-7373, suekane@me.tokushima-u.ac.jp)

⇒ Kiyota (M522, +81-88-656-7374, kiyota@me.tokushima-u.ac.jp)

Multiphase Fluids Transport

2 units

Akiharu Ousaka · PROFESSOR / MECHANICAL SYSTEMS, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces a new technology of advanced heat transfer and fluid mechanics that can be used for determining the optimal design and operating conditions of nuclear and geothermal power plants and also chemical plant.

Outline) Fundamental concepts of multiphase mixtures, Modeling flow-pattern transitions, Gas-liquid two-phase flow under microgravity, Film formation in annular flow, Flooding phenomena, Two-phase flow in micro-channel

Style) Lecture

Keyword) Fundamental concepts of multiphase mixtures, Film formation in annular flow, Flooding phenomena

Relational Lecture) “Thermal Energy Control”(0.5, ⇒p.107), “Energy and Environment Engineering”(0.5, ⇒p.107), “Fluid Energy Control”(0.5, ⇒p.107)

Requirement) Students are required to have a good understanding of undergraduate-level heat transfer engineering, thermodynamics, hydrodynamics and related subjects.

Goal) To understand the outline of the transport phenomena in multiphase fluids

Schedule) 1. 1. Fundamental concepts of multiphase flow 2. 2. Flow pattern map 3. 3. Pressure drop, Void fraction 4. 4. Bubble flow 5. 5. Slug flow, Froth flow 6. 6. Annular flow, Mist flow 7. 7. Film formation in annular flow(No.1) 8. 8. Film formation in annular flow(No.2) 9. 9. Gas-liquid two-phase flow under microgravity(No.1) 10. 10. Gas-liquid two-phase flow under microgravity(No.2) 11. 11. Flooding phenomena(No.1) 12. 12. Flooding phenomena(No.2) 13. 13. Flooding phenomena(No.3) 14. 14. Two-phase flow in micro-channel(No.1) 15. 15. Two-phase flow in micro-channel(No.2) 16. 16. Discussion on multiphase fluids transport

Textbook) To be introduced in the class

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169554>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Ousaka (M523, +81-88-656-7375, ousaka@me.tokushima-u.ac.jp)

Energy and Environment Engineering

2 units

Kunihiko Ishihara · PROFESSOR / MECHANICAL SYSTEMS, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
 Masashi Ichimiya · ASSOCIATE PROFESSOR / MECHANICAL SYSTEMS, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) Aeroacoustic represented to high speed Shinkansen is complex in its generation mechanism and is still in investigation. This class aims to understand the theory of the generation mechanism and turbulence phenomenon underlying it.

Outline) Latest energy and environment problems in Japan and the world. Alternative energy sources for fossil fuels which are origins of green house effects. Fluid energy transfer machines. Systems of nuclear and sustainable energy machine. Harmony of energy consumption and environment problem. Aerodynamic response of sound and vibration, and turbulent properties of fluid machines. Lecture in combination with Portfolio.(2unit)

Style) Lecture in combination with Portfolio

Keyword) Aeroacoustic, Flow induced vibration, viscous fluid, turbulence

Fundamental Lecture) "Applied Fluid Dynamics"(1.0, ⇒p.18), "Fluids Energy Conversion Engineering"(1.0, ⇒p.22)

Requirement) Students are required to have a good understanding of fundamental knowledge of fluid mechanics.

Goal) This class aims to train researchers for universities and companies

Schedule) 1. Outline of aeroacoustic 2. What is a vortex sound? 3. Basic equations of fluid dynamics and acoustics 4. Green function for free space 5. Physical meanings of monopole, dipole and quadrupole 6. Lighthill's equation and Curle's equation 7. Radiation sound from compact body 8. Summary and intermediate test 9. Viscous fluid and boundary layer 10. Laminar flow, turbulent flow and transition 11. Description of turbulence 12. Fundamental equations for turbulence 13. Wall turbulence 14. Free turbulence 15. Homogeneous and isotropic turbulence 16. Final examination

Evaluation Criteria) Attitude for attending class (30%) and two examinations (70%) are evaluated.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169533>

Contact)

⇒ Ishihara (M518, +81-88-656-7366, ishihara@me.tokushima-u.ac.jp) (Office Hour: 木曜日 17:00~18:00)

⇒ Ichimiya (M520, +81-88-656-7368, ichimiya@me.tokushima-u.ac.jp) (Office Hour: 毎週火曜日, 17:00~18:00)

Mechanical Systems Design

2 units

Junichi Hino · PROFESSOR / INTELLIGENT MACHINES, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) The applied technologies of modeling, simulation, control and design methods for mechanical systems are made to master.

Outline) In mechanical systems, modelling and simulation by using modal analysis, semi-active and active vibration controls of mechanical systems, optimum design of active mass dampers for mechanical systems, intelligent vibration controls of mechanical systems, semi-active and active vehicle suspensions by modern control theory, and semi-active and active vehicle suspensions by intelligent methods are lectured.

Style) Lecture

Keyword) Modal Analysis, Vibration Control

Requirement) Students are required to have a good understanding of basic applied dynamics and vibration control

Goal)

1. To understand knowledge of dynamic design method of mechanical systems
2. To advance applied technologies for dynamic design method

Schedule) 1. Modeling and simulation by modal analysis method 1 2. Modeling and simulation by modal analysis method 2 3. Modeling and simulation by modal analysis method 3 4. Modeling and simulation by modal analysis method 4 5. Active and semi-active vibration control method 1 6. Active and semi-active vibration control method 2 7. Active and semi-active vibration control method 3 8. Vibration control by active mass damper 1 9. Vibration control by active mass damper 2 10. Vibration control by intelligent control methods 1 11. Vibration control by intelligent control methods 2 12. Design of active suspension of vehicles by modern control theory 1 13. Design of active suspension of vehicles by modern control theory 2 14. Design of active and semi-active suspension of vehicles by intelligent control theory 1 15. Design of active and semi-active suspension of vehicles by intelligent control theory 2

Evaluation Criteria) Assignments count 100%

Textbook) Printed synopses are used

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169540>

Student) 工学研究科博士課程 1, 2, 3 年次

Contact)

⇒ Yoshimura .

⇒ Hino (M422, +81-88-656-7384, hino@me.tokushima-u.ac.jp) (Office Hour: mon. 17:00 - 18:00)

Instrument and Control Engineering

2 units

Masafumi Miwa · ASSOCIATE PROFESSOR / INTELLIGENT MACHINES, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces the research results using control strategies, the application to the industrial plant of control technology.

Outline) Computer application to factory automation, control of industrial robot, digital process control, dynamic modeling of industrial chemical plant with neural network, dynamics of pneumatic actuators, two degree of freedom control and control of pneumatic actuators using intelligence strategies are lectured.

Style) Lecture

Keyword) Dynamic modeling, Intelligent control

Relational Lecture) "Mechanical Systems Design"(0.5, ⇒p.108), "Design of Dynamic Systems"(0.5, ⇒p.108)

Requirement) Students are required to have a good understanding of graduate-level control engineering and related subjects.

Goal) To understand the application to industrial plant of digital control theory, the intelligent control using actuators.

Schedule) 1. Outline of digital control theory 2. Outline of two-degree-of-freedom control method 3. Design of two-degree-of-freedom control system 4. Model predictive control 5. Application to chemical plant control of model predictive control 6. Auto tuning PID control of chemical plant(1) 7. Auto tuning PID control of chemical plant(2) 8. Application of generalized predictive control 9. The structure and function of actuators 10. Digital control and servo mechanism 11. Recent topics of intelligent control 12. Outline of neural network 13. Neural network compensator 14. Intelligent control using actuators 15. Application to plant of control theory(1) 16. Application to plant of control theory(2)

Evaluation Criteria) Assignments count 100 %

Textbook) Printed synopses are used.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169547>

Contact)

⇒ Hashimoto .

Design of Dynamic Systems

2 units

Katsunobu Konishi · PROFESSOR / INTELLIGENT MACHINES, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces automatic control and image recognition techniques that can be used for autonomous control of mechanical systems.

Outline) Modeling and control for mechanical systems such as actuators, robotic manipulators and aerial vehicles are introduced in the first half of this class. In the second half, image processing and image recognition techniques are introduced in order to obtain environmental information necessary for autonomous control behaviour.

Fundamental Lecture) "Actuator Control Theory"(1.0, ⇒p.24), "System Design"(1.0, ⇒p.23), "Image Processing"(1.0)

Relational Lecture) "Visual pattern processing"(0.5, ⇒p.148)

Requirement) Students are required to have a good understanding of undergraduate-level automatic control theory and image processing.

Goal)

1. To understand the procedures and tools of control system design.
2. To understand the feature space analysis and object detection techniques.

Schedule) 1. Actuator 2. Sensor 3. Equation of motion (robot arm) 4. Equation of motion (aerial vehicle) 5. Modal analysis 6. Reduced order model 7. Vibration control 8. Trajectory control 9. Intermediate examination 10. Image processing (color space) 11. Image processing (filtering) 12. Image processing (bird view observation) 13. Brightness pattern analysis 14. Feature space analysis 15. Object detection 16. Final examination

Evaluation Criteria) Evaluate base on two examinations and reports.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169604>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Konishi (M423, +81-88-656-7383, konishi@me.tokushima-u.ac.jp)

Advanced Production Technology

2 units

Yoshinari Kaieda · PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Masahiro Masuda · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Yoshihiro Tada · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduce powder processings and machining technologies that can be used for novel material fabrication and advanced manufacturing.

Outline) Forming and high-precision machining technologies for novel materials are introduced, and powder technologies for new material fabrication are also discussed.

Keyword) combustion synthesis, isostatic processing, tool failure, ultra-precision cutting, powder metallurgy

Requirement) Students are required to have a good understanding on fundamentals of metal processing technologies including machining and forming.

Goal)

1. To understand advanced forming technologies including powder processings and isostatic processings.
2. To understand advanced machining technologies including tool failure, wear mechanism and precision/ultra-precision cutting.

Schedule) 1. Introduction to powder metallurgy 2. Fundamentals of combustion synthesis 3. Applications of combustion synthesis 4. Isostatic forming technologies 5. Exercise 6. Machining of novel materials 7. Tool failure and wear mechanism 8. Diamond tool 9. Precision / ultra-precision machining 10. Exercise 11. Fundamentals of porous metals 12. Forming technologies of sintered metals 13. Consolidation and forming of powder materials 14. Processing of porous metals 15. Novel processing of porous metals 16. Examination

Evaluation Criteria) Assignments count 70%, exercises and examinations count 30%.

Textbook) Printed synopses are used.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169582>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Yoshinari Kaieda, room:M-321,TEL:088-656-7379, e-mail:kaieda@me.tokushima-u.ac.jp
⇒ Masahiro Masuda, room:M-320,TEL:088-656-7380, e-mail:masuda@me.tokushima-u.ac.jp
⇒ Yoshihiro Tada, room:M-319,TEL:088-656-7381, e-mail:tada@me.tokushima-u.ac.jp

Micro-Nano Engineering

2 units

Takao Hanabusa · PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Tetsuo Iwata · PROFESSOR / INTELLIGENT MACHINES, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces measurement techniques and instruments for analyzing and developing new materials.

Outline) Prof. Hanabusa lectures on the method of materials evaluation by means of X-ray diffraction: Principle of X-ray diffraction, macro and micro lattice strains, and residual stress measurement. Prof.

Iwata reviews instrumental methods for extracting information on materials using optical and spectroscopic techniques: Scientific measurements, data processing, and instrumentation for chemical analysis.

Style) Portfolio

Keyword) X-ray structure analysis, scientific measurements

Relational Lecture) “Materials Surface Performance Control”(0.5, ⇒p.109), “Advanced Micro-Nano Engineering”(0.5, ⇒p.110), “Instrument and Control Engineering”(0.5, ⇒p.108)

Requirement) Students are required to have a good understanding of undergraduate-level related subjects.

Goal)

1. To understand x-ray diffraction method and its application for material science
2. To understand scientific measurements and instrumentation technology

Schedule) 1. Basics of X-rays 2. Lattices and crystal structures 3. Crystal axes and reciprocal lattice 4. Scattering by an atom 5. Diffraction by small crystal 6. Kinds of residual stresses 7. X-ray stress measurement 8. Instruments for scientific measurements 9. Instrumental methods for chemical analysis 10. Microscopy and near-field optics 11. Analytical instruments 1 12. Analytical instruments 2 13. Electronics for scientific measurements 14. Data-processing method for scientific measurements 15. System design for scientific measurements 16. Report and presentation

Evaluation Criteria) Assignments counts 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169634>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Iwata (M427, +81-88-656-9743, iwata@me.tokushima-u.ac.jp)
⇒ Hanabusa (M317, +81-88-656-7377, hanabusa@me.tokushima-u.ac.jp)

Materials Surface Performance Control

2 units

Ri-ichi Murakami · PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING
Daisuke Yonekura · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) The nano processing of the material surface in the atomic and molecular level is carried out by the surface modification methods such as PVD or CVD. The material surface nano processing to manifest the new performance in the material surface and its evaluation is explain in this lecture. The development of the new functional materials and the precept to its application are given.

Outline) In this lecture, the surface micro processing which manifests new performance on the surface of material by processed under the atom or molecule level is explained, and its evaluation also is mentioned. How to be invested the transparency, electrical and electronic properties, photocatalytic materials and gas barrier by PVD or CVD methods is explained. Then, the effects of surface modification on the mechanical properties such as fatigue, friction-wear and corrosion of materials are discussed and then its evaluation is mentioned.

Style) Lecture

Keyword) Surface modification, PVD, CVD, Functional thin film, Surface engineering

Relational Lecture) “Advanced Micro-Nano Engineering”(0.5, ⇒p.110), “Controlling Physical Properties of Crystalline Materials”(0.5, ⇒p.106), “Micro-Nano Engineering”(0.5, ⇒p.109)

Requirement) 特になし

Goal)

1. Understanding of functional materials development
2. Understanding of evaluation of material surface performance
3. Understanding of nano processing
4. Understanding of mechanical properties of functional materials

Schedule) 1. Function of material surface 2. Nano processing of material surface 3. Nano processing of material surface 4. Nano processing of material surface 5. Material surface modification by PVD and CVD 6. Material surface modification by PVD and CVD 7. Group discussion 8. Evaluation methods of material surface performance 9. Evaluation methods of material surface performance 10. Transparency 11. Electromagnetic wave shielding properties 12. Electric properties 13. Improvement

of corrosive resistance **14.** Improvement of friction and wear properties **15.** Improvement of fatigue properties **16.** Group discussion

Evaluation Criteria) Over 60% of group discussion, reports and Examination

Textbook) Prints

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169625>

Contact)

⇒ Murakami (M318, +81-88-656-7392, murakami@me.tokushima-u.ac.jp)

Intelligent Information Systems

2 units

Yoneo Yano · PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Kazuhide Kanenishi · ASSOCIATE PROFESSOR / APPLIED INFORMATION MEDIA ENGINEERING, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Hiroaki Ogata · ASSOCIATE PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Teruaki Ito · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Hiroyuki Mitsuhashi · ASSOCIATE PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) Learning the design methods of intelligent information systems such as educational software and interactive systems.

Outline) Intelligent systems and their mechanics. Intelligent CAI. Intelligent interface. Micro-worlds in intelligent CAI. Learner-teacher modelling. Knowledge acquisition models. Empirical and analytical machine learning, e. g., ID3, similarity-, explanation-, and case-based learning. Genetics-based machine learning, e. g., genetic evolution and co-evolution of production systems, finite state machines, recurrent neural networks, and strategic knowledge. Concepts of collaborative interface systems based on intelligent interactions, and their implementation for design support systems.

Style) Lecture and exercise

Keyword) Intelligent Interface, Intelligent Educational Systems, Intelligent Agents, CSCW, CSCL, Interactive Interface

Fundamental Lecture) “Human Factors”(1.0)

Relational Lecture) “Applied Knowledge Systems”(0.5), “Autonomous Adaptive Systems Engineering”(0.5)

Goal) Acquisition of the design methods of educational systems and interactive systems

Schedule) **1.** Overview of Intelligent Information Systems **2.** Intelligent CAI **3.** Cognitive model for Learning **4.** Design of ITS(Intelligent Tutoring System) **5.** ILE(Interactive Learning Environment) **6.** CSCL **7.** Ubiquitous and Mobile Learning Environment **8.** Design of Intelligent Interactive System **9.** Collaborative Interface **10.** Design of Intelligent Information System (1) **11.** Design of Intelligent Information System (2) **12.** Design of Intelligent Information System (3) **13.** Design of Intelligent Information System (4) **14.** Design of Intelligent Information System (5) **15.** Conclusion

Evaluation Criteria) We will grade based on reports and interactive presentation among students.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169593>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Yano (C511, +81-88-656-7495, yano@is.tokushima-u.ac.jp) (Office Hour: 火曜日 16 時 ~ 17 時, 水曜日 16 時 ~ 17 時, 金曜日 16 時 ~ 17 時)

⇒ Kanenishi (院生棟 506, +81-88-656-7285, marukin@cue.tokushima-u.ac.jp)

⇒ Ogata (C507, +81-88-656-7498, ogata@is.tokushima-u.ac.jp) (Office Hour: 月曜日 ~ 金曜日:午後 5 時 ~ 6 時)

⇒ Ito (M316, +81-88-656-2150, ito@me.tokushima-u.ac.jp)

Visual pattern processing

2 units

Shunichiro Oe · PROFESSOR / APPLIED INFORMATION MEDIA ENGINEERING, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Kenji Terada · ASSOCIATE PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) The basic technologies which replace the visual pattern processing function of man by computer and their applied technologies are made to master.

Outline) The advanced processing techniques of visual pattern, i.e., the pre-processing techniques, the feature extraction techniques, the classification techniques of visual pattern, the processing techniques of color image and their application examples are lectured.

Style) Lecture in combination with Portfolio

Keyword) pattern recognition, vision, image processing

Fundamental Lecture) “Applied Image Processing”(1.0)

Goal) Acquisition of knowledge about the processing theories of visual pattern and their various applied technologies, and the processing technologies of color image

Schedule) **1.** Concept of pattern recognition **2.** Statistical pattern classification method1 **3.** Statistical pattern classification method 2 **4.** Pattern classification method by the structural analysis technique **5.** Pre-processing method of visual pattern **6.** Feature extraction method of visual pattern 1 **7.** Feature extraction method of visual pattern 2 **8.** Segmentation method of visual pattern 1 **9.** Segmentation method of visual pattern 2 **10.** Pattern classification method by neural network **11.** Pattern classification method by GA **12.** Security image processing **13.** Tracking of moving object **14.** Texture analysis **15.** The feature extraction method of color image and its application **16.** Periodic examination

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169559>

Student) Able to be taken by only specified class(es)

Advanced conversion systems of resource energy

2 units

Yoshiyuki Kidoguchi · PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To learn special knowledge concerning present energy resources and energy supplying systems, to understand principle and mechanism of energy conversion, and to improve thinking faculty for application of new energy and its conversion

Outline) To explain effective combustion technologies, reasonable utilization of energy and application of unused energy for saving consumption of fossil fuels and primary energy on the point of saving resources, energy and preserving the environment

Style) Portfolio

Keyword) Energy conversion, Energy resources, Utilization of energy, Environmental protection, Energy saving

Requirement) None

Notice) None

Goal) To understand fundamentals of energy conversion and to consider effective utilization of energy and improvement of energy conversion technologies

Schedule) **1.** Present state of energy resources **2.** Energy and environmental problem **3.** Future view of energy resources **4.** Fundamentals of energy conversion (1) **5.** Fundamentals of energy conversion (2) **6.** Principle of energy conversion (1) **7.** Principle of energy conversion (2) **8.** Principle of energy conversion (3) **9.** Technologies of energy conversion (1) **10.** Technologies of energy conversion (2) **11.** Technologies of energy conversion (3) **12.** Approach to effective utilization of energy (1) **13.** Approach to effective utilization of energy (2) **14.** Application of new energy (1) **15.** Application of new energy (2)

Evaluation Criteria) Appraise the understanding of the content of the lecture by setting some reports

Textbook) None

Reference) None

Webpage) <http://www.eco.tokushima-u.ac.jp/w3/miwa/index.html>

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169563>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Kidoguchi (Eco502, +81-88-656-9633, kidog@eco.tokushima-u.ac.jp)

Note) Need to submit some reports

Advanced Micro-Nano Engineering

2 units

Toshihiko Ooie · PROFESSOR / NANO-PROCESSING ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Masato Tanaka · ASSOCIATE PROFESSOR / NANO-PROCESSING ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces micro-nano process, especially photo-induced processes

Outline) Basics of micro-nano engineering for the beginners.

Requirement) Students are required to have a good understanding of under-graduate level physics and related subjects.

Goal) To obtain advanced knowledge for performing a research project on micro-nano engineering using a laser.

Schedule) 1. Basics of micro-nano engineering 2. Various micro-nano process and photo-induced process
3. Laser radiation and oscillator 4. Optical components for laser systems 5. Laser induced phenomena
6. Heat conduction in laser processing 7. Laser welding 8. Laser drilling and cutting 9. Ultra-fast laser processing
10. Micro thermal process 11. Micro/nano processing in industry 12. Thermal inkjet process
13. Piezo inkjet process 14. Inkjet for biotechnology 15. Latest inkjet technology 16. Examination

Evaluation Criteria) Assignments counts 100%

Textbook) Norimitsu Hirai, Practical Laser Technology, Kyoritsu publishing ISBN4-320-08470-5 Takeshi Amari, Inkjet printer, CMC publishing ISBN4-88231-859-8 Electronic files on Web

Reference) Mitsuo Nakazawa, Practical Ultrafine Process and Measurement, NTS ISBN4-86043-035-2 Kenichi Iga, Basic Laser Optics, Ohm-sha ISBN4-274-02137-8 Kunihiro Sato, Yoshihiko Mukai, Masao Toyoda, Welding Engineering, Rikogaku-sha ISBN4-8445-2108-X

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169606>

Advanced Exercise on Mechanical Engineering

2 units
All teachers

Target) To obtain comprehensive insight in the field of mechanical engineering.

Outline) Advanced exercise on mechanical engineering.

Style) Portfolio, Lecture in combination with Portfolio

Keyword) Mechanical Engineering, Doctor thesis

Requirement) N/A

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169541>

Student) Able to be taken by only specified class(es)

Advanced Research on Mechanical Engineering

2 units
Teachers in other colleges or departments

Target) To obtain broad information on recent engineering.

Outline) To research a theme in a technology, which is different from the main technology in your field.

Style) Portfolio, Lecture in combination with Portfolio, Lecture and exercise

Keyword) Engineering, Technology, Different field

Requirement) N/A

Notice) N/A

Goal) To learn a recent technology, which is different from the main technology in your field.

Schedule) Choose a theme on technology or engineering.

Evaluation Criteria) Evaluated with portfolio or examination.

Textbook) Ask to teachers.

Reference) Prints.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169651>

Student) Able to be taken by only specified class(es)

Contact)

⇒ 教務係.

Earth and Life Environmental Engineering — Chemical Science and Technology

SYLLABUS OF SUBJECTS

● Integrated Subjects

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● Specialized Exercise and Experiments

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Human Factors

2 units
Atsuya Yoshida · PART-TIME LECTURER / FACULTY OF INTEGRATED ARTS AND SCIENCES

Target) The objective of this class is to provide students with sufficiently thorough appreciation of the many facets of the human factors discipline so that they may make use of it to their own doctoral works.

Outline) This class offers a broad and comprehensive overview of the human factors/ergonomics discipline with four areas of emphasis, (1) historical review of human factors research, (2) human physical, perceptual and cognitive capabilities and limitations, (3) application of human factors research data in design, especially in the interface design of computer-based systems, and (4) discussion about the relationship between the designed system (technology) and people.

Schedule) 1. What is Human Factors 2. Historical Overview of Human Factors 3. Multi-Disciplinary Aspect of Human Factors 4. Health and Safty Issue of Human Factors 5. Human Psychological Capability 6. Task Analysis 7. Human Error 8. Universal Design 9. Cognitive Artifact 10. Visibility and Affordance 11. Human-Computer Interaction 12. Human Information Processing 13. Knowledge and Mental Model 14. Usability Paradigms and Principles 15. Evaluation and Testing 16. Making system that makes us smart

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169608>

Life Science

2 units
Hiroshi Takagi · PART-TIME LECTURER / FUKUI PREFECTURAL UNIVERSITY
Akihiko Tsuji · PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) Understanding of significance of protein in biotechnology

Outline) Basics of structure, function and application of protein are introduced

Style) Lecture

Keyword) Protein, Enzyme, Biotechnology

Goal)

1. Understanding of multiple functions of proteins
2. Understanding of principle of protein engineering and its application

Schedule) 1. Introduction of life science 2. History of life science 3. Structure and function of DNA and RNA 4. mRNA is a template of protein 5. Duplication of DNA 6. Regulation of protein expression 7. Human Genetics 8. Genetic disease 9. DNA diagnosis 10. Structure and function of protein 11. Principle of gene technology (1) 12. Principle of gene technology (2) 13. Protein engineering 14. Future of life science (1) 15. Future of life science (2) 16. Preparation of report

Evaluation Criteria) Evaluation by report

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169586>

Contact)

⇒ Tsuji (G710, +81-88-656-7526, tsuji@bio.tokushima-u.ac.jp) (Office Hour: Monday 16:20-17:50)

Social Science

2 units
Shuzo Goto · PART-TIME LECTURER / SHIKOKU UNIVERSITY

Target) The mutual relationship of economic activities, the structure and function of economic society, and the concept and technique of mathematical programming modelling are lectured.

Outline) Not only the mutual relationship of economic activities is explained from domestic and international points of view, but also the technique of case studies by application of mathematical programming models is taught using the various kinds of materials and examples.

Keyword) Economic activities, Structure and function, Mathematical programming model

Goal) To understand the mutual relationship of economic activities, empirically explain them using the mathematical programming model and evaluate the model.

Schedule) 1. Guidance and purpose of this subject 2. Examples of economic activities 1 3. Examples of economic activities 2 4. Examples of economic activities 3 5. Change in structure of economic society 1 6. Change in structure of economic society 2 7. Function of economic society 1 8. Function of economic society 2 9. Mutual relationship of economic activities 1 10. Mutual relationship of economic activities 2 11. Concept of mathematical programming model 12. Technique of model construction 13. Modelling of economic activities 1 14. Modelling of economic activities 2 15. Evaluation of modelling

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169569>

Contact)

⇒ Kondo (ECO602, +81-88-656-7339, kondo@eco.tokushima-u.ac.jp)

Science and Technology Studies

Kunio Goto · PART-TIME LECTURER / MOMOYAMA GAKUIN UNIVERSITY

Target) Students are expected to learn the minimum essentials of science and technology studies and their functions in contemporary society.

Outline) Science and technology studies deal with science and technology research and its outcomes by means of various methods of social sciences and humanities. They have emerged in 1930s when social importance of science and technology became evident. Since 1970s, the science and technology studies have developed as mission oriented learning for government policy, business administrations and civic activity. In the first half of this lecture, the outline of the science technology studies is given. The involved topics are philosophy, history, sociology, and economics of science and technology.

Style) Lecture

Goal)

1. Understanding of the minimum essentials of the science and technology studies
2. Understanding of the social meaning of each student's research

Schedule) 1. Introduction: A brief history of the science and technology studies since 1930s 2. Philosophical understanding of science: (1) From Greek Classics to German Classical Philosophy 3. Philosophical understanding of science: (2) Rise of the philosophy of science the early twentieth century 4. Historical investigation of science and technology : (1) Emergence of the modern Western science 5. Historical investigation of science and technology : (2) From the Power Revolution of the Medieval West to the modern the Industrial Revolution 6. Sociology of science and technology: (1) Normative structure and Paradigm 7. Sociology of science and technology: (2) Social constructivism and Laboratory life analysis 8. Economics and science and technology : (1) Market and planning economies 9. Economics and science and technology : (2) Innovation and economic policy 10. The 1950s model of science and technology policy in the Cold War 11. Knowledge industrial society since 1970s: (1) Environmental problem and energy problem 12. Knowledge industrial society since 1970s: (2) Computer science and Information society 13. Policy issues in the transform of industrial structure and role of university 14. Science and technology in the global economy since 1990s 15. Concluding remark: Science, technology and society in the future

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169536>

Contact)

⇒ Kawamura (410 Chem Bldg, +81-88-656-7401, kawamura@chem.tokushima-u.ac.jp)

Management Theory of New Business

2 units

Vice chairperson of School Affairs Committee , Faculty of Engineering

First-line men with experience of practical business · PART-TIME LECTURER

Target) New business is the word which means the business to make the most of technical knowledge, technology, the new idea and which is developed creatively, and that main bearer is the enterprise called a venture. There is a purpose of this class in providing the knowledge which is necessary, and know-how and a spirit so that a taking lecture student may establish a venture business.

Outline) The regeneration of the Japanese society with the vitality is being asked. Government enforced "a university venture 3 years 1000 companies plan" over Heisei 14-the 16th year. Though that goal

was almost attained, it is very important to promote entrepreneur education continuously from now on. Tokushima Prefecture supports this class based on the recognition done like this, and it is established.

Requirement) The person whom the one with the classroom is constructed by the class start time in the person who doesn't learn the unit of "Introduction to new business" in the college, and a group are organized, and it is limited to the person with the intention to make a business plan, and taking lecture is recognized.

Notice) Being late and a whisper in class should be prohibited strictly. Be careful over and again because it should dispose of exit and future taking lecture may not be recognized when it is wicked.

Goal) Learning of the necessary knowledge to establish venture business, and the ability which can make a business plan.

Schedule) 1. Guidance 2. What is the new business? 3. Keynote lecture 4. Theory of a stand-alone version venture success 5. The law knowledge which is necessary for entrepreneur 6. Fund-raising and capital policy 7. Indirect finance 8. Direct finance 9. The basis of the company management 10. The elementary knowledge of the business accounting 11. The point of the business plan preparation 12. Management strategy and marketing 13. Product development and intellectual property 14. Business plan preparation practice 15. Examination 16. Business plan announcement meeting

Evaluation Criteria) It is evaluated by the presentation (40%) of the written examination (60%) and the business plan. And, the presentation of the written examination and the business plan is decided to be recognized only for the taking lecture student who attended it for 2/3 and more of the classes that it is opened.

Textbook) The summary is distributed every time.

Reference) Several are introduced in the school hours.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169607>

Student) he person who hasn't learned the unit of the new business outline that it is opened with this learning in all the students enrolled in the graduate school yet is made the target. The number of completion people may be restricted in the method such as a lottery in case of a taking lecture applicant many. As for the details, an applicant for taking lecture is to follow those directions because the notice which showed attention in taking lecture is done.

Contact)

⇒ Vice chairperson of School Affairs Committee , Faculty of Engineering

Note) The man of business that it is active in the forefront every time, and an adviser are invited as an instructor, and working knowledge is provided for theory plus practice in this class from the specialist's position. This class is the thing which is useful enough even if it is taken to the person who aims at a general enterprise and a laboratory, the employment to the self-governing body and so on.

Introduction to Intellectual Property

2 units

Tohru Sakai · PART-TIME LECTURER / (助)工業所有権協カセンター, Juichiroh Osame · PART-TIME LECTURER

Akio Fujii · PART-TIME LECTURER / INTELLECTUAL PROPERTY OFFICE, Yasushi Toyosu · PART-TIME LECTURER, Kuniaki Kubota · PART-TIME LECTURER

Target) Understanding the basic systems and importance of protection and practical use of intellectual property based on some examples.

Outline) It is necessary for a working staff in a company, a university, etc., in a future. It is introduced the importance to protect and practical use of intellectual property at governments , industrial circles, universities and institutes in Japan using potential on scientific techniques. This lecture is treated the basic systems of protection and practical use of intellectual property particularly based on strategy and invasion of patent in an organization such as company, university, etc.

Style) Lecture

Keyword) Intellectual property, Patent Law, Protect and Use of Intellectual Property

Relational Lecture) "Introduction to Intellectual Property"(0.5)

Requirement) No requirement

Notice) It is necessary to be present at two concentrated lecture.

Goal)

1. Understanding concept of intellectual property right.
2. Understand the Patent Act, the Trademark Act, the Design Act and the Copyright Act.
3. Understanding on basical practical use of intellectual property.

Schedule) 1. Concept of intellectual property(Sakai) 2. Outline of intellectual property(Patent and Trademark)(Sakai) 3. Outline of intellectual property(Design and Copyright)(Sakai) 4. Patent, invention and invasion of patent (Sakai) 5. Management of intellectual property and use (Sakai) 6. A way of research and development and intellectual property in a future(Sakai) 7. The midterm examination and its comment for Target and 8. History of system of intellectual property (Osame) 9. International trend of system of intellectual property (Osame) 10. Acquisition method of intellectual property right(Fujii) 11. Use of intellectual property(Watanabe) 12. Strategy of intellectual property on development of techniques(Y.Higuchi) 13. Effective intellectual property in development of techniques (Kubota) 14. Special lecture on a use of intellectual property by a chief executive officer(1) 15. Special lecture on a use of intellectual property by a chief executive officer(2)

Evaluation Criteria) Passing mark is over 60% on the examinations and the reports for each reaching level, respectively.

Textbook) To be used textbooks made by lecturers.

Reference) Nobuhiro Nakayama:Titeki Shoyuken, Nikkan Kohgyo Shinbunsha

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169591>

Student) For the course students and other graduate school students.

Contact)

⇒ Sakai (+81-3-5600-2631,)

⇒ Mizuguchi (A501, +81-88-656-7349, mizuguch@ce.tokushima-u.ac.jp) (Office Hour: Monday,11:00-12:30, 17:00-18:00)

Presentation Method (D)

2 units

Target) Poster and oral presentations, and journal publications are common means of appealing the research work in various scientific and technological disciplines. It's undoubtedly important for activating the research work. The lecture is intending for students to learn most efficient way to appeal their findings and discussions in scientific community.

Outline) Credits are acknowledged to the students who are supervised to give conference speech by themselves and do actually the lectures.

Goal) The lecture is aiming at having knowledge and experience of the presentation in international conferences.

Evaluation Criteria) Students' achievement is evaluated by portfolios submitted showing the progress in preparation of international conferences as well as by presentation records.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169628>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Internship (D)

2 units

Target) This program is provided to increase knowledge and experience in the actual industrial technology in various fields. Through the practical experience, the program will allow students to become discerning and well-balanced researchers or engineers with deeper understanding of technological societies.

Outline) Credits are acknowledged to students who experienced the internship in companies and/or government offices. Their fulfillment is evaluated by activity reports during internship.

Goal)

1. Grasping internal systems of a company, management, action and strategy to achieve the company's goal. (2)
2. Understanding human relationship and communicative manner in a working society and a company.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by supervisors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169542>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Venture Business (D)

2 units

Target) Aims of the lecture are doing collaborative works with private enterprises and establishing venture businesses through such works.

Outline) The lecture is aiming at founding a venture business company as well as establishing collaborative research works with private enterprises. It's worth to apply their accomplishment to an actual society beyond the range of a laboratory work.

Goal) Objective of the lecture is to have experience and knowledge of collaborative works with private enterprises and to mature the works to venture businesses.

Evaluation Criteria) Credits are acknowledged in case of doing collaborative works with enterprises and/or maturing them to venture businesses. Handouts, reports, and presentation materials, etc. are evaluated to approve credits.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169539>

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Long-term Internship (D)

6 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This program is provided long-term internship in the actual industrial companies and so on, doing a joint study between companies and university on practical problems proposed by the company and practical experience of management of technologies. Through the long-term internship, the program will allow students to become a engineer with a core role in researches and companies

Outline) Credits are acknowledged to students who experienced the internship in companies or government offices of 270 hours during three months or more and presentation to executive officer of the company. Their fulfillment is evaluated by activity reports during internship and appraisal and interviewed report from a mentor.

Goal) Grasping abilities for practical engineers by studying activities in company and so on.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by mentors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169697>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Nishida (K409, +81-88-656-7630, nishida@kg.tokushima-u.ac.jp)

⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

⇒ Morimoto (A407, +81-88-656-7619, emi.morimoto@kg.tokushima-u.ac.jp) (Office Hour: 月～木(10時～15時))

Note) Students who register the coop-education program for "Pai-shape" engineers with sense for management of technology, are able to have a grant-in-aid for travel and so on. Ask committee members of long-term internship in your course or coordinators of this program.

Advanced Lecture in Theory of Business Models

2 units

Tatsuya Deguchi · PART-TIME LECTURER, Kenichi Yasumuro · PART-TIME LECTURER, Katsuo Touma · PART-TIME LECTURER
Takahide Yamaguchi · PART-TIME LECTURER, Shingou Nishii · PART-TIME LECTURER

Target) There is a purpose of this class in providing the knowledge which is necessary, and know-how so that students may achieve a business model in establishing enterprises based on the lecture of "Management Theory of New Business", and in making students understood the profit generating stream by studying on the frame work of companies in several business fields.

Outline) Business Model is a remarkable term in modern economic and organizational theories in these days but describes a broad range of definitions. In this lecture, Business Model is defined as "System which converts technology and know how into profit for the purpose of customers' satisfaction" and aims at providing the ability for the design of profitable system, by learning cost issues in establishing business strategies of companies.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business"

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of business model design is learned
2. Understanding of the concept of business model by case study analysis are appreciated
3. It learns forming ability of business plan through the case study on business models

Schedule) 1. Guidance 2. Keynote lecture "Business Model Thinking" 3. Questions and answers, Discussions 4. Lecture "Theory of Business Models" 5. Lecture "Design principles of Business Models" 6. Lecture "Evaluation of Business Models" 7. Case Study "Business Model in a R&D company" 8. Case Study "Business Model in a manufacturing industrial company" 9. Case Study "Business Model in a company of service industry" 10. Case Study "Business Model in a company of information industry" 11. Business plan practice, Present situation analysis and alternatives. 12. Business plan practice, Concept ad design of business. 13. Business plan practice, Financial analysis . 14. Business plan practice, Concluding and submitting 15. Presentation(1) of Business plan practice. 16. Presentation(2) of Business plan practice, Comments and summary.

Evaluation Criteria) Participation in class(20%) Group work and its report(80%)

Textbook) Ken-ichi Amuro and Study Group of Business model "Case Book: Business Model Thinking" Bunshindo

Reference) Several are introduced in class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169696>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Contact)

- ⇒ Tatsuya Deguchi (Wakayama University)
 ⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

Note) This class is supported by Tokushima Prefecture Government

Management of Technology

2 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) About the production management of the automobile industry, it is understood variously from the point of view such as "research and development", "production management", "purchasing" and "quality control" "marketing" and "cross-cultural management".

Outline) It learns about the production management. This time, "the automobile industry" specially takes up the production management of "Honda Motor Co.,Ltd. (following Honda)" even of that in the case, and the class to appreciate that importance with ranking of technology in management is taken.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business"

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of management is learned.
2. Ranking of the technology in management and that importance are appreciated.
3. It learns how to solve the various problems which always occur in the spot of the management through the case study and the business game.

Schedule) 1. Guidance 2. Lecture "What in Management of Technology?" 3. Case report "Research and development of Honda" 4. Case study "Plan an overseas factory." "A new car development order" 5. Lecture "Production management and purchasing" 6. Lecture "Quality control" 7. Case report "The production management of Honda"; "The supply chain management of Honda" 8. Case study "Plan an overseas factory." 9. Case report "The quality control of Honda" 10. Case study "Don't make material defects flare up again." 11. Lecture "Marketing strategy" 12. Lecture "Cross-cultural management" 13. Case report "Around the products project of Honda - the two-wheeled vehicle" 14. Case report "The path of internationalization of Honda" 15. Case report "The personnel management of Honda" 16. Summary and questions and answers

Evaluation Criteria) It is evaluated in the remark (20%) in class and the middle, end of a term report (80% in total).

Textbook) It doesn't specially use. The summary and so on is distributed every time.

Reference) Several are introduced in class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169698>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the doctor former term course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Note) This class invites seven Honda alumnuni who did work in "research and development", "production management", "purchasing", "quality control", "marketing", "cross-cultural management", and so on as an instructor, and it is the class to do case report. Even if it is seen nationwide, the trial done like this is very rare, and it is a precious class. And, an applicant for taking lecture is to attend it in the guidance to hold it in advance. A schedule is indicated separately.

Advanced Molecular Design

2 units

Koichi Ute · PROFESSOR / SYNTHETIC AND POLYMER CHEMISTRY, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Tomohiro Hirano · ASSOCIATE PROFESSOR / SYNTHETIC AND POLYMER CHEMISTRY, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) The purpose of this class is to understand the principles of precise synthesis and polymerization reactions from the viewpoint of ligand design, asymmetric induction, etc.

Outline) Advanced discussion of current aspects of molecular design. Organic reaction mechanism and molecular design. Polymer synthesis, polymerization mechanism, and macromolecular design. Supramolecular chemistry. Correlation between inter- or intramolecular structure and chemical reactivity or functionality.

Style) Portfolio

Keyword) chain polymerization, living polymerization, stereospecific polymerization

Fundamental Lecture) "Advanced Topics in Polymerization Reactions"(1.0, ⇒p.32)

Relational Lecture) "Functional Materials"(0.5, ⇒p.117)

Requirement) Requires undergraduate level knowledge of organic and polymer chemistry.

Goal)

1. To understand the principles of precise synthesis.
2. To understand the principles of precise polymerization.

Schedule) 1. organic radicals 2. radical structure and ESR 3. radical structure and reactivity 4. molecular design based on radical mechanism 5. synthesis of functional polymers by radical polymerization 6. polymerization with heterogeneous catalysts 7. polymerization with homogeneous catalysts 8. polymerization with transition metal catalysts - stereocontrol 9. reaction control by Lewis acids 10. stereospecific polymerization 11. reaction field and molecular design 12. molecular assembly and molecular design 13. reaction control in asymmetric field 14. application of physical gels to polymerization reaction 15. molecular design and synthesis of dendritic polymers

Evaluation Criteria) Assignments counts 100% mainly based on the report submitted.

Textbook) Printed synopses will be distributed.

Reference) 野瀬卓平他編「大学院高分子科学」講談社

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169630>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Ute (化学棟 406, +81-88-656-7402, ute@chem.tokushima-u.ac.jp) (Office Hour: Monday 15:00 - 17:00)
 ⇒ Hirano (G405, +81-88-656-7403, hirano@chem.tokushima-u.ac.jp)

Advanced Molecular Transformations

2 units

Yasuhiko Kawamura · PROFESSOR / SYNTHETIC AND POLYMER CHEMISTRY, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) Let students understand the latest synthetic methodology of highly functionalized organic molecules. The method enhances both the energy and atomic efficiency.

Outline) This lecture shows modern synthetic methodologies, i.e. reagents, synthetic design, and synthetic processes, etc., which are situated as a basic concept of the synthesis of biologically active molecules and of high functionalized organic molecules.

Style) Lecture in combination with Portfolio

Keyword) Biologically active molecule, Organometallic compound, Microwave, Green sustainable chemistry, Excited state chemistry

Fundamental Lecture) “Advanced Organic Chemistry”(1.0, ⇒p.32)

Relational Lecture) “Advanced Molecular Design”(0.5, ⇒p.116)

Requirement) Students should have sound knowledge of organic chemistry of the master-course level.

Goal)

1. Understanding the synthetic method of biologically active molecules by microwave activation.
2. Understanding environmentally friendly and highly stereoselective organic syntheses by using organometallic reagents.
3. Understanding the organic reaction mechanism and basic computer chemistry.

Schedule) 1. Introduction to the microwave chemistry 2. Microwave excitation and its application 3. Application of the microwave excitation to the molecular conversion (1) 4. Application of the microwave excitation to the molecular conversion (2): 5. Introduction of the green, homogenous organometallic catalyst to the highly selective organic synthesis 6. Application of the green, homogenous organometallic catalyst to the highly selective organic synthesis 7. Introduction of the green, solid acidic catalyst to organic synthesis 8. Application of the green, solid acidic catalyst to organic synthesis 9. Application of the green, solid catalyst to the highly selective oxidation reaction 10. Molecular modelling: molecular orbital theory 1 11. Molecular modelling: molecular orbital theory 2 12. Excited state chemistry 1: Interaction of organic molecules with light 13. Excited state chemistry 2: Reaction mechanisms of the photoexcited organic molecules 14. Excited state chemistry 3: Reaction mechanisms of the photoexcited organic molecules 15. Excited state chemistry 4: Application of the photoexcited molecules

Evaluation Criteria) Credit is given to the students who earn the total 60% up scores. The score is assigned by evaluating the reports submitted.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169626>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Kawamura (410 Chem Bldg, +81-88-656-7401, kawamura@chem.tokushima-u.ac.jp)

Chemical Process Design and Development

2 units

Shigeru Sugiyama · PROFESSOR / CHEMICAL PROCESS ENGINEERING, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Ken-Ichiro Sotowa · ASSOCIATE PROFESSOR / CHEMICAL PROCESS ENGINEERING, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) The purpose of this class is to introduce the basic theory of both reaction engineering and plant engineering

Outline) The required properties of industrial catalysts, as well as their application to industrial processes will be explained. The recent techniques to analyze the local structure of active sites will also be introduced. An emphasis is placed on the application of XPS, EXAFS and solid NMR. Portfolio style is also available.

Style) Lecture in combination with Portfolio

Keyword) catalyst, NMR, EXAFS, chemical reactor, microreactor

Fundamental Lecture) “Surface Science and Technology”(0.5, ⇒p.118), “Advanced Molecular Transformations”(0.4, ⇒p.117)

Relational Lecture) “Advanced Molecular Design”(0.3, ⇒p.116), “Materials Chemistry”(0.3, ⇒p.118)

Requirement) Requires undergraduate level knowledge of catalyst chemistry and reaction engineering.

Goal)

1. To understand the state of art of industrial catalysts and its industrial applications in the lectures from 1st to 5th and 11th to 13th.
2. To understand the advanced technique of analysing local structure of catalysts in the lectures from 6th to 10th and 14th to 15th.

Schedule) 1. Industrial catalysts(1): State of art of reactors and catalysts 2. Industrial catalysts(2): Catalyst preparation 3. Industrial catalysts(3): Status and future of catalysts for chemicals' production 4. Industrial catalysts(4): Status and future of catalysts for environment protection 5. Industrial catalysts(5): Applications to industrial plants, including microreactors 6. Analysis of local structure (1): XPS 7. Analysis of local structure (2): Introduction to EXAFS 8. Analysis of local structure (3): Application of EXAFS 9. Analysis of local structure (4): Introduction to solid state NMR 10. Analysis of local structure (5): Application of solid state NMR 11. Case study (1): Application of EXAFS to catalysts 12. Case study (2): Application of EXAFS to environmental protection materials 13. Case study (3): Application of solid state NMR to catalysts 14. Case study (4): Application of solid state NMR to environmental protection materials 15. Case study (5): Summary. Submission of the report on the present course will be requested.

Evaluation Criteria) Assignments counts 100% mainly based on the report submitted.

Textbook) To be announced in the class

Reference) To be announced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169629>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Sugiyama (G309, +81-88-656-7432, sugiyama@chem.tokushima-u.ac.jp) (Office Hour: 16:00-17:00 on Monday and Tuesday.)

⇒ Sotowa (Chemistry and biotechnology building, 307., +81-88-656-4440, sotowa@chem.tokushima-u.ac.jp) (Office Hour: 16:00-17:00 on Monday and Tuesday.)

Functional Materials

2 units

Junko Motonaka · PROFESSOR / PSYCHO-CHEMISTRY AND MATERIAL SCIENCE, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Keiji Minagawa · ASSOCIATE PROFESSOR / SYNTHETIC AND POLYMER CHEMISTRY, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Mikito Yasuzawa · ASSOCIATE PROFESSOR / PSYCHO-CHEMISTRY AND MATERIAL SCIENCE, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To understand functions and applications of various functional materials.

Outline) This class introduces various materials based on functional polymers. The mechanism and design of physical and chemical functions of polymer materials are introduced in detail.

Style) Portfolio

Keyword) Functional Material, Functional Polymer, Sensor Material, Soft Matter, Biocompatible Material

Goal)

1. To understand properties and applications of various functional materials.
2. To understand mechanisms of functions and application method of material design.

Schedule) 1. Introduction to Functional Materials 2. Functional Polymer as Sensor Materials 3. Preparation of Various Sensors 4. Analysis of Sensor Properties 5. Evaluation of Sensor Properties 6. Characteristics and Preparation of Soft Matter 7. Properties of Polymer Solution 8. Thermosensitive Polymer Materials 9. Rheology of Soft Matter 10. Rheological Function of Materials 11. Design and Synthesis of Biocompatible Materials 12. Evaluation of Biocompatible Materials and its Application 13. Design and Synthesis of Electroconductive Polymers 14. Evaluation of Electroconductive Polymers and its Application 15. Surface Functional Modification 16. まとめ

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169543>

Contact)

⇒ Motonaka (G611, +81-88-656-7409, motonaka@chem.tokushima-u.ac.jp)

⇒ Minagawa (G612, +81-88-656-9153, minagawa@chem.tokushima-u.ac.jp)

⇒ Yasuzawa (G512, +81-88-656-7421, mik@chem.tokushima-u.ac.jp)

(Office Hour: 月曜日 16:30~ 17:30)

Materials Chemistry

2 units

Yasuhiro Uosaki · PROFESSOR / SYNTHETIC AND POLYMER CHEMISTRY, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Eiji Kanezaki · PROFESSOR / PHYSICO-CHEMISTRY AND MATERIAL SCIENCE, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To understand the molecular aspects of solid-state properties and/or fluid properties of materials(Uosaki). To understand the structure and electronic states of molecular crystal including metal ions(Kanezaki).

Outline) Molecular, atomic and ionic aspects of experimental approach for materials chemistry are lectured on the basis of physical chemistry. In order to understand the synthesis and the characterization of inorganic, organic and inorganic-organic composite materials, recent advances in electrochemistry, quantum chemistry, thermodynamics, surface chemistry and solid state chemistry are presented in relation to the properties depending on the association-condition of materials, the catalytic function of electrode, the application of STM to developing new materials etc. Design of the desirable properties for some new materials is also discussed.

Style) Lecture

Keyword) Material Development, Supercritical fluids

Fundamental Lecture) “Advanced exercise on chemical science and technology”(1.0, ⇒p.119), “Advanced research on chemical science and technology”(1.0)

Relational Lecture) “Advanced exercise on chemical science and technology”(0.5, ⇒p.119), “Advanced research on chemical science and technology”(1.0)

Requirement) not particular needed

Goal)

1. To understand the structures and properties of fluids and to develop an ability to apply supercritical fluids to environmental problems
2. ability for discussing properties of condensed phases from the aspect of molecules

Schedule) 1. Structures of fluids 2. Properties of fluids 3. Physical properties of supercritical fluids (1) 4. Physical properties of supercritical fluids (2) 5. Applications of supercritical fluids 6. Nature of molecules(1) 7. Nature of molecules(2) 8. electronic states of molecules(1) 9. electronic states of molecules(2) 10. electronic states of molecules(3) 11. electronic states of molecules(4) 12. electronic states of molecules(5) 13. molecular assembly(1) 14. molecular assembly(2) 15. molecular assembly(3) 16. examination

Evaluation Criteria) Evaluation is made by means of examination and presentation.

Textbook) Will be introduced at the first lecture.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169558>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Uosaki (G510, +81-88-656-7417, uosaki@chem.tokushima-u.ac.jp) (Office Hour: Monday (17:00-18:00))
⇒ Kanezaki (G516, +81-88-656-9444, kanezaki@chem.tokushima-u.ac.jp) (Office Hour: 年度毎に学科の掲示を参照すること)

Surface Science and Technology

2 units

Toshihiro Moriga · ASSOCIATE PROFESSOR / CHEMICAL PROCESS ENGINEERING, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) The purpose of this class is to understand the basic characteristics of surface and bulk and their differences, which are necessary in developing new material science.

Outline) This class will introduce surface structures and surface phenomena, governing the physical properties of combustion catalysts, electrode materials for fuel cell, transparent conducting materials, phosphors and oxynitrides for photocatalysts, and fundamentals of surface modifications for advanced functional materials.

Style) Portfolio

Keyword) bulk, surface, photocatalyst, transparent conducting oxide, solid oxide fuel cell, phosphor, X-ray photoelectron spectroscopy, X-ray absorption fine structure

Fundamental Lecture) “Physical Properties of Materials”(0.2), “Chemical Plant Design”(0.2), “Material Science”(0.2), “Advanced Materials Science”(0.2, ⇒p.34)

Relational Lecture) “Advanced exercise on chemical science and technology”(0.5, ⇒p.119), “Advanced research on chemical science and technology”(0.5)

Requirement) Nothing special.

Notice) Reports should be submitted within two weeks after the assignment.

Goal) To understand the outline of materials in which their surface structures and surface phenomena are effectively used.

Schedule) 1. Orientation 2. Recent topics on metal oxynitrides for photocatalysts -1- 3. Recent topics on metal oxynitrides for photocatalysts -2- 4. Recent topics on transparent conducting oxides thin films -1- 5. Recent topics on transparent conducting oxides thin films -2- 6. Recent topics on transparent conducting oxides thin films -3- 7. Recent topics on X-ray spectroscopy -1- 8. Recent topics on X-ray spectroscopy -2- 9. Recent topics on X-ray spectroscopy -3- 10. Recent topics on phosphors for white LEDs -1- 11. Recent topics on phosphors for white LEDs -2- 12. Recent topics on combustion catalysts -1- 13. Recent topics on combustion catalysts -2- 14. Recent topics on electrode materials for fuel cells -1- 15. Recent topics on electrode materials for fuel cells -2- 16. Final reports, dissertational defense

Evaluation Criteria) Assignment counts 100% based on the reports submitted and on the result of dissertational defense.

Textbook) To be announced in the class.

Reference) To be announced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169624>

Student) Able to be taken by student of other department

Contact)

- ⇒ Moriga (M603, +81-88-656-7423, moriga@chem.tokushima-u.ac.jp) (Office Hour: Monday 4:30pm—5:30pm for 1st semester, Thursday 4:30pm—5:30pm for 2nd semester)

Transport Process Engineering

2 units

Masahiro Katoh · ASSOCIATE PROFESSOR / CHEMICAL PROCESS ENGINEERING, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) The purpose of this class is to understand the transport phenomena on the interface of differential phases (gas, liquid and solid) for production and environmental preservation processes.

Outline) Interfacial mass transfer analysis in various production and environmental processes, with an emphasis is on the process systemization based on the manipulation of fluid flow near material surfaces and molecular transport in functional materials matrices. Analysis and design of chemical separation processes in terms of the molecular transport control within membranes and porous structures. Design of high functional porous micro-structured materials and spectroscopic analysis of molecular transfer phenomena in these materials.

Style) Portfolio

Keyword) mass transfer, separation processes

Fundamental Lecture) “Advanced Separation Technology”(1.0, ⇒p.34)

Requirement) Nothing special

Goal)

1. To understand transport phenomena on interface of differential phases
2. To understand analysis method of the phenomena in micro porous for separation processes

Schedule) 1. The principle of mass transfer 2. Mass transfer on gas-liquid interface 3. Mass transfer on gas-solid interface 4. Mass transfer on solid-liquid interface 5. Mass transfer process using membrane 6. Adsorption separation processes 7. Adsorption velocity and diffusion 8. Porous materials 9. Synthesis of porous materials 10. Analysis of porous materials 11. Adsorption processes using zeolites 12. The control of molecular transfer in micro porous materials 13. High functionalized porous materials 14. Analysis of solid materials by IR spectroscopy 15. Spectroscopic analysis for phenomena in porous materials

Evaluation Criteria) Assignment counts 100% mainly based on the report submitted.

Textbook) To be announced in the class.

Reference) To be announced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169527>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Katoh (M304, +81-88-656-7429, katoh@chem.tokushima-u.ac.jp)

Bioprocess Engineering

2 units

Katsuhiro Kawashiro · PROFESSOR / CHEMICAL PROCESS ENGINEERING, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Katsuhiro Tamura · PROFESSOR / PHYSICO-CHEMISTRY AND MATERIAL SCIENCE, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Yoshihisa Suzuki · ASSOCIATE PROFESSOR / PHYSICO-CHEMISTRY AND MATERIAL SCIENCE, CHEMICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) This class introduces (1) application of enzymatic reactions to industrial production (Professor Kawashiro), (2) effects of high-pressure gas on biological systems (Professor Tamura) and (3) basic concepts and methods of protein crystallization (Dr. Suzuki).

Outline) (Professor Kawashiro) Characteristics and specificity of biocatalysts. Organic synthesis and optical resolution by enzymatic reactions. Enzymatic reactions in nonaqueous media. Control of enantioselectivity of enzymatic reactions. Application of enzymatic reactions to industry. (Professor Tamura) Estimation of bioactivities of microorganisms by calorimetry and its application to ecology. Response of microorganisms to physical and chemical stresses. Behaviors of microorganisms under high pressure. Physical properties of liposomal membranes. (Dr. Suzuki) Basic concepts, methods and recent developments of protein crystallization.

Style) Lecture

Keyword) peptide synthesis, optical resolution, bioassay, Biomembrane, crystal growth

Fundamental Lecture) “Basic Physical Chemistry”(1.0), “Biochemical Engineering”(1.0), “Biophysical Chemistry”(1.0)

Relational Lecture) “Physico-chemical Exercise 1”(0.5), “Advanced Physical Chemistry”(0.5, =>p.33)

Requirement) Students are required to have a good understanding of master course-level biochemical and biophysical sciences.

Goal)

1. To understand the optical resolutions and industrial productions catalyzed by enzymes
2. To understand the effects of high-pressure gas on biological systems
3. To understand the significance of protein crystallization

Schedule) 1. Enzymatic reaction processes and their applications 2. Properties and catalytic mechanisms of enzymes 3. Peptide syntheses catalyzed by hydrolases 4. Optical resolutions using hydrolases 5. Enantioselectivity of enzymatic reactions in organic media 6. Enzymatic reactions under unusual conditions (frozen aqueous solution) 7. History of high-pressure effects on biological sciences 8. Measurements of metabolic heats of microorganisms under high pressure (1) 9. Measurements of metabolic heats of microorganisms under high pressure (2) 10. Measurements of metabolic heats using a high-pressure gas and its applications for ecological studies 11. Disinfection technology of fluid food products using high-pressure gases 12. Deoxydation technology of fluid food products using high-pressure gases 13. Understandings of the mechanisms of anesthetic actions using high-pressure gases 14. Structure analysis of protein molecules and significance of protein crystallization 15. Fundamentals of crystal growth 16. Recent topics on protein crystallization

Evaluation Criteria) Assignment counts 100%.

Textbook) To be announced in the class

Reference) To be announced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169585>

Contact)

- ⇒ Tamura (G509, +81-88-656-7416, tamura@chem.tokushima-u.ac.jp)
- ⇒ Kawashiro (G308, +81-88-656-7431, kawashiro@chem.tokushima-u.ac.jp)
- ⇒ Suzuki (G514, +81-88-656-7415, suzuki@chem.tokushima-u.ac.jp)

Advanced research on chemical science and technology

2 units

Teachers in other colleges or departments

Target) To obtain broad information on recent engineering

Outline) To research a theme in a technology, which is different from the main technology in your field.

Style) Portfolio, Lecture in combination with Portfolio, Lecture and exercise

Keyword) Engineering, Technology, Different field

Requirement) N/A

Notice) N/A

Goal) To learn a recent technology, which is different from the main technology in your field

Schedule) Choose a theme on technology or engineering, which is different from that in your field

Evaluation Criteria) Evaluated with portfolio or examination

Textbook) Ask teachers

Reference) Prints

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169650>

Student) Able to be taken by only specified class(es)

Advanced exercise on chemical science and technology

2 units

All teachers

Target) To learn how to identify and solve problems in the engineering.

Outline) Students will conduct a research work in a field of engineering, and acquire competent knowledge of the field. Students will also learn how to find and solve an engineering problem as an independent researcher.

Keyword) research, doctor thesis

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169537>

Earth and Life Environmental Engineering — Biological Science and Technology

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Human Factors

2 units

Atsuya Yoshida · PART-TIME LECTURER / FACULTY OF INTEGRATED ARTS AND SCIENCES

Target) The objective of this class is to provide students with sufficiently thorough appreciation of the many facets of the human factors discipline so that they may make use of it to their own doctoral works.

Outline) This class offers a broad and comprehensive overview of the human factors/ergonomics discipline with four areas of emphasis, (1) historical review of human factors research, (2) human physical, perceptual and cognitive capabilities and limitations, (3) application of human factors research data in

design, especially in the interface design of computer-based systems, and (4) discussion about the relationship between the designed system (technology) and people.

Schedule) 1. What is Human Factors 2. Historical Overview of Human Factors 3. Multi-Disciplinary Aspect of Human Factors 4. Health and Safty Issue of Human Factors 5. Human Psychological Capability 6. Task Analysis 7. Human Error 8. Universal Design 9. Cognitive Artifact 10. Visibility and Affordance 11. Human-Computer Interaction 12. Human Information Processing 13. Knowledge and Mental Model 14. Usability Paradigms and Principles 15. Evaluation and Testing 16. Making system that makes us smart

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169608>

Life Science

2 units

Hiroshi Takagi · PART-TIME LECTURER / FUKUI PREFECTURAL UNIVERSITY

Akihiko Tsuji · PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) Understanding of significance of protein in biotechnology

Outline) Basics of structure, function and application of protein are introduced

Style) Lecture

Keyword) Protein, Enzyme, Biotechnology

Goal)

1. Understanding of multiple functions of proteins
2. Understanding of principle of protein engineering and its application

Schedule) 1. Introduction of life science 2. History of life science 3. Structure and function of DNA and RNA 4. mRNA is a template of protein 5. Duplication of DNA 6. Regulation of protein expression 7. Human Genetics 8. Genetic disease 9. DNA diagnosis 10. Structure and function of protein 11. Principle of gene technology (1) 12. Principle of gene technology (2) 13. Protein engineering 14. Future of life science (1) 15. Future of life science (2) 16. Preparation of report

Evaluation Criteria) Evaluation by report

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169586>

Contact)

⇒ Tsuji (G710, +81-88-656-7526, tsuji@bio.tokushima-u.ac.jp) (Office Hour: Monday 16:20-17:50)

Social Science

2 units

Shuzo Goto · PART-TIME LECTURER / SHIKOKU UNIVERSITY

Target) The mutual relationship of economic activities, the structure and function of economic society, and the concept and technique of mathematical programming modelling are lectured.

Outline) Not only the mutual relationship of economic activities is explained from domestic and international points of view, but also the technique of case studies by application of mathematical programming models is taught using the various kinds of materials and examples.

Keyword) Economic activities, Structure and function, Mathematical programming model

Goal) To understand the mutual relationship of economic activities, empirically explain them using the mathematical programming model and evaluate the model.

Schedule) 1. Guidance and purpose of this subject 2. Examples of economic activities 1 3. Examples of economic activities 2 4. Examples of economic activities 3 5. Change in structure of economic society 1 6. Change in structure of economic society 2 7. Function of economic society 1 8. Function of economic society 2 9. Mutual relationship of economic activities 1 10. Mutual relationship of economic activities 2 11. Concept of mathematical programming model 12. Technique of model construction 13. Modelling of economic activities 1 14. Modelling of economic activities 2 15. Evaluation of modelling

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169569>

Contact)

⇒ Kondo (ECO602, +81-88-656-7339, kondo@eco.tokushima-u.ac.jp)

Science and Technology Studies

Kunio Goto · PART-TIME LECTURER / MOMOTAMA GAKUIN UNIVERSITY

Target) Students are expected to learn the minimum essentials of science and technology studies and their functions in contemporary society.

Outline) Science and technology studies deal with science and technology research and its outcomes by means of various methods of social sciences and humanities. They have emerged in 1930s when social importance of science and technology became evident. Since 1970s, the science and technology studies have developed as mission oriented learning for government policy, business administrations and civic activity. In the first half of this lecture, the outline of the science technology studies is given. The involved topics are philosophy, history, sociology, and economics of science and technology.

Style) Lecture

Goal)

1. Understanding of the minimum essentials of the science and technology studies
2. Understanding of the social meaning of each student's research

Schedule) **1.** Introduction: A brief history of the science and technology studies since 1930s **2.** Philosophical understanding of science: (1) From Greek Classics to German Classical Philosophy **3.** Philosophical understanding of science: (2) Rise of the philosophy of science the early twentieth century **4.** Historical investigation of science and technology : (1) Emergence of the modern Western science **5.** Historical investigation of science and technology : (2) From the Power Revolution of the Medieval West to the modern the Industrial Revolution **6.** Sociology of science and technology: (1) Normative structure and Paradigm **7.** Sociology of science and technology: (2) Social constructivism and Laboratory life analysis **8.** Economics and science and technology : (1) Market and planning economies **9.** Economics and science and technology : (2) Innovation and economic policy **10.** The 1950s model of science and technology policy in the Cold War **11.** Knowledge industrial society since 1970s: (1) Environmental problem and energy problem **12.** Knowledge industrial society since 1970s: (2) Computer science and Information society **13.** Policy issues in the transform of industrial structure and role of university **14.** Science and technology in the global economy since 1990s **15.** Concluding remark: Science, technology and society in the future

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169536>

Contact)

⇒ Kawamura (410 Chem Bldg, +81-88-656-7401, kawamura@chem.tokushima-u.ac.jp)

Management Theory of New Business

2 units

Vice chairperson of School Affairs Committee , Faculty of Engineering
First-line men with experience of practical business · PART-TIME LECTURER

Target) New business is the word which means the business to make the most of technical knowledge, technology, the new idea and which is developed creatively, and that main bearer is the enterprise called a venture. There is a purpose of this class in providing the knowledge which is necessary, and know-how and a spirit so that a taking lecture student may establish a venture business.

Outline) The regeneration of the Japanese society with the vitality is being asked. Government enforced "a university venture 3 years 1000 companies plan" over Heisei 14-the 16th year. Though that goal was almost attained, it is very important to promote entrepreneur education continuously from now on. Tokushima Prefecture supports this class based on the recognition done like this, and it is established.

Requirement) The person whom the one with the classroom is constructed by the class start time in the person who doesn't learn the unit of "Introduction to new business" in the college, and a group are organized, and it is limited to the person with the intention to make a business plan, and taking lecture is recognized.

Notice) Being late and a whisper in class should be prohibited strictly. Be careful over and again because it should dispose of exit and future taking lecture may not be recognized when it is wicked.

Goal) Learning of the necessary knowledge to establish venture business, and the ability which can make a business plan.

Schedule) **1.** Guidance **2.** What is the new business? **3.** Keynote lecture **4.** Theory of a stand-alone version venture success **5.** The law knowledge which is necessary for entrepreneur **6.** Fund-raising and capital policy **7.** Indirect finance **8.** Direct finance **9.** The basis of the company management **10.** The elementary knowledge of the business accounting **11.** The point of the business plan preparation **12.** Management strategy and marketing **13.** Product development and intellectual property **14.** Business plan preparation practice **15.** Examination **16.** Business plan announcement meeting

Evaluation Criteria) It is evaluated by the presentation (40%) of the written examination (60%) and the business plan. And, the presentation of the written examination and the business plan is decided to be recognized only for the taking lecture student who attended it for 2/3 and more of the classes that it is opened.

Textbook) The summary is distributed every time.

Reference) Several are introduced in the school hours.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169607>

Student) he person who hasn't learned the unit of the new business outline that it is opened with this learning in all the students enrolled in the graduate school yet is made the target. The number of completion people may be restricted in the method such as a lottery in case of a taking lecture applicant many. As for the details, an applicant for taking lecture is to follow those directions because the notice which showed attention in taking lecture is done.

Contact)

⇒ Vice chairperson of School Affairs Committee , Faculty of Engineering

Note) The man of business that it is active in the forefront every time, and an adviser are invited as an instructor, and working knowledge is provided for theory plus practice in this class from the specialist's position. This class is the thing which is useful enough even if it is taken to the person who aims at a general enterprise and a laboratory, the employment to the self-governing body and so on.

Introduction to Intellectual Property

2 units

Tohru Sakai · PART-TIME LECTURER / (財)工業所有権協カセンター, Juichiroh Osame · PART-TIME LECTURER

Akio Fujii · PART-TIME LECTURER / INTELLECTUAL PROPERTY OFFICE, Yasushi Toyosu · PART-TIME LECTURER, Kuniaki Kubota · PART-TIME LECTURER

Target) Understanding the basic systems and importance of protection and practical use of intellectual property based on some examples.

Outline) It is necessary for a working staff in a company, a university, etc., in a future. It is introduced the importance to protect and practical use of intellectual property at governments , industrial circles, universities and institutes in Japan using potential on scientific techniques. This lecture is treated the basic systems of protection and practical use of intellectual property particularly based on strategy and invasion of patent in an organization such as company, university, etc.

Style) Lecture

Keyword) Intellectual property, Patent Law, Protect and Use of Intellectual Property

Relational Lecture) "Introduction to Intellectual Property"(0.5)

Requirement) No requirement

Notice) It is necessary to be present at two concentrated lecture.

Goal)

1. Understanding concept of intellectual property right.
2. Understand the Patent Act, the Trademark Act, the Design Act and the Copyright Act.
3. Understanding on basical practical use of intellectual property.

Schedule) **1.** Concept of intellectual property(Sakai) **2.** Outline of intellectual property(Patent and Trademark)(Sakai) **3.** Outline of intellectual property(Design and Copyright)(Sakai) **4.** Patent, invention and invasion of patent (Sakai) **5.** Management of intellectual property and use (Sakai) **6.** A way of research and development and intellectual property in a future(Sakai) **7.** The midterm examination and its comment for Target and **8.** History of system of intellectual property (Osame) **9.** International trend of system of intellectual property (Osame) **10.** Acquisition method of intellectual property right(Fujii)

11. Use of intellectual property(Watanabe) 12. Stetragy of intellectual property on development of techniques(Y.Higuchi) 13. Effective intellectual property in development of techniques (Kubota) 14. Special lecture on a use of intellectual property by a chief executive officer(1) 15. Special lecture on a use of intellectual property by a chief executive officer(2)

Evaluation Criteria) Passing mark is over 60% on the examinations and the reports for each reaching level, respectively.

Textbook) To be used textbooks made by lecturers.

Reference) Nobuhiro Nakayama:Titeki Shoyuken, Nikkan Kohgyo Shinbunsha

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169591>

Student) For the course students and other graduate school students.

Contact)

⇒ Sakai (+81-3-5600-2631,)

⇒ Mizuguchi (A501, +81-88-656-7349, mizuguch@ce.tokushima-u.ac.jp) (Office Hour: Monday,11:00-12:30, 17:00-18:00)

Presentation Method (D)

2 units

Target) Poster and oral presentations, and journal publications are common means of appealing the research work in various scientific and technological disciplines. It's undoubtedly important for activating the research work. The lecture is intending for students to learn most efficient way to appeal their findings and discussions in scientific community.

Outline) Credits are acknowledged to the students who are supervised to give conference speech by themselves and do actually the lectures.

Goal) The lecture is aiming at having knowledge and experience of the presentaion in international conferences.

Evaluation Criteria) Students' achievement is evaluated by portfolios submitted showing the progress in preparation of international conferences as well as by presentation records.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169628>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Internship (D)

2 units

Target) This program is provided to increase knowledge and experience in the actual industrial technology in various fields. Through the practical experience, the program will allow students to become discerning and well-balanced researchers or engineers with deeper understanding of technological societies.

Outline) Credits are acknowledged to students who experienced the internship in companies and/or government offices. Their fulfilment is evaluated by activity reports during internship.

Goal)

1. Grasping internal systems of a company, management, action and strategy to achieve the company's goal. (2)
2. Understanding human relationship and communicative manner in a working society and a company.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by supervisors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169542>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Venture Business (D)

2 units

Target) Aims of the lecture are doing collaborative works with private enterprises and establishing venture businesses through such works.

Outline) The lecture is aiming at founding a venture business company as well as establishing collaborative research works with private enterprises. It's worth to apply their accomplishment to an actual society beyond the range of a laboratory work.

Goal) Objective of the lecture is to have experience and knowledge of collaborative works with private enterprises and to mature the works to venture businesses.

Evaluation Criteria) Credits are acknowledged in case of doing collaborative works with enterprises and/or maturing them to venture businesses. Handouts, reports, and presentation materials, etc. are evaluated to approve credits.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169539>

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Long-term Internship (D)

6 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This program is provided long-term internship in the actual industrial companies and so on, doing a joint study between companies and university on practical problems proposed by the company and practical experience of management of technologies. Through the long-term internship, the program will allow students to become a engineer with a core role in researches and companies

Outline) Credits are acknowledged to students who experienced the internship in companies or government offices of 270 hours during three months or more and presentation to executive officer of the company. Their fulfillment is evaluated by activity reports during internship and appraisal and interviewed report from a mentor.

Goal) Grasping abilities for practical engineers by studying activities in company and so on.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by mentors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169697>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Nishida (K409, +81-88-656-7630, nishida@kg.tokushima-u.ac.jp)

⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

⇒ Morimoto (A407, +81-88-656-7619, emi.morimoto@kg.tokushima-u.ac.jp) (Office Hour: 月～木(10時～15時))

Note) Students who resister the coop-education program for "Pai-shape" engineers with sense for management of technology, are able to have a grant-in-aid for travel and so on. Ask committee members of long-term internship in your course or coordinators of this program.

Advanced Lecture in Theory of Business Models

2 units

Tatsuya Deguchi · PART-TIME LECTURER, Kenichi Yasumuro · PART-TIME LECTURER, Katsuo Touma · PART-TIME LECTURER
Takahide Yamaguchi · PART-TIME LECTURER, Shingou Nishii · PART-TIME LECTURER

Target) There is a purpose of this class in providing the knowledge which is necessary, and know-how so that students may achieve a business model in establishing enterprises based on the lecture of "Management Theory of New Business", and in making students understood the profit generating stream by studying on the frame work of companies in several business fields.

Outline) Business Model is a remarkable term in modern economic and organizational theories in these days but describes a broad range of definitions. In this lecture, Business Model is defined as "System which converts technology and know how into profit for the purpose of customers' satisfaction" and aims at providing the ability for the design of profitable system, by learning cost issues in establishing business strategies of companies.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business"

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of business model design is learned
2. Understanding of the concept of business model by case study analysis are appreciated
3. It learns forming ability of business plan through the case study on business models

Schedule) 1. Guidance 2. Keynote lecture "Business Model Thinking" 3. Questions and answers, Discussions 4. Lecture "Theory of Business Models" 5. Lecture "Design principles of Business Models" 6. Lecture "Evaluation of Business Models" 7. Case Study "Business Model in a R&D company" 8. Case Study "Business Model in a manufacturing industrial company" 9. Case Study "Business Model in a company of service industry" 10. Case Study "Business Model in a company of information industry" 11. Business plan practice, Present situation analysis and alternatives. 12. Business plan practice, Concept ad design of business. 13. Business plan practice, Financial analysis . 14. Business plan practice, Concluding and submitting 15. Presentation(1) of Business plan practice. 16. Presentation(2) of Business plan practice, Comments and summary.

Evaluation Criteria) Participation in class(20%) Group work and its report(80%)

Textbook) Ken-ichi Amuro and Study Group of Business model "Case Book: Business Model Thinking" Bunshindo

Reference) Several are introduced in class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169696>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Contact)

- ⇒ Tatsuya Deguchi (Wakayama University)
- ⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

Note) This class is supported by Tokushima Prefecture Government

Management of Technology

2 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) About the production management of the automobile industry, it is understood variously from the point of view such as "research and development", "production management", "purchasing" and "quality control" "marketing" and "cross-cultural management".

Outline) It learns about the production management. This time, "the automobile industry" specially takes up the production management of "Honda Motor Co.,Ltd. (following Honda)" even of that in the case, and the class to appreciate that importance with ranking of technology in management is taken.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business".

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of management is learned.
2. Ranking of the technology in management and that importance are appreciated.
3. It learns how to solve the various problems which always occur in the spot of the management through the case study and the business game.

Schedule) 1. Guidance 2. Lecture "What in Management of Technology?" 3. Case report "Research and development of Honda" 4. Case study "Plan an overseas factory." "A new car development order" 5. Lecture "Production management and purchasing" 6. Lecture "Quality control" 7. Case report "The production management of Honda," "The supply chain management of Honda" 8. Case study "Plan an overseas factory." 9. Case report "The quality control of Honda" 10. Case study "Don't make material defects flare up again." 11. Lecture "Marketing strategy" 12. Lecture "Cross-cultural management" 13. Case report "Around the products project of Honda - the two-wheeled vehicle" 14. Case report "The

path of internationalization of Honda" 15. Case report "The personnel management of Honda" 16. Summary and questions and answers

Evaluation Criteria) It is evaluated in the remark (20%) in class and the middle, end of a term report (80% in total).

Textbook) It doesn't specially use. The summary and so on is distributed every time.

Reference) Several are introduced in class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169698>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the doctor former term course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Note) This class invites seven Honda alumnuni who did work in "research and development", "production management", "purchasing", "quality control", "marketing", "cross-cultural management", and so on as an instructor, and it is the class to do case report. Even if it is seen nationwide, the trial done like this is very rare, and it is a precious class. And, an applicant for taking lecture is to attend it in the guidance to hold it in advance. A schedule is indicated separately.

Biofunctional Design of Biomolecules

2 units

Hitoshi Hori · PROFESSOR / BIOLOGICAL FUNCTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Yoshihiro Uto · ASSOCIATE PROFESSOR / BIOLOGICAL FUNCTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) Advanced review of concepts and strategies in biofunctional design of biomolecules based on philosophy of biomolecular mimetics.

Outline) Advanced conceptual and bioengineering-based strategic skills in biofunctional design of biomolecules such as pharmaceuticals and biologically active compounds as molecular descriptors of biomolecular mimetics, and then advanced case study of pharmaceuticals designed with strategic interests.

Style) Lecture

Keyword) biofunctional design, biomolecular mimetics, structure-activity-relationship

Goal)

1. Advanced medicinal-chemistry based skills for biofunctional design of biomolecules based on biomolecular mimetics.
2. Advanced drug-design skills for drug discovery based on applied medicinal chemistry.
3. Advanced biomedical ethical skills for drug discovery for human disease.

Schedule) 1. Overview of biofunctional design of biomolecules 2. Biomolecular mimetics and molecular descriptors 3. Biofunctional design of biomolecules, such as pharmaceuticals and biologically active compounds, as molecular descriptors 4. Medicinal chemistry as a science of biofunctional design of biomolecules. Subject review report-1 5. Medicinal chemistry: discovery of a lead compound 6. Medicinal chemistry: structure-activity relationship. Subject review report-2 7. Discussion on subject review report-1 and -2 8. Medicinal chemistry: pharmacophore and pharmacophoric descriptors 9. Medicinal chemistry: pharmacodynamics & pharmacokinetics 10. Medicinal chemistry: clinical study. Subject review report-3 11. Discussion on subject review report-3 and biomedical ethics 12. Medicinal chemistry: case study 1 (donepezil HCl) 13. Medicinal chemistry: case study 2 (mevalotin) 14. Medicinal chemistry: case study 3 (our efforts for drug discovery) Subject review report-4 15. Discussion on subject review report-4 and biomedical ethics 16. Discussion. Summary of the course

Evaluation Criteria) Subject review report 1-4 counts 100%.

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169584>

Contact)

- ⇒ Hori (M821, +81-88-656-7514, hori@bio.tokushima-u.ac.jp) (Office Hour: Monday 11:55-12:50)

Molecular Microbiology

2 units

Hiroki Kourai · PROFESSOR / BIOLOGICAL FUNCTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Hideaki Maseda · ASSOCIATE PROFESSOR / BIOLOGICAL FUNCTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) This course will cover in depth topics related to current research in the fields of molecular microbiology especially environmental harmful microbial control field.

Outline) This course describes environmental harmful microbes, microbial degradation and microbial deterioration, microbial corrosion of metal. Further, new microbial control methodology and new microbial molecular design are lectured.

Style) Lecture

Keyword) Environmental harmful microbes, Microbial degradation, Microbial deterioration, Antimicrobial molecular design

Fundamental Lecture) "Advanced Microbiological Engineering"(1.0, ⇒p.44)

Relational Lecture) "Biomolecular Design"(1.0, ⇒p.44)

Requirement) Students are required to have a good understanding of undergraduate- and postgraduate-level microbiology and organic chemistry.

Notice) Students will be required to read recent research articles on the topics under discussion.

Goal)

1. To understand an outline of environmental harmful microbes.
2. To understand methodology of new microbial molecular design.

Schedule) 1. Overview of environmental microbiology 2. Summary of environmental harmful microbiology 3. Environmental harmful microbiology: gram(+)bacteria 4. Environmental harmful microbiology: gram(-)bacteria 5. Environmental harmful microbiology: molds 6. Environmental harmful microbiology: yeasts 7. Environmental harmful microbiology: virus 8. Subject report-1 9. Overview of organic antimicrobial agents 10. Overview of inorganic antimicrobial agents 11. Overview of antibiotics 12. Subject report-2 13. Quantitative structure-activity relationship 14. Methodology of new organic antimicrobial agents 15. Methodology of new inorganic antimicrobial agents 16. Subject report-3

Evaluation Criteria) Subject review report 1-3 counts 100%

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169618>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Kourai (M813, +81-88-656-7408, kourai@bio.tokushima-u.ac.jp) (Office Hour: Friday 16:20-17:20)
 ⇒ Maseda (生物棟 814, +81-88-656-7524, maseda@bio.tokushima-u.ac.jp) (Office Hour: Friday 16:20-17:50)

Engineering of Genetic Information

2 units

Sumihare Noji · PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
 Hideyo Ohuchi · ASSOCIATE PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
 Yoshinori Matsuo · PROFESSOR / FACULTY OF INTEGRATED ARTS AND SCIENCES

Target) To obtain information on recent genetic studies

Outline) Lectures on Advanced research on analysis of genetic information of Drosophila, mouse, and human.
 2) Analysis of structure and function of the genes based on the genetic information: gene expression, loss of function and gain of function 3) Genetic engineering to create new biological functions. 4) Application of the genetic engineering to improve biological functions. 5) Advanced research on developmental and regeneration biology, focusing on limb development and regeneration. 6) Application of the developmental and regeneration biology to improve biological functions. 7) Recent topics of genetic engineering. 8) Recent topics of developmental biology and its application.

Style) Portfolio

Keyword) genom science, molecular biology, genetic engineering

Relational Lecture) "Cell Signaling System"(0.5, ⇒p.124), "Biofunctional Engineering"(0.5, ⇒p.125), "Technology of Enzyme Functions"(0.5, ⇒p.124)

Requirement) N/A

Notice) N/A

Goal) To understand recent information on genetics

Schedule) 1. Recent advance in genetics, insects 2. Recent advance in genetics, invertebrates 3. Recent advance in genetic engineering, invertebrates 4. Recent advance in genetics, chicken 5. Recent advance in genetic engineering, mouse 6. Recent advance in genetics, mouse 7. Recent advance in genetic engineering, mouse 8. report for evaluation 9. Recent advance in genetics, human 10. Recent advance in genetic engineering, human 11. Recent advance in genetics, plants 12. Recent advance in genetic engineering, plants 13. Recent advance in RNA engineering 14. Recent advance in detection of gene expression 15. Recent advance in recent topics 1 16. Recent advance in recent topics 2 17. Final report

Evaluation Criteria) Evaluate two reports (50% each)

Textbook) N/A

Reference) Handouts

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169526>

Student) Able to be taken by student of other department

Contact)

- ⇒ Noji (G803, +81-88-656-7528, noji@bio.tokushima-u.ac.jp) (Office Hour: Monday 15:30-17:00)

Cell Signaling System

2 units

Akihiko Tsuji · PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
 Masami Nagahama · ASSOCIATE PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) This class introduces signaling system which regulates cell functions.

Outline) Structure of signaling molecule and cell signaling system are introduced.

Style) Lecture

Keyword) Growth/differentiation factor, Receptor, Signal transduction

Fundamental Lecture) "Cell Biology"(0.5), "Biochemistry 2"(0.3), "Advanced Biochemistry"(0.3, ⇒p.42)

Relational Lecture) "Life Science"(0.2, ⇒p.120)

Requirement) Students are required to have a good understanding of undergraduate-level cell biology and biochemistry.

Goal)

1. Understanding of regulatory mechanism of biological activity of signaling molecule
2. Understanding of function of receptor and intracellular signaling system

Schedule) 1. Introduction of cell signaling system 2. Cell structure and function of organelle 3. Post-translational modification of signaling molecule 4. Structure of processing enzyme 5. Function and regulation of processing enzyme 6. Secretion of signaling molecule 7. Structure and function of receptor 8. Protein kinase and protein phosphatase 9. Transcriptional regulation 10. Regulation of cell function by AAA protein (1) 11. Regulation of cell function by AAA protein (2) 12. Recent research on signaling molecule (1) 13. Recent research on signaling molecule (2) 14. Significance of signaling molecule as target for drug design (1) 15. Significance of signaling molecule as target for drug design (2) 16. Preparation of report

Evaluation Criteria) Evaluation by report

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169555>

Contact)

- ⇒ Tsuji (G710, +81-88-656-7526, tsuji@bio.tokushima-u.ac.jp) (Office Hour: Monday 16:20-17:50)

Technology of Enzyme Functions

2 units

Yoshitoshi Nakamura · PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To understand recent progress in the research of enzyme functions

Outline) Genetic recombination, development and control of bioreactor for increasing enzyme functions

Style) Portfolio

Requirement) /

Goal) To understand recent progress in the research of genetic recombination, development and application of bioreactor for increasing enzyme functions

Schedule) 1. Breeding and cultivation of genetic recombinant yeast having glucoamylase activity 2. Breeding and cultivation of glucoamylase-producing recombinant yeast with inactivation of MAT locus 3. Mathematical model for growth process of glucoamylase-producing recombinant yeast 4. Mathematical model for growth process of immobilized glucoamylase-producing recombinant yeast 5. Process analysis of continuous alcohol fermentation with glucoamylase-producing recombinant yeast 6. Recombinant Escherichia coli having over expression system of cloned gene for effective production of glucoamylase 7. Efficient production of recombinant protein using salt-out effect protecting against proteolytic degradation 8. Efficient production of recombinant protein using bioreactor with membrane filtration 9. Mathematical model of diauxic growth based on synthesis mechanism of inducible enzyme 10. Efficient production of inducible enzyme by exchange of substrates 11. Stability analysis of steady state in a continuous culture with diauxic growth 12. Mathematical model of immobilized cell culture with diauxic growth 13. Screening and cultivation of basidiomycete fungi having enzyme degrading undegradable aromatic compounds 14. Efficient production of enzyme degrading undegradable aromatic compounds by immobilized fungi 15. Development and application of bioreactor with enzyme degrading undegradable aromatic compounds

Evaluation Criteria) Report (assignments count 100%)

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169553>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Nakamura (720, +81-88-656-7518, ynakamu@bio.tokushima-u.ac.jp) (Office Hour: 水曜日 17:00-18:00)

Biofunctional Engineering

2 units

Hitoshi Matsuki · PROFESSOR / BIOLOGICAL FUNCTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) Biological membranes play an important role in structure formation and function revelation of cells. Characteristic properties owned by lipid membranes are mainly described and the structure and function of biological membranes are reviewed.

Outline) This lecture describes fundamental matters concerning self-association of biomolecules such as structure of water and hydrophobic effect, properties for molecular aggregates of amphiphilic molecules, after that various structure changes for molecular aggregates formed by lipids such as phase transitions, polymorphism, non-bilayer structure and domain formation are explained. Further, significant functions revealed in biological membranes like transport phenomena and mechanisms of drug action and so on are lectured. Portfolio lessons are also adapted depending on students.

Style) Lecture in combination with Portfolio

Keyword) Biological membrane, Lipid, Molecular aggregate, Membrane structure, Membrane function

Fundamental Lecture) “Biochemical Thermodynamics”(1.0, ⇒p.42), “Advanced Biophysical Chemistry”(1.0, ⇒p.43)

Requirement) Students are required to have a good understanding of undergraduate- and postgraduate-level physical chemistry and biophysical chemistry and related subjects.

Goal)

1. To understand the structures and nature of molecular aggregates formed by lipids, which are components of biological membranes.
2. To understand the functions revealed by biological membranes such as material transport, signal transduction and drug action.

Schedule) 1. Structures of biological membranes (1) structure of water and hydrophobic interaction 2. Structures of biological membranes (2) self-association of amphiphilic molecules 1: monolayers 3. Structures of biological membranes (3) self-association of amphiphilic molecules 2: micelles 4. Structures of biological membranes (4) bilayer structure and phase transitions of lipid membranes 5. Structures of biological membranes (5) stability and polymorphism of lipid membranes 6. Structures of biological membranes (6) non- bilayer structure of lipid membranes 7. Structures of biological membranes (7) mixed lipid membranes and domain formation 8. Structures of biological membranes (8) fluidization and

dynamics of lipid membranes 9. Structures of biological membranes (9) surface and membrane potentials 10. Functions of biological membranes (1) molecular recognition of lipid membranes 11. Functions of biological membranes (2) ion transport (passive and active transport) 12. Functions of biological membranes (3) ion channel and nerve conduction 13. Functions of biological membranes (4) mechanisms of drug action (specific binding) 14. Functions of biological membranes (5) mechanisms of drug action (non-specific binding) 15. Functions of biological membranes (6) cell functions and signal transduction 16. Report preparation for structures and functions of biological membranes

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169583>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Matsuki (G609, +81-88-656-7513, matsuki@bio.tokushima-u.ac.jp) (Office Hour: Friday 16:20-17:50)

Molecular Pathogenic Microbiology

2 units

Hideaki Nagamune · PROFESSOR / BIOLOGICAL FUNCTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Toshifumi Tomoyasu · ASSOCIATE PROFESSOR / BIOLOGICAL FUNCTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) This class aims to understand the latest findings on molecular feature and application of virulence factors expressed in pathogenic microorganisms.

Outline) The latest findings on virulence factors concerned with infectious diseases by pathogenic microorganisms are introduced in this class. Assignments on the introduced topics are set and marked in portfolio system.

Style) Portfolio

Keyword) pathogenic microorganism, virulence factor, infection

Relational Lecture) “Molecular Microbiology”(0.9, ⇒p.123)

Requirement) Students are required to have a good understanding of undergraduate-level of microbiology and related subjects

Goal)

1. To understand the latest molecular information on virulence factors of pathogenic microorganisms
2. To understand the application technology of microbial virulence factors in molecular level

Schedule) 1. Bacterial toxins 1: CDC pore-forming toxins 2. Bacterial toxins 2: other pore-forming toxins 3. Bacterial toxins 3: neuron-directional enzymatic toxins 4. Bacterial toxins 4: gastrointestinal tissue-directional enzymatic toxins 5. Bacterial toxins 5: translational step-directional enzymatic toxins 6. Bacterial toxins 6: superantigens 7. Plasmids carrying antimicrobial-resistant genes 8. Fungal toxins 1: small molecular toxins 9. Fungal toxins 2: protein toxins 10. Other Bacterial virulence factors 1: adherence factors 11. Other Bacterial virulence factors 2: enzymes 12. Other Bacterial virulence factors 3: secretion systems 13. Viral virulence factors 1: adherence factors 14. Viral virulence factors 2: enzymes 15. Viral virulence factors 3: transcriptional factors

Evaluation Criteria) Assignments count 100%(Goal 1 and 2).

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169631>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Nagamune (G707, +81-88-656-7525, nagamune@bio.tokushima-u.ac.jp) (Office Hour: Monday 16:20-17:50)

Advanced Exercise on Biological Science and Technology

2 units

Teacher of course

Target) To obtain broad information in addition to information on own field

Outline) To learn recent biological technology and experimental techniques

Style) Portfolio

Keyword) Biology, Technology, Experiment

Relational Lecture) “Engineering of Genetic Information”(0.5, ⇒p.124), “Technology of Enzyme Functions”(0.5, ⇒p.124), “Cell Signaling System”(0.5, ⇒p.124)

Requirement) N/A

Notice) N/A

Goal) To understand recent biology and biotechnology

Schedule) To learn recent biotechnology under direction of a teacher working on bioengineering

Evaluation Criteria) Evaluated with portfolios

Textbook) Not specified

Reference) Provided by teachers

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169587>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Administration Office(M703)

Advanced Research on Biological Science and Technology

2 units

Target) To obtain broad information on recent engineering

Outline) To research a theme in a technology, which is different from the main technology in your field.

Style) Portfolio, Lecture in combination with Portfolio, Lecture and exercise

Keyword) Engineering, Technology, Different field

Requirement) N/A

Notice) N/A

Goal) To learn a recent technology, which is different from the main technology in your field

Schedule) Choose a theme on technology or engineering, which is different from that in your field.

Evaluation Criteria) Evaluated with portfolio or examination

Textbook) Ask to teachers

Reference) Prints

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169588>

Student) Able to be taken by only specified class(es)

Contact)

⇒ 指導教員

Earth and Life Environmental Engineering — Ecosystem Engineering

SYLLABUS OF SUBJECTS

● Integrated Subjects

Human Factors ...Yoshida	127
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● Specialized Exercise and Experiments

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Human Factors

2 units

Atsuya Yoshida · PART-TIME LECTURER / FACULTY OF INTEGRATED ARTS AND SCIENCES

Target) The objective of this class is to provide students with sufficiently thorough appreciation of the many facets of the human factors discipline so that they may make use of it to their own doctoral works.

Outline) This class offers a broad and comprehensive overview of the human factors/ergonomics discipline with four areas of emphasis, (1) historical review of human factors research, (2) human physical, perceptual and cognitive capabilities and limitations, (3) application of human factors research data in

design, especially in the interface design of computer-based systems, and (4) discussion about the relationship between the designed system (technology) and people.

Schedule) 1. What is Human Factors 2. Historical Overview of Human Factors 3. Multi-Disciplinary Aspect of Human Factors 4. Health and Safty Issue of Human Factors 5. Human Psychological Capability 6. Task Analysis 7. Human Error 8. Universal Design 9. Cognitive Artifact 10. Visibility and Affordance 11. Human-Computer Interaction 12. Human Information Processing 13. Knowledge and Mental Model 14. Usability Paradigms and Principles 15. Evaluation and Testing 16. Making system that makes us smart

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169608>

Life Science

2 units

Hiroshi Takagi · PART-TIME LECTURER / FUKUI PREFECTURAL UNIVERSITY

Akihiko Tsuji · PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) Understanding of significance of protein in biotechnology

Outline) Basics of structure, function and application of protein are introduced

Style) Lecture

Keyword) Protein, Enzyme, Biotechnology

Goal)

1. Understanding of multiple functions of proteins
2. Understanding of principle of protein engineering and its application

Schedule) 1. Introduction of life science 2. History of life science 3. Structure and function of DNA and RNA 4. mRNA is a template of protein 5. Duplication of DNA 6. Regulation of protein expression 7. Human Genetics 8. Genetic disease 9. DNA diagnosis 10. Structure and function of protein 11. Principle of gene technology (1) 12. Principle of gene technology (2) 13. Protein engineering 14. Future of life science (1) 15. Future of life science (2) 16. Preparation of report

Evaluation Criteria) Evaluation by report

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169586>

Contact)

⇒ Tsuji (G710, +81-88-656-7526, tsuji@bio.tokushima-u.ac.jp) (Office Hour: Monday 16:20-17:50)

Social Science

2 units

Shuzo Goto · PART-TIME LECTURER / SHIKOKU UNIVERSITY

Target) The mutual relationship of economic activities, the structure and function of economic society, and the concept and technique of mathematical programming modelling are lectured.

Outline) Not only the mutual relationship of economic activities is explained from domestic and international points of view, but also the technique of case studies by application of mathematical programming models is taught using the various kinds of materials and examples.

Keyword) Economic activities, Structure and function, Mathematical programming model

Goal) To understand the mutual relationship of economic activities, empirically explain them using the mathematical programming model and evaluate the model.

Schedule) 1. Guidance and purpose of this subject 2. Examples of economic activities 1 3. Examples of economic activities 2 4. Examples of economic activities 3 5. Change in structure of economic society 1 6. Change in structure of economic society 2 7. Function of economic society 1 8. Function of economic society 2 9. Mutual relationship of economic activities 1 10. Mutual relationship of economic activities 2 11. Concept of mathematical programming model 12. Technique of model construction 13. Modelling of economic activities 1 14. Modelling of economic activities 2 15. Evaluation of modelling

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169569>

Contact)

⇒ Kondo (ECO602, +81-88-656-7339, kondo@eco.tokushima-u.ac.jp)

Science and Technology Studies

Kunio Goto · PART-TIME LECTURER / MOMOYAMA GAKUIN UNIVERSITY

Target) Students are expected to learn the minimum essentials of science and technology studies and their functions in contemporary society.

Outline) Science and technology studies deal with science and technology research and its outcomes by means of various methods of social sciences and humanities. They have emerged in 1930s when social importance of science and technology became evident. Since 1970s, the science and technology studies have developed as mission oriented learning for government policy, business administrations and civic activity. In the first half of this lecture, the outline of the science technology studies is given. The involved topics are philosophy, history, sociology, and economics of science and technology.

Style) Lecture

Goal)

1. Understanding of the minimum essentials of the science and technology studies
2. Understanding of the social meaning of each student's research

Schedule) **1.** Introduction: A brief history of the science and technology studies since 1930s **2.** Philosophical understanding of science: (1) From Greek Classics to German Classical Philosophy **3.** Philosophical understanding of science: (2) Rise of the philosophy of science the early twentieth century **4.** Historical investigation of science and technology : (1) Emergence of the modern Western science **5.** Historical investigation of science and technology : (2) From the Power Revolution of the Medieval West to the modern the Industrial Revolution **6.** Sociology of science and technology: (1) Normative structure and Paradigm **7.** Sociology of science and technology: (2) Social constructivism and Laboratory life analysis **8.** Economics and science and technology : (1) Market and planning economies **9.** Economics and science and technology : (2) Innovation and economic policy **10.** The 1950s model of science and technology policy in the Cold War **11.** Knowledge industrial society since 1970s: (1) Environmental problem and energy problem **12.** Knowledge industrial society since 1970s: (2) Computer science and Information society **13.** Policy issues in the transform of industrial structure and role of university **14.** Science and technology in the global economy since 1990s **15.** Concluding remark: Science, technology and society in the future

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169536>

Contact)

⇒ Kawamura (410 Chem Bldg, +81-88-656-7401, kawamura@chem.tokushima-u.ac.jp)

Management Theory of New Business

2 units

Vice chairperson of School Affairs Committee , Faculty of Engineering
First-line men with experience of practical business · PART-TIME LECTURER

Target) New business is the word which means the business to make the most of technical knowledge, technology, the new idea and which is developed creatively, and that main bearer is the enterprise called a venture. There is a purpose of this class in providing the knowledge which is necessary, and know-how and a spirit so that a taking lecture student may establish a venture business.

Outline) The regeneration of the Japanese society with the vitality is being asked. Government enforced "a university venture 3 years 1000 companies plan" over Heisei 14-the 16th year. Though that goal was almost attained, it is very important to promote entrepreneur education continuously from now on. Tokushima Prefecture supports this class based on the recognition done like this, and it is established.

Requirement) The person whom the one with the classroom is constructed by the class start time in the person who doesn't learn the unit of "Introduction to new business" in the college, and a group are organized, and it is limited to the person with the intention to make a business plan, and taking lecture is recognized.

Notice) Being late and a whisper in class should be prohibited strictly. Be careful over and again because it should dispose of exit and future taking lecture may not be recognized when it is wicked.

Goal) Learning of the necessary knowledge to establish venture business, and the ability which can make a business plan.

Schedule) **1.** Guidance **2.** What is the new business? **3.** Keynote lecture **4.** Theory of a stand-alone version venture success **5.** The law knowledge which is necessary for entrepreneur **6.** Fund-raising and capital policy **7.** Indirect finance **8.** Direct finance **9.** The basis of the company management **10.** The elementary knowledge of the business accounting **11.** The point of the business plan preparation **12.** Management strategy and marketing **13.** Product development and intellectual property **14.** Business plan preparation practice **15.** Examination **16.** Business plan announcement meeting

Evaluation Criteria) It is evaluated by the presentation (40%) of the written examination (60%) and the business plan. And, the presentation of the written examination and the business plan is decided to be recognized only for the taking lecture student who attended it for 2/3 and more of the classes that it is opened.

Textbook) The summary is distributed every time.

Reference) Several are introduced in the school hours.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169607>

Student) he person who hasn't learned the unit of the new business outline that it is opened with this learning in all the students enrolled in the graduate school yet is made the target. The number of completion people may be restricted in the method such as a lottery in case of a taking lecture applicant many. As for the details, an applicant for taking lecture is to follow those directions because the notice which showed attention in taking lecture is done.

Contact)

⇒ Vice chairperson of School Affairs Committee , Faculty of Engineering

Note) The man of business that it is active in the forefront every time, and an adviser are invited as an instructor, and working knowledge is provided for theory plus practice in this class from the specialist's position. This class is the thing which is useful enough even if it is taken to the person who aims at a general enterprise and a laboratory, the employment to the self-governing body and so on.

Introduction to Intellectual Property

2 units

Tohru Sakai · PART-TIME LECTURER / (財)工業所有権協カセンター, Juichiroh Osame · PART-TIME LECTURER

Akio Fujii · PART-TIME LECTURER / INTELLECTUAL PROPERTY OFFICE, Yasushi Toyosu · PART-TIME LECTURER, Kuniaki Kubota · PART-TIME LECTURER

Target) Understanding the basic systems and importance of protection and practical use of intellectual property based on some examples.

Outline) It is necessary for a working staff in a company, a university, etc., in a future. It is introduced the importance to protect and practical use of intellectual property at governments , industrial circles, universities and institutes in Japan using potential on scientific techniques. This lecture is treated the basic systems of protection and practical use of intellectual property particularly based on strategy and invasion of patent in an organization such as company, university, etc.

Style) Lecture

Keyword) Intellectual property, Patent Law, Protect and Use of Intellectual Property

Relational Lecture) "Introduction to Intellectual Property"(0.5)

Requirement) No requirement

Notice) It is necessary to be present at two concentrated lecture.

Goal)

1. Understanding concept of intellectual property right.
2. Understand the Patent Act, the Trademark Act, the Design Act and the Copyright Act.
3. Understanding on basical practical use of intellectual property.

Schedule) **1.** Concept of intellectual property(Sakai) **2.** Outline of intellectual property(Patent and Trademark)(Sakai) **3.** Outline of intellectual property(Design and Copyright)(Sakai) **4.** Patent, invention and invasion of patent (Sakai) **5.** Management of intellectual property and use (Sakai) **6.** A way of research and development and intellectual property in a future(Sakai) **7.** The midterm examination and its comment for Target and **8.** History of system of intellectual property (Osame) **9.** International trend of system of intellectual property (Osame) **10.** Acquisition method of intellectual property right(Fujii)

11. Use of intellectual property(Watanabe) 12. Stetragy of intellectual property on development of techniques(Y.Higuchi) 13. Effective intellectual property in development of techniques (Kubota) 14. Special lecture on a use of intellectual property by a chief executive officer(1) 15. Special lecture on a use of intellectual property by a chief executive officer(2)

Evaluation Criteria) Passing mark is over 60% on the examinations and the reports for each reaching level, respectively.

Textbook) To be used textbooks made by lecturers.

Reference) Nobuhiro Nakayama:Titeki Shoyuken, Nikkan Kohgyo Shinbunsha

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169591>

Student) For the course students and other graduate school students.

Contact)

⇒ Sakai (+81-3-5600-2631,)

⇒ Mizuguchi (A501, +81-88-656-7349, mizuguch@ce.tokushima-u.ac.jp) (Office Hour: Monday,11:00-12:30, 17:00-18:00)

Presentation Method (D)

2 units

Target) Poster and oral presentations, and journal publications are common means of appealing the research work in various scientific and technological disciplines. It's undoubtedly important for activating the research work. The lecture is intending for students to learn most efficient way to appeal their findings and discussions in scientific community.

Outline) Credits are acknowledged to the students who are supervised to give conference speech by themselves and do actually the lectures.

Goal) The lecture is aiming at having knowledge and experience of the presentaion in international conferences.

Evaluation Criteria) Students' achievement is evaluated by portfolios submitted showing the progress in preparation of international conferences as well as by presentation records.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169628>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Internship (D)

2 units

Target) This program is provided to increase knowledge and experience in the actual industrial technology in various fields. Through the practical experience, the program will allow students to become discerning and well-balanced researchers or engineers with deeper understanding of technological societies.

Outline) Credits are acknowledged to students who experienced the internship in companies and/or government offices. Their fulfilment is evaluated by activity reports during internship.

Goal)

1. Grasping internal systems of a company, management, action and strategy to achieve the company's goal. (2)
2. Understanding human relationship and communicative manner in a working society and a company.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by supervisors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169542>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Venture Business (D)

2 units

Target) Aims of the lecture are doing collaborative works with private enterprises and establishing venture businesses through such works.

Outline) The lecture is aiming at founding a venture business company as well as establishing collaborative research works with private enterprises. It's worth to apply their accomplishment to an actual society beyond the range of a laboratory work.

Goal) Objective of the lecture is to have experience and knowledge of collaborative works with private enterprises and to mature the works to venture businesses.

Evaluation Criteria) Credits are acknowledged in case of doing collaborative works with enterprises and/or maturing them to venture businesses. Handouts, reports, and presentation materials, etc. are evaluated to approve credits.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169539>

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Long-term Internship (D)

6 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This program is provided long-term internship in the actual industrial companies and so on, doing a joint study between companies and university on practical problems proposed by the company and practical experience of management of technologies. Through the long-term internship, the program will allow students to become a engineer with a core role in researches and companies

Outline) Credits are acknowledged to students who experienced the internship in companies or government offices of 270 hours during three months or more and presentation to executive officer of the company. Their fulfillment is evaluated by activity reports during internship and appraisal and interviewed report from a mentor.

Goal) Grasping abilities for practical engineers by studying activities in company and so on.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by mentors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169697>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Nishida (K409, +81-88-656-7630, nishida@kg.tokushima-u.ac.jp)

⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

⇒ Morimoto (A407, +81-88-656-7619, emi.morimoto@kg.tokushima-u.ac.jp) (Office Hour: 月～木(10時～15時))

Note) Students who resister the coop-education program for "Pai-shape" engineers with sense for management of technology, are able to have a grant-in-aid for travel and so on. Ask committee members of long-term internship in your course or coordinators of this program.

Advanced Lecture in Theory of Business Models

2 units

Tatsuya Deguchi · PART-TIME LECTURER, Kenichi Yasumuro · PART-TIME LECTURER, Katsuo Touma · PART-TIME LECTURER
Takahide Yamaguchi · PART-TIME LECTURER, Shingou Nishii · PART-TIME LECTURER

Target) There is a purpose of this class in providing the knowledge which is necessary, and know-how so that students may achieve a business model in establishing enterprises based on the lecture of "Management Theory of New Business", and in making students understood the profit generating stream by studying on the frame work of companies in several business fields.

Outline) Business Model is a remarkable term in modern economic and organizational theories in these days but describes a broad range of definitions. In this lecture, Business Model is defined as "System which converts technology and know how into profit for the purpose of customers' satisfaction" and aims at providing the ability for the design of profitable system, by learning cost issues in establishing business strategies of companies.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business"

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of business model design is learned
2. Understanding of the concept of business model by case study analysis are appreciated
3. It learns forming ability of business plan through the case study on business models

Schedule) 1. Guidance 2. Keynote lecture "Business Model Thinking" 3. Questions and answers, Discussions 4. Lecture "Theory of Business Models" 5. Lecture "Design principles of Business Models" 6. Lecture "Evaluation of Business Models" 7. Case Study "Business Model in a R&D company" 8. Case Study "Business Model in a manufacturing industrial company" 9. Case Study "Business Model in a company of service industry" 10. Case Study "Business Model in a company of information industry" 11. Business plan practice, Present situation analysis and alternatives. 12. Business plan practice, Concept ad design of business. 13. Business plan practice, Financial analysis . 14. Business plan practice, Concluding and submitting 15. Presentation(1) of Business plan practice. 16. Presentation(2) of Business plan practice, Comments and summary.

Evaluation Criteria) Participation in class(20%) Group work and its report(80%)

Textbook) Ken-ichi Amuro and Study Group of Business model "Case Book: Business Model Thinking" Bunshindo

Reference) Several are introduced in class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169696>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Contact)

- ⇒ Tatsuya Deguchi (Wakayama University)
- ⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

Note) This class is supported by Tokushima Prefecture Government

Management of Technology

2 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) About the production management of the automobile industry, it is understood variously from the point of view such as "research and development", "production management", "purchasing" and "quality control" "marketing" and "cross-cultural management".

Outline) It learns about the production management. This time, "the automobile industry" specially takes up the production management of "Honda Motor Co.,Ltd. (following Honda)" even of that in the case, and the class to appreciate that importance with ranking of technology in management is taken.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business"

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of management is learned.
2. Ranking of the technology in management and that importance are appreciated.
3. It learns how to solve the various problems which always occur in the spot of the management through the case study and the business game.

Schedule) 1. Guidance 2. Lecture "What in Management of Technology?" 3. Case report "Research and development of Honda" 4. Case study "Plan an overseas factory." "A new car development order" 5. Lecture "Production management and purchasing" 6. Lecture "Quality control" 7. Case report "The production management of Honda," "The supply chain management of Honda" 8. Case study "Plan an overseas factory." 9. Case report "The quality control of Honda" 10. Case study "Don't make material defects flare up again." 11. Lecture "Marketing strategy" 12. Lecture "Cross-cultural management" 13. Case report "Around the products project of Honda - the two-wheeled vehicle" 14. Case report "The

path of internationalization of Honda" 15. Case report "The personnel management of Honda" 16. Summary and questions and answers

Evaluation Criteria) It is evaluated in the remark (20%) in class and the middle, end of a term report (80% in total).

Textbook) It doesn't specially use. The summary and so on is distributed every time.

Reference) Several are introduced in class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169698>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the doctor former term course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Note) This class invites seven Honda alumni who did work in "research and development", "production management", "purchasing", "quality control", "marketing", "cross-cultural management", and so on as an instructor, and it is the class to do case report. Even if it is seen nationwide, the trial done like this is very rare, and it is a precious class. And, an applicant for taking lecture is to attend it in the guidance to hold it in advance. A schedule is indicated separately.

Advanced Topics in Atoms and/or Molecules Manipulation

2 units

Shuichi Hashimoto · PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Shigeki Matsuo · ASSOCIATE PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) New methodologies for the manipulation of the atoms and molecules in materials will be presented and students are encouraged to gain skills to think about to solve problems in this field

Outline) New methodologies will be given for manipulating atoms and molecules, controlling physical and chemical properties, and fabricating micro- and nanostructures based upon optical/laser techniques

Style) Portfolio

Goal) To acquire knowledge of the properties of materials to the level of atoms and molecules

Schedule) 1. Photophysical processes 2. Photophysical processes 3. Photochemical processes 4. Photochemical Processes 5. Two-photon processes 6. laser trapping 7. laser trapping 8. laser ablation 9. laser ablation 10. laser micro processing 11. laser micro fabrication 12. photonic crystals 13. laser crystallization 14. New topics 15. New topics

Evaluation Criteria) Assignments counts 100%

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169549>

Advanced conversion systems of resource energy

2 units

Yoshiyuki Kidoguchi · PROFESSOR / RESOURCE CIRCULATORY ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To learn special knowledge concerning present energy resources and energy supplying systems, to understand principle and mechanism of energy conversion, and to improve thinking faculty for application of new energy and its conversion

Outline) To explain effective combustion technologies, reasonable utilization of energy and application of unused energy for saving consumption of fossil fuels and primary energy on the point of saving resources, energy and preserving the environment

Style) Portfolio

Keyword) Energy conversion, Energy resources, Utilization of energy, Environmental protection, Energy saving

Requirement) None

Notice) None

Goal) To understand fundamentals of energy conversion and to consider effective utilization of energy and improvement of energy conversion technologies

Schedule) 1. Present state of energy resources 2. Energy and environmental problem 3. Future view of energy resources 4. Fundamentals of energy conversion (1) 5. Fundamentals of energy conversion (2) 6. Principle of energy conversion (1) 7. Principle of energy conversion (2) 8. Principle of energy conversion (3) 9. Technologies of energy conversion (1) 10. Technologies of energy conversion (2) 11.

Technologies of energy conversion (3) **12.** Approach to effective utilization of energy (1) **13.** Approach to effective utilization of energy (2) **14.** Application of new energy (1) **15.** Application of new energy (2)

Evaluation Criteria) Appraise the understanding of the content of the lecture by setting some reports

Textbook) None

Reference) None

Webpage) <http://www.eco.tokushima-u.ac.jp/w3/miwa/index.html>

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169562>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Kidoguchi (Eco502, +81-88-656-9633, kidog@eco.tokushima-u.ac.jp)

Note) Need to submit some reports

Advance Lecture of Political Simulation

2 units

Akio Kondo · PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING
Yoshinobu Hirose · ASSOCIATE PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) The technique of modelling of regional and environmental systems, and the concept and application method of prediction and evaluation models to political simulation are studied.

Outline) Not only the technique of modelling, but also the application method of prediction and evaluation models to political simulation is discussed in portfolio.

Style) Portfolio

Keyword) Political Simulation, Technique of Modelling, Prediction and Evaluation

Requirement) 特になし

Notice) 特になし

Goal) To obtain the knowledge of the technique of modelling and application method of prediction and evaluation models, apply them to political simulation.

Schedule) **1.** Guidance and purpose of this subject **2.** Systems of political simulation **3.** Technique of modelling **4.** Technique of modelling **5.** Application of model : Prediction **6.** Application of model : Prediction **7.** Application of model : Evaluation of policy **8.** Application of model : Evaluation of policy **9.** Example of political simulation : Population policy **10.** Example of political simulation : Urban transport policy **11.** Example of political simulation : Landuse policy **12.** Example of political simulation : Social policy **13.** Example of political simulation : Environment policy **14.** The technique of political simulation in the future **15.** Regional policies in the 21st Century

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Webpage) <http://www.eco.tokushima-u.ac.jp/w3/kondo/top/index.htm>

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169580>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Kondo (ECO602, +81-88-656-7339, kondo@eco.tokushima-u.ac.jp) (Office Hour: 月曜日9-10校時)

Note) 特になし

Advanced Lecture in Social Risk Engineering

2 units

Yasunori Kozuki · PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) To understand concept of risk, to cultivate ability of measures how to reduce, avoid, compensate for various risks. the reducing, the evading of the risk, the compensation for it.

Outline) Technique of risk assessment and its communication for various social risks on risk management is lectured.

Style) Lecture in combination with Portfolio

Keyword) Social Risks, Risk Management, Crisis Management

Goal) To obtain the knowledge of risk management and application method of various social risks.

Schedule) **1.** Guidance and purpose of this subject **2.** Sources of various social risks **3.** Evaluation of social risk(1) **4.** Evaluation of social risk(2) **5.** Risk management (1.risik perception) **6.** Risk management(2.risik communication) **7.** Risk management(3.evaluation standard) **8.** Example of risk management(1.evacuation for natural disaster) **9.** Example of risk management(2.evacuation for natural disaster) **10.** Example of risk management(3.evacuation for natural disaster) **11.** Example of risk management(4.avoidance of risk and insurance) **12.** Presentaion and discussion for social risk(1) **13.** Presentaion and discussion for social risk(2) **14.** Presentaion and discussion for social risk(3) **15.** Summary

Evaluation Criteria) Assignments Count 100%

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169571>

Student) To be limited to the students of the course

Contact)

⇒ Murakami . (Office Hour: Monday 16:20-17:50)

Design for Adapting the Environment Instead of the Peop

2 units

Shoichiro Fujisawa · ASSOCIATE PROFESSOR / SOCIAL ENVIRONMENT SYSTEMS ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) The objective of this lecture is to consider the role of assistive technology for the persons with disabilities living in the society and to learn on the development of assistive products in the view point of human factors and outcome measure in daily living with assistive products.

Outline) Assistive technology for a disabled individual living in the society. Human factors and R & D of assistive devices and services. Adapting the environment instead of the disabled people. Evaluation of appropriateness of assistive technology system for a person.

Style) Lecture

Keyword) Assistive products, Outcome measure, Persons with disability, Research and development, Ergonomics

Goal) An expertise necessary to research and develop an actual assistive products is acquired. The method of outcome measure for assistive products will be mastered.

Schedule) **1.** Guidance **2.** Human factors in physical view point (1) **3.** Human factors in anatomical view point (2) **4.** Human factors in psychological view point (3) **5.** Adapting the people to the environment **6.** Adapting the environment insted of the people **7.** Physical impairment and daily living support **8.** Sensory impairment and daily living support **9.** Intellectual impairment and daily living support **10.** R&D of assistive products and ergonomic approach (1) **11.** R&D of assistive products and ergonomic approach (2) **12.** R&D of assistive products based on daily living (1) **13.** R&D of assistive products based on daily living (2) **14.** Outcome measure of assistive products (1) **15.** Outcome measure of assistive products (2)

Evaluation Criteria) Results will be evaluated through the lecture and reports submitted after each lesson.

Textbook) To be introduced in th class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169609>

Contact)

⇒ Fujisawa (ECO704, 656-7537, s-fuji@eco.tokushima-u.ac.jp) (Office Hour: 水曜日 18:00~ 20:00)

Engineering on Circulation of Resources

2 units

Takahiro Hirotsu · PROFESSOR / MARINE ENVIRONMENT SCIENCE AND ENGINEERING, ECOSYSTEM ENGINEERING, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) Learning advanced technology for circulation of resouces

Outline) Separation and utilization of unused inorganic resources, separation of isotopes of light elements, and design and synthesis of adsorbents for separation of isotopes.

Style) Excercise

Keyword) recovery of resources, separation of materials, separation of isotopes

Goal) understanding of an advanced technology for circulation of resources

Schedule) 1. What are resources? 2. Types and properties of substances 3. Separation of ions: ion-exchange method 1 4. Separation of ions: ion-exchange method 2 5. Separation of ions: ion-exchange method 3 6. Separation of ions: chelate exchange 1 7. Separation of ions: chelate exchange 2 8. Separation of ion: chelate exchange 3 9. Separation of isotopes by chemical-exchange method 10. Principle of separation of lithium-isotopes 11. Principle of separation of boron-isotopes 12. Separation of isotopes by ion-exchange method 1 13. Separation of isotopes by ion-exchange method 2 14. Separation of isotopes by ion-exchange method 3 15. Separation of isotopes by ion-exchange method 4 16. Significance of advanced separation of substances in circulation of resources

Evaluation Criteria) Discussion in the class and description of ideas in the report

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169564>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Hirotsu (National Institute of Advanced Industrial Science and Technology, +81-87-869-3562, takahiro-hirotsu@aist.go.jp)

Advanced mitigation engineering

2 units

Hideki Ueshima · PROFESSOR / GRADUATE SCHOOL OF ENGINEERING

Target) To obtain the abilities to find and solve environmental problems using for application of mitigation technique

Outline) To surveying of the latest news of mitigation and to understand its concept and examine the technique to mitigate the deterioration environment

Style) Lecture in combination with Portfolio

Keyword) District Improvement Plan for Disaster Mitigation, coastal environment

Fundamental Lecture) “Advanced Lecture in Social Risk Engineering”(1.0, ⇒p.131), “Advance Lecture of Political Simulation”(1.0, ⇒p.131)

Goal) To design and assess the mitigation plan for deterioration coastal environment

Schedule) 1. Guidance of this subject 2. Current topics about mitigation 1 3. Current topics about mitigation 2 4. Current topics about mitigation 3 5. Current topics about mitigation 4 6. Current topics about mitigation 5 7. Current topics about mitigation 6 8. Current topics about mitigation 7 9. Current topics about mitigation 8 10. Current topics about mitigation 9 11. Current topics about mitigation 10 12. Discussion on research theme1 13. Discussion on research theme2 14. Discussion on research theme3 15. Presentation

Evaluation Criteria) Assignments count 100%

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169637>

Contact)

⇒ Ueshima (National Institute of Advanced Industrial Science and Technology, +81-823-72-1901, h-ueshima@aist.go.jp)

Advanced Exercise on Ecosystem Engineering

2 units

All teachers

Target) To conduct research leading to the awarding of doctoral degrees.

Outline) To conduct research in Conversion Systems of Resource Energy, Resources Recycling Technology, Political Simulation, Social Risk Engineering, Design for Adapting the Environment Instead of the People and Engineering on Circulation of Resources.

Style) Portfolio, Lecture in combination with Portfolio, Lecture and exercise

Keyword) Ecosystem Engineering

Notice) Course plan differs depending on the laboratory you choose.

Goal) To present the results of your research related conferences, departmental research meetings, etc.

Schedule) After the student selects the subjects, research can be carried out at the laboratory.

Textbook) None

Reference) Using papers for each research field.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169532>

Student) Able to be taken by only specified class(es)

Advanced Research on Ecosystem Engineering

2 units

Teachers in other colleges or departments

Target) To obtain broad information on recent engineering

Outline) To research a theme in a technology, which is different from the main technology in your field.

Keyword) Engineering, Technology, Different field

Goal) To learn a recent technology, which is different from the main technology in your field.

Schedule) Choose a theme on the technology or engineering, which is different from that in your field.

Evaluation Criteria) Evaluated with portfolio or examination

Textbook) Ask to teachers

Reference) Prints

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169649>

Student) Able to be taken by only specified class(es)

Systems Innovation Engineering — Electrical and Electronic Engineering

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Social Science ...Goto	134
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• Specialized Exercise and Experiments

Special Exercise on Electrical and Electronic Systems Innovation Engineering ...All teachers	143
Advanced Research on Electrical and Electronic Engineering ...All teachers	143

Human Factors

2 units
Atsuya Yoshida · PART-TIME LECTURER / FACULTY OF INTEGRATED ARTS AND SCIENCES

Target) The objective of this class is to provide students with sufficiently thorough appreciation of the many facets of the human factors discipline so that they may make use of it to their own doctoral works.

Outline) This class offers a broad and comprehensive overview of the human factors/ergonomics discipline with four areas of emphasis, (1) historical review of human factors research, (2) human physical, perceptual and cognitive capabilities and limitations, (3) application of human factors research data in design, especially in the interface design of computer-based systems, and (4) discussion about the relationship between the designed system (technology) and people.

Schedule) 1. What is Human Factors 2. Historical Overview of Human Factors 3. Multi-Disciplinary Aspect of Human Factors 4. Health and Safty Issue of Human Factors 5. Human Psychological Capability 6. Task Analysis 7. Human Error 8. Universal Design 9. Cognitive Artifact 10. Visibility and Affordance 11. Human-Computer Interaction 12. Human Information Processing 13. Knowledge and Mental Model 14. Usability Paradigms and Principles 15. Evaluation and Testing 16. Making system that makes us smart

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169608>

Life Science

2 units
Hiroshi Takagi · PART-TIME LECTURER / FUKUI PREFECTURAL UNIVERSITY
Akihiko Tsuji · PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) Understanding of significance of protein in biotechnology

Outline) Basics of structure, function and application of protein are introduced

Style) Lecture

Keyword) Protein, Enzyme, Biotechnology

Goal)

1. Understanding of multiple functions of proteins
2. Understanding of principle of protein engineering and its application

Schedule) 1. Introduction of life science 2. History of life science 3. Structure and function of DNA and RNA 4. mRNA is a template of protein 5. Duplication of DNA 6. Regulation of protein expression 7. Human Genetics 8. Genetic disease 9. DNA diagnosis 10. Structure and function of protein 11. Principle of gene technology (1) 12. Principle of gene technology (2) 13. Protein engineering 14. Future of life science (1) 15. Future of life science (2) 16. Preparation of report

Evaluation Criteria) Evaluation by report

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169586>

Contact)

⇒ Tsuji (G710, +81-88-656-7526, tsuji@bio.tokushima-u.ac.jp) (Office Hour: Monday 16:20-17:50)

Social Science

2 units

Shuzo Goto · PART-TIME LECTURER / SHIKOKU UNIVERSITY

Target) The mutual relationship of economic activities, the structure and function of economic society, and the concept and technique of mathematical programming modelling are lectured.

Outline) Not only the mutual relationship of economic activities is explained from domestic and international points of view, but also the technique of case studies by application of mathematical programming models is taught using the various kinds of materials and examples.

Keyword) Economic activities, Structure and function, Mathematical programming model

Goal) To understand the mutual relationship of economic activities, empirically explain them using the mathematical programming model and evaluate the model.

Schedule) 1. Guidance and purpose of this subject 2. Examples of economic activities 1 3. Examples of economic activities 2 4. Examples of economic activities 3 5. Change in structure of economic society 1 6. Change in structure of economic society 2 7. Function of economic society 1 8. Function of economic society 2 9. Mutual relationship of economic activities 1 10. Mutual relationship of economic activities 2 11. Concept of mathematical programming model 12. Technique of model construction 13. Modelling of economic activities 1 14. Modelling of economic activities 2 15. Evaluation of modelling

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169569>

Contact)

⇒ Kondo (ECO602, +81-88-656-7339, kondo@eco.tokushima-u.ac.jp)

Science and Technology Studies

Kunio Goto · PART-TIME LECTURER / MOMOYAMA GAKUIN UNIVERSITY

Target) Students are expected to learn the minimum essentials of science and technology studies and their functions in contemporary society.

Outline) Science and technology studies deal with science and technology research and its outcomes by means of various methods of social sciences and humanities. They have emerged in 1930s when social importance of science and technology became evident. Since 1970s, the science and technology studies have developed as mission oriented learning for government policy, business administrations and civic activity. In the first half of this lecture, the outline of the science technology studies is given. The involved topics are philosophy, history, sociology, and economics of science and technology.

Style) Lecture

Goal)

1. Understanding of the minimum essentials of the science and technology studies
2. Understanding of the social meaning of each student's research

Schedule) 1. Introduction: A brief history of the science and technology studies since 1930s 2. Philosophical understanding of science: (1) From Greek Classics to German Classical Philosophy 3. Philosophical understanding of science: (2) Rise of the philosophy of science the early twentieth century 4. Historical investigation of science and technology : (1) Emergence of the modern Western science 5. Historical investigation of science and technology : (2) From the Power Revolution of the Medieval West to the modern the Industrial Revolution 6. Sociology of science and technology: (1) Normative structure and Paradigm 7. Sociology of science and technology: (2) Social constructivism and Laboratory life analysis 8. Economics and science and technology : (1) Market and planning economies 9. Economics and science and technology : (2) Innovation and economic policy 10. The 1950s model of science and technology policy in the Cold War 11. Knowledge industrial society since 1970s: (1) Environmental problem and energy problem 12. Knowledge industrial society since 1970s: (2) Computer science and Information society 13. Policy issues in the transform of industrial structure and role of university 14. Science and technology in the global economy since 1990s 15. Concluding remark: Science, technology and society in the future

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169536>

Contact)

⇒ Kawamura (410 Chem Bldg, +81-88-656-7401, kawamura@chem.tokushima-u.ac.jp)

Management Theory of New Business

2 units

Vice chairperson of School Affairs Committee , Faculty of Engineering
First-line men with experience of practical business · PART-TIME LECTURER

Target) New business is the word which means the business to make the most of technical knowledge, technology, the new idea and which is developed creatively, and that main bearer is the enterprise called a venture. There is a purpose of this class in providing the knowledge which is necessary, and know-how and a spirit so that a taking lecture student may establish a venture business.

Outline) The regeneration of the Japanese society with the vitality is being asked. Government enforced "a university venture 3 years 1000 companies plan" over Heisei 14-the 16th year. Though that goal was almost attained, it is very important to promote entrepreneur education continuously from now on. Tokushima Prefecture supports this class based on the recognition done like this, and it is established.

Requirement) The person whom the one with the classroom is constructed by the class start time in the person who doesn't learn the unit of "Introduction to new business" in the college, and a group are organized, and it is limited to the person with the intention to make a business plan, and taking lecture is recognized.

Notice) Being late and a whisper in class should be prohibited strictly. Be careful over and again because it should dispose of exit and future taking lecture may not be recognized when it is wicked.

Goal) Learning of the necessary knowledge to establish venture business, and the ability which can make a business plan.

Schedule) 1. Guidance 2. What is the new business? 3. Keynote lecture 4. Theory of a stand-alone version venture success 5. The law knowledge which is necessary for entrepreneur 6. Fund-raising and capital policy 7. Indirect finance 8. Direct finance 9. The basis of the company management 10. The elementary knowledge of the business accounting 11. The point of the business plan preparation 12. Management strategy and marketing 13. Product development and intellectual property 14. Business plan preparation practice 15. Examination 16. Business plan announcement meeting

Evaluation Criteria) It is evaluated by the presentation (40%) of the written examination (60%) and the business plan. And, the presentation of the written examination and the business plan is decided to be recognized only for the taking lecture student who attended it for 2/3 and more of the classes that it is opened.

Textbook) The summary is distributed every time.

Reference) Several are introduced in the school hours.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169607>

Student) he person who hasn't learned the unit of the new business outline that it is opened with this learning in all the students enrolled in the graduate school yet is made the target. The number of completion people may be restricted in the method such as a lottery in case of a taking lecture applicant many. As for the details, an applicant for taking lecture is to follow those directions because the notice which showed attention in taking lecture is done.

Contact)

⇒ Vice chairperson of School Affairs Committee , Faculty of Engineering

Note) The man of business that it is active in the forefront every time, and an adviser are invited as an instructor, and working knowledge is provided for theory plus practice in this class from the specialist's position. This class is the thing which is useful enough even if it is taken to the person who aims at a general enterprise and a laboratory, the employment to the self-governing body and so on.

Introduction to Intellectual Property

2 units

Tohru Sakai · PART-TIME LECTURER / (財)工業所有権協カセンター, Juichiroh Osame · PART-TIME LECTURER

Akio Fujii · PART-TIME LECTURER / INTELLECTUAL PROPERTY OFFICE, Yasushi Toyosu · PART-TIME LECTURER, Kuniaki Kubota · PART-TIME LECTURER

Target) Understanding the basic systems and importance of protection and practical use of intellectual property based on some examples.

Outline) It is necessary for a working staff in a company, a university, etc., in a future. It is introduced the importance to protect and practical use of intellectual property at governments , industrial circles, universities and institutes in Japan using potential on scientific techniques. This lecture is treated the basic systems of protection and practical use of intellectual property particularly based on strategy and invasion of patent in an organization such as company, university, etc.

Style) Lecture

Keyword) Intellectual property, Patent Law, Protect and Use of Intellectual Property

Relational Lecture) “Introduction to Intellectual Property”(0.5)

Requirement) No requirement

Notice) It is necessary to be present at two concentrated lecture.

Goal)

1. Understanding concept of intellectual property right.
2. Understand the Patent Act, the Trademark Act, the Design Act and the Copyright Act.
3. Understanding on basical practical use of intellectual property.

Schedule) 1. Concept of intellectual property(Sakai) 2. Outline of intellectual property(Patent and Trademark)(Sakai) 3. Outline of intellectual property(Design and Copyright)(Sakai) 4. Patent, invention and invasion of patent (Sakai) 5. Management of intellectual property and use (Sakai) 6. A way of research and development and intellectual property in a future(Sakai) 7. The midterm examination and its comment for Target and 8. History of system of intellectual property (Osame) 9. International trend of system of intellectual property (Osame) 10. Acquisition method of intellectual property right(Fujii) 11. Use of intellectual property(Watanabe) 12. Stragry of intellectual property on development of techniques(Y.Higuchi) 13. Effective intellectual property in development of techniques (Kubota) 14. Special lecture on a use of intellectual property by a chief executive officer(1) 15. Special lecture on a use of intellectual property by a chief executive officer(2)

Evaluation Criteria) Passing mark is over 60% on the examinations and the reports for each reaching level, respectively.

Textbook) To be used textbooks made by lecturers.

Reference) Nobuhiro Nakayama:Titeki Shoyuken, Nikkan Kohgyo Shinbunsha

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169591>

Student) For the course students and other graduate school students.

Contact)

- ⇒ Sakai (+81-3-5600-2631,)
- ⇒ Mizuguchi (A501, +81-88-656-7349, mizuguch@ce.tokushima-u.ac.jp) (Office Hour: Monday,11:00-12:30, 17:00-18:00)

Presentation Method (D)

2 units

Target) Poster and oral presentations, and journal publications are common means of appealing the research work in various scientific and technological disciplines. It's undoubtedly important for activating the research work. The lecture is intending for students to learn most efficient way to appeal their findings and discussions in scientific community.

Outline) Credits are acknowledged to the students who are supervised to give conference speech by themselves and do actually the lectures.

Goal) The lecture is aiming at having knowledge and experience of the presentaion in international conferences.

Evaluation Criteria) Students' achievement is evaluated by portfolios submitted showing the progress in preparation of international conferences as well as by presentation records.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169628>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Internship (D)

2 units

Target) This program is provided to increase knowledge and experience in the actual industrial technology in various fields. Through the practical experience, the program will allow students to become discerning and well-balanced researchers or engineers with deeper understanding of technological societies.

Outline) Credits are acknowledged to students who experienced the internship in companies and/or government offices. Their fulfilment is evaluated by activity reports during internship.

Goal)

1. Grasping internal systems of a company, management, action and strategy to achieve the company's goal. (2)
2. Understanding human relationship and communicative manner in a working society and a company.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by supervisors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169542>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Venture Business (D)

2 units

Target) Aims of the lecture are doing collaborative works with private enterprises and establishing venture businesses through such works.

Outline) The lecture is aiming at founding a venture business company as well as establishing collaborative research works with private enterprises. It's worth to apply their accomplishment to an actual society beyond the range of a laboratory work.

Goal) Objective of the lecture is to have experience and knowledge of collaborative works with private enterprises and to mature the works to venture businesses.

Evaluation Criteria) Credits are acknowledged in case of doing collaborative works with enterprises and/or maturing them to venture businesses. Handouts, reports, and presentation materials, etc. are evaluated to approve credits.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169539>

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Long-term Internship (D)

6 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This program is provided long-term internship in the actual industrial companies and so on, doing a joint study between companies and university on practical problems proposed by the company and practical experience of management of technologies. Through the long-term internship, the program will allow students to become a engineer with a core role in researches and companies

Outline) Credits are acknowledged to students who experienced the internship in companies or government offices of 270 hours during three months or more and presentation to executive officer of the company. Their fulfilment is evaluated by activity reports during internship and appraisal and interviewed report from a mentor.

Goal) Grasping abilities for practical engineers by studying activities in company and so on.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by mentors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169697>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Nishida (K409, +81-88-656-7630, nishida@kg.tokushima-u.ac.jp)
- ⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)
- ⇒ Morimoto (A407, +81-88-656-7619, emi.morimoto@kg.tokushima-u.ac.jp) (Office Hour: 月～木(10時～15時))

Note) Students who resister the coop-education program for "Pai-shape" engineers with sense for management of technology, are able to have a grant-in-aid for travel and so on. Ask committee members of long-term internship in your course or coordinators of this program.

Advanced Lecture in Theory of Business Models

2 units

Tatsuya Deguchi · PART-TIME LECTURER, Kenichi Yasumuro · PART-TIME LECTURER, Katsuo Touma · PART-TIME LECTURER
Takahide Yamaguchi · PART-TIME LECTURER, Shingou Nishii · PART-TIME LECTURER

Target) There is a purpose of this class in providing the knowledge which is necessary, and know-how so that students may achieve a business model in establishing enterprises based on the lecture of "Management Theory of New Business", and in making students understood the profit generating stream by studying on the frame work of companies in several business fields.

Outline) Business Model is a remarkable term in modern economic and organizational theories in these days but describes a broad range of definitions. In this lecture, Business Model is defined as "System which converts technology and know how into profit for the purpose of customers' satisfaction" and aims at providing the ability for the design of profitable system, by learning cost issues in establishing business strategies of companies.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business"

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of business model design is learned
2. Understanding of the concept of business model by case study analysis are appreciated
3. It learns forming ability of business plan through the case study on business models

Schedule) 1. Guidance 2. Keynote lecture "Business Model Thinking" 3. Questions and answers, Discussions 4. Lecture "Theory of Business Models" 5. Lecture "Design principles of Business Models" 6. Lecture "Evaluation of Business Models" 7. Case Study "Business Model in a R&D company" 8. Case Study "Business Model in a manufacturing industrial company" 9. Case Study "Business Model in a company of service industry" 10. Case Study "Business Model in a company of information industry" 11. Business plan practice, Present situation analysis and alternatives. 12. Business plan practice, Concept ad design of business. 13. Business plan practice, Financial analysis . 14. Business plan practice, Concluding and submitting 15. Presentation(1) of Business plan practice. 16. Presentation(2) of Business plan practice, Comments and summary.

Evaluation Criteria) Participation in class(20%) Group work and its report(80%)

Textbook) Ken-ichi Amuro and Study Group of Business model "Case Book: Business Model Thinking" Bunshindo

Reference) Several are introduced in class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169696>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Contact)

⇒ Tatsuya Deguchi (Wakayama University)
⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

Note) This class is supported by Tokushima Prefecture Government

Management of Technology

2 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) About the production management of the automobile industry, it is understood variously from the point of view such as "research and development", "production management", "purchasing" and "quality control" "marketing" and "cross-cultural management".

Outline) It learns about the production management. This time, "the automobile industry" specially takes up the production management of "Honda Motor Co.,Ltd. (following Honda)" even of that in the case, and the class to appreciate that importance with ranking of technology in management is taken.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business" .

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of management is learned.
2. Ranking of the technology in management and that importance are appreciated.
3. It learns how to solve the various problems which always occur in the spot of the management through the case study and the business game.

Schedule) 1. Guidance 2. Lecture "What in Management of Technology?" 3. Case report "Research and development of Honda" 4. Case study "Plan an overseas factory." "A new car development order" 5. Lecture "Production management and purchasing" 6. Lecture "Quality control" 7. Case report "The production management of Honda"; "The supply chain management of Honda" 8. Case study "Plan an overseas factory." 9. Case report "The quality control of Honda" 10. Case study "Don't make material defects flare up again." 11. Lecture "Marketing strategy" 12. Lecture "Cross-cultural management" 13. Case report "Around the products project of Honda - the two-wheeled vehicle" 14. Case report "The path of internationalization of Honda" 15. Case report "The personnel management of Honda" 16. Summary and questions and answers

Evaluation Criteria) It is evaluated in the remark (20%) in class and the middle, end of a term report (80% in total).

Textbook) It doesn't specially use. The summary and so on is distributed every time.

Reference) Several are introduced in class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169698>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the doctor former term course. And, the number of taking lecture people is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Note) This class invites seven Honda alumnuni who did work in "research and development", "production management", "purchasing", "quality control", "marketing", "cross-cultural management", and so on as an instructor, and it is the class to do case report. Even if it is seen nationwide, the trial done like this is very rare, and it is a precious class. And, an applicant for taking lecture is to attend it in the guidance to hold it in advance. A schedule is indicated separately.

Topics in algebra and analysis

2 units

Shigeaki Nagamachi · PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING
Hiroki Sumida-Takahashi · ASSOCIATE PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) We will learn some important properties of a special function, which is called the Riemann zeta function. Further we will learn how to solve problems produced by this function.

Outline) We will learn development of mathematical tools in order to prove some properties of the Riemann zeta function, such as the special values, Euler product and the functional equation.

Fundamental Lecture) "Basic Mathematics/Calculus 1"(1.0), "Basic Mathematics/Calculus 2"(1.0), "Complex Analysis"(1.0)

Relational Lecture) "Numerical Analysis"(0.5)

Goal) We will learn fundamentals of modern abstract mathematics and realize its effectiveness.

Schedule) 1. Introduction 2. Zeta function 3. Leonhard Euler 4. Special values 5. Analytic continuation 6. Special values and analytic continuation 7. Euclid's proof 8. Fermat prime 9. Euler product 10. Prime number theorem I 11. Prime number theorem II 12. Prime number theorem III 13. Functional equation I 14. Functional equation II 15. Summation 16. Assignments

Evaluation Criteria) Evaluation will be based on assignments.

Reference) Dunham, William, "Euler: the Master of Us All", The Mathematical Association of America

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169590>

Contact)

⇒ Sumida-Takahashi (A204, +81-88-656-7542, hiroki@pm.tokushima-u.ac.jp) (Office Hour: Wednesday, 17:00-18:00)

Radio Frequency Solid State Physics

2 units

Takashi Ohno · PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING
Koichi Nakamura · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICAL SYSTEMS ENGINEERING**Target)** This class introduces basis of NMR and applications to studies on superconductivity, magnetism and ionic diffusion in solid.**Outline)** The spectrum, spin-lattice relaxation, spin-spin relaxation, chemical shift etc., which are obtained by NMR measurements, are introduced and discussed in connection with various physical properties of solids.**Keyword)** Nuclear Magnetic Resonance, Nuclear magnetic moment, Magnetism, Diffusion, Superconductor, Spin - lattice relaxation, Knight shift**Goal)**

1. To understand basis of NMR.
2. To understand relationship between various problems in solid state physics and relaxation phenomena observed using NMR.

Schedule) 1. Introduction 2. Spin-echo and NMR spectrum 3. Equipments 4. Dipole interaction 5. Hyperfine interaction and spectrum 6. Chemical shift 7. Quadrupole interaction and quadrupole resonance 8. Spin-lattice relaxation 9. Internal magnetic field in ferro and antiferro magnets 10. Spin-lattice relaxation in metals 11. NMR studies on superconducting state 12. NMR studies on High T_c superconductors 13. Diffusion in solid and spin-lattice relaxation 14. NMR studies on lithium ionic conductors 15. NMR studies on protonic conductors 16. Summary**Evaluation Criteria)** Report 100%**Textbook)** 遍歴電子系の核磁気共鳴 (朝山邦輔著, 裳華房)**Reference)** To be introduced in the class**Contents)** <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169600>**Contact)**

⇒ takashi Ohno (A201, 656-7549)

⇒ Nakamura (A216, +81-88-656-7577, koichi@pm.tokushima-u.ac.jp)

Engineering of Correlated Electron Matter

2 units

Yutaka Kishimoto · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING
Yu Kawasaki · ASSOCIATE PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING**Target)** In many solid-state materials, new phenomena evolve due to strong electron interactions. In this Lecture, review will be given on some advanced topics and their applications, including high temperature superconductivity, metal-insulator transition and strongly correlated electronics.**Outline)** New types of superconducting and magnetic phenomena emerge in correlated electron matters. The term "correlated electron" represents the state of matter where many electrons are strongly interacting with each other. After an introductory talk on magnetism and superconductivity, review will be given on some advanced topics, including high temperature superconductivity, metal-insulator transition and colossalmagneto resistance. Potential application of correlated electron matters to technology is also presented focusing on spintronics or strongly correlated electronics.**Style)** Lecture**Keyword)** strongly correlated electron systems, Mott insulator, colossalmagneto resistance, high temperature superconductor**Goal)** To understand basic concepts of correlated electron matter and its application**Schedule)** 1. Introduction to correlated electron matters 2. Perspectives of magnetism and superconductivity in correlated electron matters 3. Electronic states of atoms and ions 4. Magnetic ions in crystal electric field 5. Introduction to superconductivity 6. How to probe rich properties in correlated electron matters 7. Mott insulator and metal-insulator transition 8. Spin, charge and orbital in transition metal oxides 9. Colossalmagneto resistance in transition metal oxides 10. Application of transition metal oxides with correlated electrons 11. High temperature superconductivity 12. Heavy-fermion superconductivity 13. Electronic states of organic conductors 14. Application of superconductors with correlated electrons 15. Towards strongly correlated electronics**Evaluation Criteria)** Reports on several subjects in lecture.**Contents)** <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169545>**Contact)**⇒ Kishimoto (A202, +81-88-656-7548, yutaka@pm.tokushima-u.ac.jp) (Office Hour: 金曜日 16:00-17:30)
⇒ Kawasaki (A217, +81-88-656-9878, yu@pm.tokushima-u.ac.jp)**Plasma Science and Technology**

2 units

Kaoru Ohya · PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) The lecture aims to understand electronic, atomic and molecular collision processes in gases and solids and to present their various applications.**Outline)** 1) Electronic, atomic and molecular collisions in gases and solid. Plasma physics and chemistry. Surface and materials science related to plasma-solid interactions. 2) Application to material processing technologies for electronic devices. Plasma-wall interactions in controlled thermonuclear fusion devices.**Style)** Lecture in combination with Portfolio**Keyword)** plasma, Collision theory, plasma-surface interaction, plasma applications**Goal)**

1. Understanding on collision processes in gases and solids
2. Understanding on applications to material processing technologies and plasma-wall interactions in controlled thermonuclear fusion devices.

Schedule) 1. Introduction to collision theory 2. Interaction potential 3. Elastic collision and nuclear stopping power 4. Inelastic collision and electronic stopping power 5. Inelastic processes in gases 6. Electron and Ion transport in gases 7. Reflection and thermal re-emission from solids 8. Collision mixing and diffusions in solids 9. Physical sputtering and chemical sputtering 10. Plasma chemical vapor deposition diffusion 11. Plasma-assisted etching 12. Other applications to material device processing 13. Plasma-wall interactions in nuclear fusion devices 14. Edge plasma physics 15. Hydrogen recycling and material erosion 16. Conclusions and future problems**Contents)** <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169627>**Contact)**

⇒ Ohya (E 棟 2 階南 A-9, +81-88-656-7444, ohya@ee.tokushima-u.ac.jp)

Photonic Semiconductor Device Physics

2 units

Shiro Sakai · PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING
Yoshiki Naoi · ASSOCIATE PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING
Katsushi Nishino · ASSOCIATE PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING**Target)** To understand the device physics and fabrication technique of photonic semiconductor devices..**Outline)** Interaction of photons and electrons in semiconductors, physics of superlattice semiconductors and their applications as photonic devices. Crystal growth of semiconductors and heteroepitaxy.**Style)** Lecture**Keyword)** Semiconductor, Photonic device**Relational Lecture)** "Optical and Functional Inorganic Materials"(0.5, ⇒p.138)**Goal)**

1. To understand device physics of photonic devices in terms of interaction of photons and electrons
2. To understand device physics of quantum effect devices
3. To understand crystal growth and related technologies for fabrication of photonic devices

Schedule) 1. Introduction 2. Energy band structure of semiconductors 3. Quantum statistics of electrons in semiconductors 4. Carrier transport in semiconductors 5. Quantum devices and superlattice 6. Light absorption in semiconductors (interaction of electrons and photons) 7. Photocinductivity, photovol and photodiode 8. Physics of light emission of semiconductors 9. Radiative recombination, non-radiative recombination, stimulated emission and spontaneous emission 10. Light emitting diodes and lasers 11. Devices for optical communication 12. Crystal growth of substrates for photonic semiconductor devices 13. MOCVD and MBE 14. Fabrication of Ohmic contact 15. Nano-photonic devices and fabrication technology 16. Examination**Evaluation Criteria)** Report 50%, Examination 50%. More than 60% is required to pass this class.**Textbook)** To be introduced in the class.**Contents)** <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169616>**Contact)**

- ⇒ Sakai (E棟2階南 A-3, +81-88-656-7446, sakai@ee.tokushima-u.ac.jp)
 ⇒ Naoi (E棟2階南 A-4, +81-88-656-7447, naoi@ee.tokushima-u.ac.jp) (Office Hour: 年度ごとに学科の掲示を参照すること.)
 ⇒ Nishino (E棟2階南 A-5, +81-88-656-7464, nishino@ee.tokushima-u.ac.jp)

Note) This lecture will be given in English.

Optical and Functional Inorganic Materials

2 units

Yasuo Ohno · PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Kikuo Tominaga · ASSOCIATE PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) This course aims to learn the fundamentals of material science of such as single crystals, polycrystals or amorphous films for optical and functional materials. At the same time, the synthesis methods of various films, their evaluation techniques and the propagating optical beam and acoustic waves in crystals are lectured. Apart from above, semiconductor device physics is also included.

Outline) Fundamentals of crystal science is lectured at first. Optical and electronic processes in optical and functional materials such as single crystals, polycrystals or amorphous films are followed. Advanced solid state physics of semiconductors, dielectric and ferroelectric materials are included. Synthesis methods of optical and functional crystals and films, evaluation methods of film properties are also contained. Electro-optical and piezo-electrical effects and solid state physics relating with their effects, characterization of crystals, symmetry elements of crystals and material constants, optical properties of crystals, electro-optical effects and nonlinear effects, piezoelectricity, acoustic waves in crystal, interaction of photons and phonons in crystal, synthesis methods of thin films (PVD method; electron beam evaporation, MBE, sputtering, laser ablation), film properties (characterizations of electrical, optical and mechanical properties) are included. In addition, modern semiconductor device physics, such as hot carrier effects, deep trap effect, short channel effects, etc will be lectured.

Style) Lecture and exercise

Keyword) Functional material, semiconductor device, crystal optics, thin film technology, deposition techniques of thin films

Relational Lecture) “Photonic Semiconductor Device Physics”(0.5, ⇒p.137), “Nonlinear Optical Devices”(0.5, ⇒p.155)

Goal) Understanding of the solid state physics of piezoelectric materials and functional thin films

Schedule) 1. Characterization of crystals 2. Symmetry elements of crystals and material constants 1 3. Symmetry elements of crystals and material constants 2 4. Optical properties of crystals 1 5. Optical properties of crystals 2 6. Electro-optical effects and nonlinear effects 1 7. Electro-optical effects and nonlinear effects 2 8. Piezoelectricity 1 9. Piezoelectricity 2 10. Acoustic waves in crystal 1 11. Acoustic waves in crystal 2 12. Interaction of photons and phonons in crystal 13. Synthesis methods of thin films 1(PVD method; electron beam evaporation, MBE, sputtering, laser ablation) 14. Synthesis methods of thin films 2(PVD method; electron beam evaporation, MBE, sputtering, laser ablation) 15. Film properties (Characterizations of electrical, optical and mechanical properties) 16. Exercise

Evaluation Criteria) Reports for each theme and examination

Textbook) Tomoya Ogawa: Fundamentals in Crystal Engineering, Shoukabo (in Japanese) and Shunichi Gonda, Applied Handbook of Thin Film Depositions, (NTS) (in Japanese)

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169639>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Ohno (E棟2階南 A-7, +81-88-656-7438, ohno@ee.tokushima-u.ac.jp)
 ⇒ Tominaga (E棟2階南 A-6, +81-88-656-7439, tominaga@ee.tokushima-u.ac.jp)

Note) This lecture will be given in English.

Nonlinear Optical Devices

2 units

Masuo Fukui · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Masanobu Haraguchi · ASSOCIATE PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) To understand the principle, typical structure, advantages and disadvantages of current nonlinear optical devices. To develop ability to design new devices and solve various problems for applications.

Outline) Physics of second-order and third-order nonlinear optical phenomena. Principles of electro-optics. Optical nonlinearities in fibers. Photorefractive materials. Nonlinear optical media. Anisotropic nonlinear optical media. Dispersive nonlinear optical media. Coupled-wave theory. Electro-optic and acousto-optic devices. Second-order and third-order nonlinear optical devices. Photonic switches. All-optical switches. Bistable optical devices. Optical connections.

Style) Portfolio

Keyword) nonlinear optics, harmonic generation, nonlinear optical device, optical switch

Relational Lecture) “Optical and Functional Inorganic Materials”(0.5), “Crystal Growth of Optical Materials”(0.5)

Requirement) Student should have fundamental knowledge of electromagnetic theory, waveoptics, optical properties of materials and lasers.

Notice) The following plan of this course is an example. Plans may be modified depending on knowledge and experiences of students.

Goal)

1. Possible to explain principles, structure and characteristics of optoelectric devices.
2. Possible to explain principles, structure and characteristics of the second-order nonlinear optical devices.
3. Possible to explain principles, structure and characteristics of the third-order nonlinear optical devices.

Schedule) 1. Introduction & interview 2. nonlinear optical phenomena 3. Electrooptic effect and its applications 4. Magneto-optic effect and its applications 5. Acousto-optic effect and its applications 6. principle of second-order nonlinear effects 7. Second-order nonlinear optical materials 8. Second-order nonlinear optical devices 9. principle of third-order nonlinear effects 10. third-order nonlinear optical materials 11. Third-order nonlinear devices 12. Experiment for nonlinear optical phenomena 13. Current application of nonlinear devices 14. Photonic crystal 15. Integrated optical devices

Evaluation Criteria) Activity:20%, reports:40% and oral examinations:40%

Textbook) After interview, we will decide suitable text books.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169621>

Contact)

- ⇒ Haraguchi (Opt.209, +81-88-656-9411, haraguti@opt.tokushima-u.ac.jp) (Office Hour: 月曜16:30-17:30, 木曜16:30-17:30)
 ⇒ Fukui (Opt.208, +81-88-656-9410, fukui@opt.tokushima-u.ac.jp)

Power System Electromagnetic Compatibility

2 units

Naoyuki Shimomura · ASSOCIATE PROFESSOR / ELECTRIC ENERGY ENGINEERING, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Masatake Kawada · ASSOCIATE PROFESSOR / ELECTRIC ENERGY ENGINEERING, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) 1. To give the students understanding of the characteristics of electromagnetic compatibility in nature. 2. To give the students understanding of the characteristics of electromagnetic field generated from power system and the effect on biological system 3. To give the students understanding of the mechanisms of electromagnetic field generated from power system, the mitigation and the detection method. 4. To improve the presentation skill of students by presenting the latest transaction or journal papers in this field in English.

Outline) Characteristics of artificial electromagnetic fields of DC, extremely low frequency (ELF) and high frequency (HF) arising from power systems are quantitatively explained as well as those of the fields from natural environments. Associate Prof. Shimomura gives lectures on how the electromagnetic fields are produced by power systems and on the management (characterization, reduction & mitigation and public education) of ELF electric and magnetic fields. Associate Prof. Kawada gives lectures on how the high frequency electromagnetic fields are produced by power systems and on the detection of VHF and UHF electromagnetic waves.

Style) Lecture in combination with Portfolio

Keyword) Electrical power engineering, Electromagnetic compatibility, Bioelectromagnetics

Relational Lecture) “Advanced Theory of Electric Power Control Systems”(0.5, ⇒p.139)

Requirement) Understanding of electromagnetic compatibility

Goal)

1. To understand the characteristics of electromagnetic compatibility in nature.
2. To understand the characteristics of electromagnetic field generated from power system and the effect on biological system
3. To understand the mechanisms of electromagnetic field generated from power system, the mitigation and the detection method.

Schedule) 1. EMC in nature 1 (Electric field) 2. EMC in nature 2 (Magnetic field) 3. Characteristics of power system EMC 1 (Electric field) 4. Characteristics of power system EMC 2 (Magnetic field) 5. Characteristics of low frequency electromagnetic field generated from power system 1 6. Characteristics of low frequency electromagnetic field generated from power system 2 7. Effect of low frequency electromagnetic field generated from power system on biological system 1 8. Effect of low frequency electromagnetic field generated from power system on biological system 2 9. Mechanisms of electromagnetic field generated from power system. 10. Coupling mechanisms of electromagnetic field and biological system 11. Analysis method between electromagnetic field and biological system 12. Social effects on electromagnetic field generated from power system 13. Mechanisms of the high frequency electromagnetic field generated from power system 1 14. Mechanisms of the high frequency electromagnetic field generated from power system 2 15. Method to detect the high frequency electromagnetic field generated from power system 16. Conclusion of power system EMC

Evaluation Criteria) Report 50%, Presentation 50%. More than 60% is required to pass this class.

Textbook) printed material

Reference)

- ◇ D.F.Warne, Electrical Power Engineer's Handbook, Newnes
- ◇ J.Patrick Reilly, Applied Bioelectricity, Springer
- ◇ IEEE Trans on "Energy Conversion", "Power Delivery", "Electromagnetic Compatibility", and "Dielectrics and Electrical Insulation"

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169603>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Kawada (E 棟 2 階北 B-10, +81-88-656-7460, kawada@ee.tokushima-u.ac.jp) (Office Hour: (水)(木) 16:00-17:00)

Note) Language: English

Power Energy Conversion and Control Engineering

2 units

Tokuo Ohnishi · PROFESSOR / ELECTRIC ENERGY ENGINEERING, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) To investigate and learn new energy conversion and control technologies in the fields of the electric power system and the renewable energy.

Outline) Power electronics technologies in utility interconnection systems such as HVDC (High-Voltage Direct-Current) transmission system, SVG (Static Var Generator), UPS (Uninterruptible Power Supply) and FACTS (Flexible AC Transmission System) and in renewable energy development system such as photovoltaic, wind and fuel cell power generation system.

Keyword) Energy conversion, Energy control, Utility interconnection control system, Renewable energy

Fundamental Lecture) "Advanced Power Electronics"(0.5, ⇒p.67)

Requirement) Prerequisites: It is preferable to have knowledge equal with power electronics in undergraduate and advanced power electronics in masters degree course.

Goal)

1. State of the Arts and Trends of The Utility Interconnection System using Power Electronics Technology
2. State of The Arts and Trends of The Renewable Energy Development using Power Electronics Technology

Schedule) 1. Introduction of Power Electronics Technology in Utility Interconnection System 2. High Voltage Direct Current Transmission System 3. Flexible AC Transmission System 4. Static Var Generator 5. Unified Power Flow Controller 6. Uninterruptible Power Supply 7. Introduction of Power Electronics Technology in Renewable Energy 8. Photovoltaic Power Generation System 9. Wind Power Generation System 10. Micro Gas Turbine System 11. Fuel Cell System 12. Charging and Discharging System for DC Battery 13. Hybrid Power Supply System 14. Distributed Generation System 15. Discussion for Reports

Evaluation Criteria) Report and presentation

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169611>

Contact)

⇒ Ohnishi (E 棟 2 階北 B-1, +81-88-656-7456, ohnishi@ee.tokushima-u.ac.jp)

Applied Superconductivity

2 units

Kiyoshi Inoue · PROFESSOR / ELECTRIC ENERGY ENGINEERING, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) As concerned with superconducting technology of which applications are beginning, superconducting physics, superconducting materials, superconducting applications, and cryogenic engineering are lectured in order to understand synthetically the applied superconductivity.

Outline) A macroscopic quantized effect; i. d. superconducting phenomenon, has many singular properties, such as complete diamagnetism, perfect zero-resistance, and fluxoid (flux quantization). Therefore in order to improve the efficiency of energy conversion and the sensitivity of measurement many superconducting applications were being progressed. On the other hand, the superconductivity appeared only at very low temperatures, which was a large obstacle to applications. However the recent great progress in cryogenic engineering and the discovery of high Tc superconductors brought the superconducting applications more easily. New practical applications were also beginning. Superconducting physics, practical superconducting materials, fabrication processes of superconducting cable, stabilization of superconducting cable, design of superconducting magnet, protection of superconducting magnet, cryogenic refrigeration engineering, cryogenic thermal insulation technology, superconducting applications, SQUID applications are lectured in technological situations in order to understand synthetically the applied superconductivity.

Style) Lecture in combination with Portfolio

Keyword) Superconductivity, Superconducting Applications, Superconducting Materials, Cryogenics

Relational Lecture) "Engineering of Correlated Electron Matter"(0.5, ⇒p.137)

Requirement) Understanding of electromagnetism and material science.

Goal)

1. Understanding technological merit and demerit of superconducting physical properties
2. Understanding physical background of superconductivity and possibility of superconducting materials
3. Understanding superconducting applications and their possibility

Schedule) 1. Superconducting Physics I 2. Superconducting physics II 3. Metallurgical superconducting materials. 4. Oxide and other type high Tc superconducting materials. 5. Flux jump and stabilization of superconducting cable. 6. Fabrication processes of superconducting metallurgical wires. 7. Fabrication processes of oxide and other type superconducting wires. 8. Fabrication technology of superconducting wire and supporting technology. 9. Cryogenic refrigeration, fabrication technology of cryogen, and physical properties of cryogen 10. Cryogenic Dewar, cryogenic thermal insulation, and cooling methods. 11. Superconducting applications for energy saving. 12. Superconducting applications for medical diagnosis and for preserving environment. 13. Superconducting applications for maglev train, fusion reactor, and accelerator. 14. Problems of oxide superconductors for practical applications. 15. Applications of SQUID. 16. Presentation by report

Evaluation Criteria) Report 50%, Presentation 50%, Higher than 60% is required to pass this class

Textbook)

- ◇ Superconducting Technology (in Japanese)
- ◇ Superconducting Materials (in Japanese)
- ◇ Introduction to Superconductivity, by Michael Tinkham, McGraw-Hill Inc.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169595>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Inoue (B-7, +81-88-656-7462, inouek@ee.tokushima-u.ac.jp) (Office Hour: Monday 13:30 - 17:30, Wednesday 13:30 - 17:30)

Advanced Theory of Electric Power Control Systems

2 units

Kensuke Kawasaki · PROFESSOR / ELECTRIC POWER, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Kiyoshi Takigawa · ASSOCIATE PROFESSOR / ELECTRIC POWER, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) The purpose of this lecture is to understand the characteristic of various power generation systems and electric power systems and to master new technologies on distributed power sources and electric power systems.

Outline) The principle of power generation in various kinds of power generation machines, the characteristic of electric power systems and the analysis technique are introduced. Moreover, the electric power control technology for a distributed power source using an inverter, and control techniques in electric power systems connecting power generation facilities whose output change will occur, such as solar systems, are introduced.

Style) Portfolio

Keyword) electric power control, solar system, inverter

Requirement) N/A

Goal)

1. To master analysis technique of power generation systems
2. To master analysis techniques of electric power systems
3. To understand control mechanism of distributed power generation systems
4. To master analysis techniques of distributed power generation systems

Schedule) 1. Energy transformation technique 2. Basic circuit equations for electric power systems 3. Analysis method 1 in electric power systems 4. Analysis method 2 in electric power systems 5. Analysis method 3 in electric power systems 6. Voltage and reactive power in electric power systems 7. Modeling of synchronous machines 8. Characteristics of synchronous machines 9. Modeling of distributed power generation systems 10. Stability of electric power systems 11. Control of electric power systems 12. Control of distributed power generation systems 13. Requirements for stability in distributed power generation systems 14. Advances analysis method 1 in electric power systems 15. Advances analysis method 1 in electric power systems 16. Examination

Evaluation Criteria) Evaluate with portfolio and examinations

Textbook) printed materials

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169602>

Advanced Mechatronics Engineering

2 units

Ikuro Morita · PROFESSOR / ELECTRIC ENERGY ENGINEERING, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Takashi Yasuno · ASSOCIATE PROFESSOR / ELECTRIC ENERGY ENGINEERING, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) This class introduces the basic principle of the diagnosis technology and the control technique of the industrial machine system that uses an electric actuator.

Outline) The objective of this lecture is to give a course on the modeling methods, the sensor techniques, the signal processing methods, the intelligent control algorithms for industrial machines driven by electrical actuators. The applications of these advanced schemes are also included.

Style) Lecture in combination with Portfolio

Keyword) Diagnosis Technology, Control Algorithm, Intelligent

Relational Lecture) “Control System Design”(0.5, ⇒p.142), “Power Energy Conversion and Control Engineering”(0.5, ⇒p.139)

Goal)

1. The modeling, the sensor technology, and the diagnosis technology of the control system are introduced.
2. Improvement performances of control system, and Control algorithm for intelligent are introduced.

Schedule) 1. Sensor technology for failure diagnosis. 2. Signal processing technology for failure diagnosis. 3. Modeling method of electrical machines. 4. Modeling method of electrical machines on faulty conditions. 5. Characteristics of electrical machines on faulty conditions. 6. Intelligent control method 7. Fuzzy reasoning 8. Control system using fuzzy reasoning 9. Neural networks 10. Control system using neural networks 11. Motion control system 12. Two degree-of-freedom control system 13. Design method of feedback controller for disturbance suppression 14. Design method of feedforward controller for improvement of responses 15. Responses of two degree-of-freedom control system 16. Return of report, and conclusions

Textbook) The print is distributed.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169641>

Contact)

⇒ Morita (E 棟 2 階北 B-3, +81-88-656-7451, morita@ee.tokushima-u.ac.jp)

⇒ Yasuno (E 棟 2 階北 B-5, +81-88-656-7458, yasuno@ee.tokushima-u.ac.jp)

Communication Systems

2 units

Takahiro Oie · PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) Understanding the designing and administrating scheme of wireless communication system and multi-nodes networks. And bring up faculty of designing original telecommunication system.

Outline) Timing detection and regeneration of a phase and a frequency using a linear filter, design of a digital PLL, digital modulation and demodulation, and multiple access technique, e. g. FDMA, TDMA, CDMA in wireless communications. Design of the spread spectrum systems and its fundamental technologies, e. g. frequency-synthesizer, data transmission protocol over computer networks, network administration techniques, e. g. DNS, and implementation of application program for internetworking.(Portfolio style)

Style) Portfolio

Keyword) Spread Spectrum, Phase Locked Loop, Frequency Synthesizer, Computer Networks, Network Architecture, Network Administration

Fundamental Lecture) “Advanced Theory of Electrical Communication”(1.0, ⇒p.68)

Requirement) Students are required to have a good understanding of communication engineering and related subjects up to master-level.

Goal)

1. Able to design the multiple-access wireless communication system (e.g. FDMA, TDMA, CDMA).
2. Able to design the network architecture which satisfies the specified demands on multi-nodes network (e.g. computer networks).

Schedule) 1. Timing detection and regeneration of a phase 2. Phase-locked loops and its components 3. Response to linear frequency variation 4. All digital phase-locked loops 5. The PLL in communications 6. Digital modulation and demodulation 7. Mobile communication system (FDMA, TDMA, CDMA) 8. Transmission protocol of computer networks (Ethernet, ATM) 9. Transmission protocol of computer networks (TCP, UDP) 10. Network administration technique (DNS) 11. Network administration technique (SNMP, MIB) 12. Implementation of network application 13. Designing the application protocol 14. Distributed database system 15. Designing the distributed system

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169576>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Oie (E-3F-C-1, +81-88-656-7479, alex@ee.tokushima-u.ac.jp) (Office Hour: Monday 16:20~17:20, Thursday 16:50~17:50)

Integrated System Design

2 units

Shinsuke Konaka · PROFESSOR / INTELLIGENT NETWORKS AND COMPUTER SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) High frequency design method and theory for GHz/Gbit high speed integrated circuits are lectured and discussed.

Outline) High frequency circuit design methodology using circuit simulator and 3D electromagnetic simulator is lectured by using high speed bipolar/MOS transistor parameters and high frequency circuit models of wire, poly-silicon resistor, MIM capacitor and spiral inductor.

Style) Lecture and exercise

Keyword) RF analog circuit design, AC device parameters, High frequency integrated circuits

Relational Lecture) “Integrated System Design”(0.5, ⇒p.140)

Goal)

1. To understand high frequency circuit models of transistor, wire, resistor, MIM capacitor and spiral inductor.
2. To understand high frequency circuit design and measurement.

Schedule) 1. Bipolar/MOS transistor device models 2. AC equivalent circuit models of a wire, resistor, MIM capacitor and spiral inductor 3. S parameter measurements and AC device parameter extractions 4. High frequency stability design 5. Case studies of high frequency integrated circuits

Evaluation Criteria) Report 100%. The passing mark is not less than 60%.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169573>

Contact)

⇒ Konaka (E棟3階南 D-8, +81-88-656-7469, konaka@ee.tokushima-u.ac.jp)

Electronic Information System Design

2 units

Masaki Hashizume · PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Hiroyuki Yotsuyanagi · ASSOCIATE PROFESSOR / INTELLIGENT NETWORKS AND COMPUTER SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) This class introduces the techniques and the recent topics related to the design and test of logic circuits.

Outline) Performance analysis methods of digital circuits in information systems, high speed logic circuit design, low power circuit design and optimized logic circuit design for high performance information system, testing and testable design of digital and analog circuits for realizing high reliable information system.

Style) Lecture in combination with Portfolio

Keyword) system design for integrated circuits, testing of integrated circuits, synthesis for testability

Fundamental Lecture) “Advanced Theory of Electronic Circuits”(1.0, ⇒p.69)

Relational Lecture) “Integrated Information System Design”(0.5, ⇒p.141), “Integrated System Design”(0.2, ⇒p.140)

Requirement) Familiarity with switching theory

Goal)

1. To understand system design techniques for integrated circuits
2. To understand test technologies for integrated circuits
3. To understand design for testability techniques for integrated circuits

Schedule) 1. compositions of information systems 2. design process of logic circuits 3. logic synthesis for combinational circuits 4. design process of sequential circuits 5. principle of dynamic logic circuits 6. design of dynamic logic circuits 7. hardware description language 8. circuit design using HDL 9. test process of logic circuits 10. test technologies for combinational logic circuits 11. test technologies for sequential logic circuits 12. design for testability 13. test technologies using design for testability 14. techniques of design for testability 15. Built-in self test for logic circuits 16. Final examination

Evaluation Criteria) Participation and presentation:30%; Final examination:70%

Textbook) specified in the first class

Reference) introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169598>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Hashizume (E棟3階南 D-2, +81-88-656-7473, tume@ee.tokushima-u.ac.jp)
 ⇒ Yotsuyanagi (E棟3階南 D-3, +81-88-656-9183, yanagi4@ee.tokushima-u.ac.jp) (Office Hour: 水・金 17:00~ 18:00)

Note) This subject will be given in English.

Multimedia Communication Theory and Technology

2 units

Yasutada Oohama · PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Hitoshi Tokushige · ASSOCIATE PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) This class provides the knowledge necessary to understand fundamental technics for multimedia information and communication systems, such as coding method of multimedia data, information security, network security, user authentication, cryptology

Outline) This lecture is focused on multimedia communication theory and technology. Particular, Internet Technology, Computer Networks, Satellite Communications, Information Security and Cryptology, Multimedia Coding Theory and Its Applications are explained in this lecture.

Style) Lecture

Keyword) Internet Technology, Computer Networks, Satellite Communications, Information Security, Multimedia Coding Theory

Fundamental Lecture) “Advanced Exercise on Intelligent Science”(1.0)

Requirement) 特になし

Goal)

1. fundamental technics for multimedia information and communication systems can be learned
2. Development method for multimedia information and communication systems can be learned

Schedule) 1. Multimedia Communication Theory and Technology 2. Coding Theory for Multimedia data (1) 3. Coding Theory for Multimedia data (2) 4. Coding Theory for Multimedia data (3) 5. Digital data Transmission (1) 6. Digital data Transmission (2) 7. Cryptology (1) 8. Cryptology (2) 9. Cryptology (3) 10. Information Security 11. Network Security (1) 12. Network Security (2) 13. Contents Protection for Multimedia Data 14. User Authentication 15. Digital Signature 16. Assignment

Evaluation Criteria) Assignments count 100%.

Textbook) Printed synopses of lecture are distributed.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169636>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Oohama (C302, +81-88-656-9446, oohama@is.tokushima-u.ac.jp)
 ⇒ Tokushige (C303, +81-88-656-9447, tokusige@is.tokushima-u.ac.jp) (Office Hour: 月曜日, 火曜日 (17:00-18:00))

Integrated Information System Design

2 units

Norio Akamatsu · PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Minoru Fukumi · PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Takashi Shimamoto · ASSOCIATE PROFESSOR / INTELLIGENT NETWORKS AND COMPUTER SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) The aim of this lecture is to master the modern design technologies of very large scale integrated circuits.

Outline) Very large scale integrated circuit (V-LSI) design and production method. Using CAD technology, VLSI logic design, testing and fabrication are explained. Design of high-speed algorithm and parallel distributed processing system. Neural network and genetic algorithm for integrated circuit design.

Style) Lecture and exercise

Requirement) It is necessary to get the unit of the mos integrated circuits in master course.

Notice) In order to get the unit of this lecture, the graduate course students should have learned the state-of-the-art of the modern hardware technology, especially C-MOS integrated circuits.

Goal) This lecture is designed to provide engineers and scientists with an introduction to the field of VLSI neurocomputing.

Schedule) 1. Embedded software architecture 2. Real-time schedule method 3. System description language 4. Application specific integrated circuits 5. Power consumption and speed of very large scale integrated circuits 6. Shared memory and communication method 7. Cache memory and main memory 8. System modeling and documentation 9. Partitioning and performance 10. data flow graph and finite state machine 11. Behavior description language and Spec C 12. Control data-flow graph and function synthesis 13. Neural computing board diagram using EEPROM-style programmable synapses 14. Layout pattern example 15. Gate-sizing wiring and timing driven 16. Boundary scan and delay estimation

Evaluation Criteria) Unit evaluation contains test and design of VLSI

Textbook) Hardware Annealing in Analog VLSI Neurocomputing, Kluwer Academic Publishers

Reference) Electronics Circuits, written by Norio Akamatsu

Webpage) <http://www.A3.is.tokushima-u.ac.jp>

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169575>

Student) Able to be taken by student of other department and faculty

Contact)

- ⇒ Akamatsu (D209, +81-88-656-7493, akamatsu@is.tokushima-u.ac.jp)
 ⇒ Fukumi (D210, +81-88-656-7510, fukumi@is.tokushima-u.ac.jp) (Office Hour: 原則として、月曜日 15時～18時、ただし年度により異なる場合があるので講義の際に指定する。)
 ⇒ Shimamoto (E棟3階南 D-5, +81-88-656-7483, simamoto@ee.tokushima-u.ac.jp) (Office Hour: 年度毎に学科の掲示、あるいは居室前の掲示を参照すること)

Note) Lecturer will show the schedule of this lecture and design technologies.

Advanced Nonlinear Circuit Technology

2 units

Yoshifumi Nishio · ASSOCIATE PROFESSOR / INTELLIGENT NETWORKS AND COMPUTER SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) Nonlinear circuits technology is lectured.

Outline) Various nonlinear circuits from communication circuits such as oscillators and modulators to large scale analog circuits including neural networks are utilized in recent technology. In this course, analysis methods, design methods and simulation methods of these nonlinear circuits are lectured. Furthermore, recent development of nonlinear circuit technology is introduced and future applications are discussed. (Style: Lecture)

Style) Lecture and exercise

Keyword) Nonlinear circuits, Neural network, Chaotic circuits

Fundamental Lecture) “Advanced Circuit Theory”(0.7, ⇒p.68), “Advanced Theory of Complex System Engineering”(0.5, ⇒p.62), “Advanced Theory of System Analysis”(0.5, ⇒p.68)

Relational Lecture) “Nonlinear System Design”(0.5, ⇒p.142)

Requirement) Students are required to know how to analyze basic linear circuits.

Notice) Course is taught in English.

Goal)

1. Understanding of importance of nonlinear circuit technology.
2. Learning of technique dealing nonlinear circuit technology.

Schedule) 1. Nonlinear circuits in engineering systems. 2. Oscillators. 3. Communication circuits. 4. Neural networks. 5. Chaotic circuits. 6. Ultra-high speed integrated circuits. 7. Analysis of nonlinear circuits. 8. Design of nonlinear circuits. 9. Simulation methods of nonlinear circuits. 10. Recent development of nonlinear circuits (for 2 lectures). 11. Future applications of nonlinear circuits (for 3 lectures). 12. Conclusions. 13. Final examination.

Evaluation Criteria) Final examination 80% and exercise 20%.

Textbook) None.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169620>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Nishio (D-7, E-3F-South, +81-88-656-7470, nishio@ee.tokushima-u.ac.jp)

Control System Design

2 units

Tomohiro Kubo · PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) To learn the control theory, mainly the robust control.

Outline) When a control system is synthesized, it is important to take the uncertainty of the plant model and the disturbances into account. The design methods to obtain robust control systems against these effects are demonstrated.(lecture or portfolio style)

Style) Lecture in combination with Portfolio

Keyword) robust control

Fundamental Lecture) “Advanced Control Theory”(1.0, ⇒p.67)

Relational Lecture) “Advanced Control Theory”(0.5, ⇒p.67)

Requirement) Knowledge about the control system design method based on the state space method and the transfer function method is required to attend this lecture.

Notice) Preparation is essential.

Goal)

1. Mastering the classical robust control.
2. Mastering the H_{∞} control.

Schedule) 1. What is the robust control? 2. Stability of linear systems 3. Sensitivity 4. Expression of uncertainty 5. Quadratic stabilization 6. Stability margin of LQ regulator 7. Insensitivity of LQ regulator 8. Review of the first half 9. Singular value and H_{∞} norm 10. Robust stabilization 11. Sensitivity reduction 12. Standard H_{∞} problem 13. Solution (state feedback) 14. Solution (output feedback) 15. Review of the second half 16. Grand review

Evaluation Criteria) Mainly by the report.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169579>

Contact)

- ⇒ Kubo (E棟3階北 C-6, +81-88-656-7466, kubo@ee.tokushima-u.ac.jp) (Office Hour: 月曜日 8:30~9:30, 木曜日 17:00~18:00)

Nonlinear System Design

2 units

Hiroshi Kawakami · EXECUTIVE DIRECTOR / THE UNIVERSITY OF TOKUSHIMA

Tetsushi Ueta · ASSOCIATE PROFESSOR / APPLIED INFORMATION MEDIA ENGINEERING, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) For various nonlinear phenomena observed in physical, chemical, and biological systems, construction methodologies of numerical models describing their dynamical behavior are discussed. Analysis and design methods are also studied.

Outline) Analysis and design of nonlinear dynamical systems are discussed: 1) description and characterization of dynamical systems, 2) qualitative theory of ordinary differential equations, 3) numerical method of analysis, 4) analysis of chaotic states and bifurcations 5) controlling chaos. Typical nonlinear phenomena are illustrated and analyzed by qualitative and numerical methods. Nonlinear system design problems are also discussed.

Style) Lecture

Keyword) nonlinear dynamical system, bifurcation, system design

Fundamental Lecture) “Advanced Theory of Complex System Engineering”(1.0, ⇒p.62), “Topics of Analysis for Mathematical Science”(1.0, ⇒p.8), “Advanced Circuit Theory”(1.0, ⇒p.68)

Relational Lecture) “Control System Design”(0.5, ⇒p.142), “Advanced Nonlinear Circuit Technology”(0.5, ⇒p.142)

Requirement) None

Notice) A lecture “Advanced Theory of Complex System Engineering,” available for the Master’s course is mutually cooperated with this lecture.

Goal) acquisition of techniques for deriving model equations and proceeding bifurcation analyses.

Schedule) 1. Introduction to dynamical systems 2. Fixed points, equilibria and their stability 3. Periodic solution and its stability 4. Analytic approaches for periodic solutions 5. Numerical approaches for periodic solutions 6. Local bifurcations 7. Calculation of bifurcation parameter values 8. Global bifurcations and its numerical analysis 9. Deriving model equations 1 10. Deriving model equations 2 11. Symmetry and its applications to calculations 12. Various bifurcation phenomena and chaos 13. Existence and numerical indices for chaos 14. practice 1 15. practice 2 16. answers and survey

Evaluation Criteria) The total grade is evaluated by homework reports (70 %) and attendance of the class. (30 %)

Textbook) not specified.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169623>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Kawakami (E棟3階北 C-7, +81-88-656-7465, hukugakk@honbu.tokushima-u.ac.jp)
 ⇒ Ueta (Ait502, +81-88-656-7501, tetsushi@ait.tokushima-u.ac.jp) (Office Hour: Wednesday, afternoon)

Note) This lecture will be given in English.

Medical and Biological Engineering

2 units

Yohsuke Kinouchi · PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Masatake Akutagawa · ASSOCIATE PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) Various applications of electronic technologies to medical fields are described.

Outline) Fundamental approaches to apply engineering such as electronics to medical fields including diagnosis, treatment and alternative function are described in relation to life sciences such as physiology, biomechanics and so forth. Typical systems of medical instruments are introduced. The development of new technologies based on the intelligent functions of living bodies are presented. Functional characteristics of the nervous system and their application to information processing and control are discussed.

Style) Lecture in combination with Portfolio

Goal) 1 Biological signal measurement 2 Biological signal processing 3 Medical systems

Schedule) 1. Introduction of medical engineering 2. Introduction of measurement of biological signal 3. Electrical measurement methods 4. Magnetic measurement methods 5. Ultrasonic measurement methods 6. Other measurement methods 7. Biological signal processing methods 8. Examples of biological signal processing 9. Biological system identification 10. Measurement of brain functions 11. Measurement of other functions 12. Biological monitor 13. Analysis of electrical properties of tissue 14. Examples of medical diagnosis technology 15. Examples of medical treatment technology 16. Medical prosthesis technology

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169530>

Contact)

⇒ Kinouchi (E 棟 3 階北 C-4, +81-88-656-7475, kinouchi@ee.tokushima-u.ac.jp)

⇒ Akutagawa (工学部電気棟 3 階北 C-5, +81-88-656-7477, makutaga@ee.tokushima-u.ac.jp) (Office Hour: Wed. 18:00 - 20:00, Fri. 17:00 - 18:00)

Note) This lecture will be given in English.

Medical Information Systems

2 units

Noboru Niki · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Yoshiki Kawata · ASSOCIATE PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) To understand the fundamental concepts of digital environment for medical diagnosis. To learn the design methods of medical information systems.

Outline) This course introduces the design and the implementation of digital environment for medical diagnosis based on the various technologies including medical image data acquisition and retrieval, computer aided diagnosis using multimodal medical data sets.

Style) Portfolio

Keyword) Imaging technology, Computed-aided diagnosis systems, Digital environment for medical diagnosis

Relational Lecture) “Medical and Biological Engineering”(0.5)

Goal)

1. To understand medical imaging techniques.
2. To understand various techniques of computer-aided diagnosis.
3. To understand the fundamentals of digital environment for medical diagnosis.

Schedule) 1. Introduction 2. Imaging techniques 3. Image processing techniques 4. Pattern recognition techniques 5. Visualization techniques 6. Virtual reality/Mixed reality techniques 7. Design of computer-aided diagnosis systems 8. Implementation of computer-aided diagnosis systems 9. Design and implementation of fundamentals of digital environment for medical diagnosis and therapy 10. Design of medical information systems (1) 11. Design of medical information systems (2) 12. Design of medical information systems (3) 13. Design of medical information systems (4) 14. Design of medical information systems (5) 15. Advanced medical information systems

Evaluation Criteria) Report 100%

Textbook) Reference books are introduced to each topics.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169528>

Contact)

⇒ Niki (Opt.507, +81-88-656-9430, niki@opt.tokushima-u.ac.jp)

⇒ Kawata (Opt.508, +81-88-656-9431, kawata@opt.tokushima-u.ac.jp)

Special Exercise on Electrical and Electronic Systems Innovation Engineering

2 units

All teachers

Target) To obtain wide knowledge on electric and electronic engineering and research skills.

Outline) To make research on your research topics with your adviser through discussions and readings of references.

Style) Portfolio

Keyword) research skill, Acquisition of professional knowledge

Requirement) none

Notice) none

Goal)

1. To obtain professional knowledge on your research topics
2. To get research skills
3. To get presentation skills

Schedule) 1. Determine your research topics 2. Read references on your research topics 3. Make research 4. Presentation and discussion

Evaluation Criteria) Evaluation with portfolio and examination

Textbook) Text books will be introduced by your supervisor at the beginning of this exercise.

Reference) References may be introduced by your supervisor.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169596>

Student) Able to be taken by only specified class(es)

Advanced Research on Electrical and Electronic Engineering

2 units

All teachers

Target) To obtain wide knowledge on recent engineering

Outline) To make research on a technology, which is different from your main research field.

Style) Portfolio

Keyword) Engineering, technology, different field

Requirement) N/A

Notice) N/A

Goal) To learn a recent technology, which is different from the main technology in your field

Schedule) Choose a research theme on technology or engineering, which is different from yours.

Evaluation Criteria) Evaluate with a portfolio and/or examinations.

Textbook) Ask to teachers

Reference) printed materials

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169597>

Student) Students belonging an other departments or colleges

Systems Innovation Engineering — Information Science and Intelligent Systems

SYLLABUS OF SUBJECTS

● Integrated Subjects

Human Factors ...Yoshida	144
Life Science ...Takagi · Tsuji	144
Social Science ...Goto	144
Science and Technology Studies ...Goto	145
Management Theory of New Business ...Vice chairperson of School Affairs Committee , Faculty of Engineering · First-line men with experience of practical business	145
Introduction to Intellectual Property ...Sakai · Osame · Fujii · Toyosu · Kubota	145
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Parallel and Distributed Processing Systems ...Shimomura · Ikeda · Sano	148
Applied Knowledge Systems ...Aoe · Kita · Ren · Shishibori · Kuroiwa · Fuketa · Morita	149
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● Specialized Exercise and Experiments

Advanced Exercise on Intelligent Science ...All teachers	150
Advanced Research on Intelligent Science ...Teachers in other colleges or departments	150

Human Factors

2 units
Atsuya Yoshida · PART-TIME LECTURER / FACULTY OF INTEGRATED ARTS AND SCIENCES

Target› The objective of this class is to provide students with sufficiently thorough appreciation of the many facets of the human factors discipline so that they may make use of it to their own doctoral works.

Outline› This class offers a broad and comprehensive overview of the human factors/ergonomics discipline with four areas of emphasis, (1) historical review of human factors research, (2) human physical, perceptual and cognitive capabilities and limitations, (3) application of human factors research data in design, especially in the interface design of computer-based systems, and (4) discussion about the relationship between the designed system (technology) and people.

Schedule› **1.** What is Human Factors **2.** Historical Overview of Human Factors **3.** Multi-Disciplinary Aspect of Human Factors **4.** Health and Safty Issue of Human Factors **5.** Human Psychological Capability **6.** Task Analysis **7.** Human Error **8.** Universal Design **9.** Cognitive Artifact **10.** Visibility and Affordance **11.** Human-Computer Interaction **12.** Human Information Processing **13.** Knowledge and Mental Model **14.** Usability Paradigms and Principles **15.** Evaluation and Testing **16.** Making system that makes us smart

Contents› <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169608>

Life Science

2 units
Hiroshi Takagi · PART-TIME LECTURER / FUKUI PREFECTURAL UNIVERSITY
Akihiko Tsuji · PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target› Understanding of significance of protein in biotechnology

Outline› Basics of structure, function and application of protein are introduced

Style› Lecture

Keyword› Protein, Enzyme, Biotechnology

Goal›

1. Understanding of multiple functions of proteins
2. Understanding of principle of protein engineering and its application

Schedule› **1.** Introduction of life science **2.** History of life science **3.** Structure and function of DNA and RNA **4.** mRNA is a template of protein **5.** Duplication of DNA **6.** Regulation of protein expression **7.** Human Genetics **8.** Genetic disease **9.** DNA diagnosis **10.** Structure and function of protein **11.** Principle of gene technology (1) **12.** Principle of gene technology (2) **13.** Protein engineering **14.** Future of life science (1) **15.** Future of life science (2) **16.** Preparation of report

Evaluation Criteria› Evaluation by report

Textbook› To be introduced in the class

Reference› To be introduced in the class

Contents› <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169586>

Contact›

⇒ Tsuji (G710, +81-88-656-7526, tsuji@bio.tokushima-u.ac.jp) (Office Hour: Monday 16:20-17:50)

Social Science

2 units
Shuzo Goto · PART-TIME LECTURER / SHIKOKU UNIVERSITY

Target› The mutual relationship of economic activities, the structure and function of economic society, and the concept and technique of mathematical programming modelling are lectured.

Outline› Not only the mutual relationship of economic activities is explained from domestic and international points of view, but also the technique of case studies by application of mathematical programming models is taught using the various kinds of materials and examples.

Keyword› Economic activities, Structure and function, Mathematical programming model

Goal› To understand the mutual relationship of economic activities, empirically explain them using the mathematical programming model and evaluate the model.

Schedule) 1. Guidance and purpose of this subject 2. Examples of economic activities 1 3. Examples of economic activities 2 4. Examples of economic activities 3 5. Change in structure of economic society 1 6. Change in structure of economic society 2 7. Function of economic society 1 8. Function of economic society 2 9. Mutual relationship of economic activities 1 10. Mutual relationship of economic activities 2 11. Concept of mathematical programming model 12. Technique of model construction 13. Modelling of economic activities 1 14. Modelling of economic activities 2 15. Evaluation of modelling

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169569>

Contact)

⇒ Kondo (ECO602, +81-88-656-7339, kondo@eco.tokushima-u.ac.jp)

Science and Technology Studies

Kunio Goto · PART-TIME LECTURER / MOMOYAMA GAKUIN UNIVERSITY

Target) Students are expected to learn the minimum essentials of science and technology studies and their functions in contemporary society.

Outline) Science and technology studies deal with science and technology research and its outcomes by means of various methods of social sciences and humanities. They have emerged in 1930s when social importance of science and technology became evident. Since 1970s, the science and technology studies have developed as mission oriented learning for government policy, business administrations and civic activity. In the first half of this lecture, the outline of the science technology studies is given. The involved topics are philosophy, history, sociology, and economics of science and technology.

Style) Lecture

Goal)

1. Understanding of the minimum essentials of the science and technology studies
2. Understanding of the social meaning of each student's research

Schedule) 1. Introduction: A brief history of the science and technology studies since 1930s 2. Philosophical understanding of science: (1) From Greek Classics to German Classical Philosophy 3. Philosophical understanding of science: (2) Rise of the philosophy of science the early twentieth century 4. Historical investigation of science and technology : (1) Emergence of the modern Western science 5. Historical investigation of science and technology : (2) From the Power Revolution of the Medieval West to the modern the Industrial Revolution 6. Sociology of science and technology: (1) Normative structure and Paradigm 7. Sociology of science and technology: (2) Social constructivism and Laboratory life analysis 8. Economics and science and technology : (1) Market and planning economies 9. Economics and science and technology : (2) Innovation and economic policy 10. The 1950s model of science and technology policy in the Cold War 11. Knowledge industrial society since 1970s: (1) Environmental problem and energy problem 12. Knowledge industrial society since 1970s: (2) Computer science and Information society 13. Policy issues in the transform of industrial structure and role of university 14. Science and technology in the global economy since 1990s 15. Concluding remark: Science, technology and society in the future

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169536>

Contact)

⇒ Kawamura (410 Chem Bldg, +81-88-656-7401, kawamura@chem.tokushima-u.ac.jp)

Management Theory of New Business

2 units

Vice chairperson of School Affairs Committee , Faculty of Engineering

First-line men with experience of practical business · PART-TIME LECTURER

Target) New business is the word which means the business to make the most of technical knowledge, technology, the new idea and which is developed creatively, and that main bearer is the enterprise called a venture. There is a purpose of this class in providing the knowledge which is necessary, and know-how and a spirit so that a taking lecture student may establish a venture business.

Outline) The regeneration of the Japanese society with the vitality is being asked. Government enforced "a university venture 3 years 1000 companies plan" over Heisei 14-the 16th year. Though that goal

was almost attained, it is very important to promote entrepreneur education continuously from now on. Tokushima Prefecture supports this class based on the recognition done like this, and it is established.

Requirement) The person whom the one with the classroom is constructed by the class start time in the person who doesn't learn the unit of "Introduction to new business" in the college, and a group are organized, and it is limited to the person with the intention to make a business plan, and taking lecture is recognized.

Notice) Being late and a whisper in class should be prohibited strictly. Be careful over and again because it should dispose of exit and future taking lecture may not be recognized when it is wicked.

Goal) Learning of the necessary knowledge to establish venture business, and the ability which can make a business plan.

Schedule) 1. Guidance 2. What is the new business? 3. Keynote lecture 4. Theory of a stand-alone version venture success 5. The law knowledge which is necessary for entrepreneur 6. Fund-raising and capital policy 7. Indirect finance 8. Direct finance 9. The basis of the company management 10. The elementary knowledge of the business accounting 11. The point of the business plan preparation 12. Management strategy and marketing 13. Product development and intellectual property 14. Business plan preparation practice 15. Examination 16. Business plan announcement meeting

Evaluation Criteria) It is evaluated by the presentation (40%) of the written examination (60%) and the business plan. And, the presentation of the written examination and the business plan is decided to be recognized only for the taking lecture student who attended it for 2/3 and more of the classes that it is opened.

Textbook) The summary is distributed every time.

Reference) Several are introduced in the school hours.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169607>

Student) he person who hasn't learned the unit of the new business outline that it is opened with this learning in all the students enrolled in the graduate school yet is made the target. The number of completion people may be restricted in the method such as a lottery in case of a taking lecture applicant many. As for the details, an applicant for taking lecture is to follow those directions because the notice which showed attention in taking lecture is done.

Contact)

⇒ Vice chairperson of School Affairs Committee , Faculty of Engineering

Note) The man of business that it is active in the forefront every time, and an adviser are invited as an instructor, and working knowledge is provided for theory plus practice in this class from the specialist's position. This class is the thing which is useful enough even if it is taken to the person who aims at a general enterprise and a laboratory, the employment to the self-governing body and so on.

Introduction to Intellectual Property

2 units

Tohru Sakai · PART-TIME LECTURER / (助)工業所有権協カセンター, Juichiroh Osame · PART-TIME LECTURER

Akio Fujii · PART-TIME LECTURER / INTELLECTUAL PROPERTY OFFICE, Yasushi Toyosu · PART-TIME LECTURER, Kuniaki Kubota · PART-TIME LECTURER

Target) Understanding the basic systems and importance of protection and practical use of intellectual property based on some examples.

Outline) It is necessary for a working staff in a company, a university, etc., in a future. It is introduced the importance to protect and practical use of intellectual property at governments , industrial circles, universities and institutes in Japan using potential on scientific techniques. This lecture is treated the basic systems of protection and practical use of intellectual property particularly based on strategy and invasion of patent in an organization such as company, university, etc.

Style) Lecture

Keyword) Intellectual property, Patent Law, Protect and Use of Intellectual Property

Relational Lecture) "Introduction to Intellectual Property"(0.5)

Requirement) No requirement

Notice) It is necessary to be present at two concentrated lecture.

Goal)

1. Understanding concept of intellectual property right.
2. Understand the Patent Act, the Trademark Act, the Design Act and the Copyright Act.
3. Understanding on basical practical use of intellectual property.

Schedule) 1. Concept of intellectual property(Sakai) 2. Outline of intellectual property(Patent and Trademark)(Sakai) 3. Outline of intellectual property(Design and Copyright)(Sakai) 4. Patent, invention and invasion of patent (Sakai) 5. Management of intellectual property and use (Sakai) 6. A way of research and development and intellectual property in a future(Sakai) 7. The midterm examination and its comment for Target and 8. History of system of intellectual property (Osame) 9. International trend of system of intellectual property (Osame) 10. Acquisition method of intellectual property right(Fujii) 11. Use of intellectual property(Watanabe) 12. Strategy of intellectual property on development of techniques(Y.Higuchi) 13. Effective intellectual property in development of techniques (Kubota) 14. Special lecture on a use of intellectual property by a chief executive officer(1) 15. Special lecture on a use of intellectual property by a chief executive officer(2)

Evaluation Criteria) Passing mark is over 60% on the examinations and the reports for each reaching level, respectively.

Textbook) To be used textbooks made by lecturers.

Reference) Nobuhiro Nakayama:Titeki Shoyuken, Nikkan Kohgyo Shinbunsha

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169591>

Student) For the course students and other graduate school students.

Contact)

⇒ Sakai (+81-3-5600-2631,)

⇒ Mizuguchi (A501, +81-88-656-7349, mizuguch@ce.tokushima-u.ac.jp) (Office Hour: Monday,11:00-12:30, 17:00-18:00)

Presentation Method (D)

2 units

Target) Poster and oral presentations, and journal publications are common means of appealing the research work in various scientific and technological disciplines. It's undoubtedly important for activating the research work. The lecture is intending for students to learn most efficient way to appeal their findings and discussions in scientific community.

Outline) Credits are acknowledged to the students who are supervised to give conference speech by themselves and do actually the lectures.

Goal) The lecture is aiming at having knowledge and experience of the presentation in international conferences.

Evaluation Criteria) Students' achievement is evaluated by portfolios submitted showing the progress in preparation of international conferences as well as by presentation records.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169628>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Internship (D)

2 units

Target) This program is provided to increase knowledge and experience in the actual industrial technology in various fields. Through the practical experience, the program will allow students to become discerning and well-balanced researchers or engineers with deeper understanding of technological societies.

Outline) Credits are acknowledged to students who experienced the internship in companies and/or government offices. Their fulfillment is evaluated by activity reports during internship.

Goal)

1. Grasping internal systems of a company, management, action and strategy to achieve the company's goal. (2)
2. Understanding human relationship and communicative manner in a working society and a company.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by supervisors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169542>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Venture Business (D)

2 units

Target) Aims of the lecture are doing collaborative works with private enterprises and establishing venture businesses through such works.

Outline) The lecture is aiming at founding a venture business company as well as establishing collaborative research works with private enterprises. It's worth to apply their accomplishment to an actual society beyond the range of a laboratory work.

Goal) Objective of the lecture is to have experience and knowledge of collaborative works with private enterprises and to mature the works to venture businesses.

Evaluation Criteria) Credits are acknowledged in case of doing collaborative works with enterprises and/or maturing them to venture businesses. Handouts, reports, and presentation materials, etc. are evaluated to approve credits.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169539>

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Long-term Internship (D)

6 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This program is provided long-term internship in the actual industrial companies and so on, doing a joint study between companies and university on practical problems proposed by the company and practical experience of management of technologies. Through the long-term internship, the program will allow students to become a engineer with a core role in researches and companies

Outline) Credits are acknowledged to students who experienced the internship in companies or government offices of 270 hours during three months or more and presentation to executive officer of the company. Their fulfillment is evaluated by activity reports during internship and appraisal and interviewed report from a mentor.

Goal) Grasping abilities for practical engineers by studying activities in company and so on.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by mentors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169697>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Nishida (K409, +81-88-656-7630, nishida@kg.tokushima-u.ac.jp)

⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

⇒ Morimoto (A407, +81-88-656-7619, emi.morimoto@kg.tokushima-u.ac.jp) (Office Hour: 月～木(10時～15時))

Note) Students who register the coop-education program for "Pai-shape" engineers with sense for management of technology, are able to have a grant-in-aid for travel and so on. Ask committee members of long-term internship in your course or coordinators of this program.

Advanced Lecture in Theory of Business Models

2 units

Tatsuya Deguchi · PART-TIME LECTURER, Kenichi Yasumuro · PART-TIME LECTURER, Katsuo Touma · PART-TIME LECTURER
Takahide Yamaguchi · PART-TIME LECTURER, Shingou Nishii · PART-TIME LECTURER

Target) There is a purpose of this class in providing the knowledge which is necessary, and know-how so that students may achieve a business model in establishing enterprises based on the lecture of "Management Theory of New Business", and in making students understood the profit generating stream by studying on the frame work of companies in several business fields.

Outline) Business Model is a remarkable term in modern economic and organizational theories in these days but describes a broad range of definitions. In this lecture, Business Model is defined as "System which converts technology and know how into profit for the purpose of customers' satisfaction" and aims at providing the ability for the design of profitable system, by learning cost issues in establishing business strategies of companies.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business"

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of business model design is learned
2. Understanding of the concept of business model by case study analysis are appreciated
3. It learns forming ability of business plan through the case study on business models

Schedule) 1. Guidance 2. Keynote lecture "Business Model Thinking" 3. Questions and answers, Discussions 4. Lecture "Theory of Business Models" 5. Lecture "Design principles of Business Models" 6. Lecture "Evaluation of Business Models" 7. Case Study "Business Model in a R&D company" 8. Case Study "Business Model in a manufacturing industrial company" 9. Case Study "Business Model in a company of service industry" 10. Case Study "Business Model in a company of information industry" 11. Business plan practice, Present situation analysis and alternatives. 12. Business plan practice, Concept ad design of business. 13. Business plan practice, Financial analysis . 14. Business plan practice, Concluding and submitting 15. Presentation(1) of Business plan practice. 16. Presentation(2) of Business plan practice, Comments and summary.

Evaluation Criteria) Participation in class(20%) Group work and its report(80%)

Textbook) Ken-ichi Amuro and Study Group of Business model "Case Book: Business Model Thinking" Bunshindo

Reference) Several are introduced in class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169696>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the course. And, the number of taking lecture person is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Contact)

- ⇒ Tatsuya Deguchi (Wakayama University)
- ⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

Note) This class is supported by Tokushima Prefecture Government

Management of Technology

2 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) About the production management of the automobile industry, it is understood variously from the point of view such as "research and development", "production management", "purchasing" and "quality control" "marketing" and "cross-cultural management".

Outline) It learns about the production management. This time, "the automobile industry" specially takes up the production management of "Honda Motor Co.,Ltd. (following Honda)" even of that in the case, and the class to appreciate that importance with ranking of technology in management is taken.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business"

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of management is learned.
2. Ranking of the technology in management and that importance are appreciated.
3. It learns how to solve the various problems which always occur in the spot of the management through the case study and the business game.

Schedule) 1. Guidance 2. Lecture "What in Management of Technology?" 3. Case report "Research and development of Honda" 4. Case study "Plan an overseas factory." "A new car development order" 5. Lecture "Production management and purchasing" 6. Lecture "Quality control" 7. Case report "The production management of Honda","The supply chain management of Honda" 8. Case study "Plan an overseas factory." 9. Case report "The quality control of Honda" 10. Case study "Don't make material defects flare up again." 11. Lecture "Marketing strategy" 12. Lecture "Cross-cultural management" 13. Case report "Around the products project of Honda - the two-wheeled vehicle" 14. Case report "The path of internationalization of Honda" 15. Case report "The personnel management of Honda" 16. Summary and questions and answers

Evaluation Criteria) It is evaluated in the remark (20%) in class and the middle, end of a term report (80% in total).

Textbook) It doesn't specially use.The summary and so on is distributed every time.

Reference) Several are introduced in class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169698>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the doctor former term course. And, the number of taking lecture person is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Note) This class invites seven Honda alumnuni who did work in "research and development", "production management", "purchasing", "quality control", "marketing", "cross-cultural management", and so on as an instructor, and it is the class to do case report. Even if it is seen nationwide, the trial done like this is very rare, and it is a precious class. And, an applicant for taking lecture is to attend it in the guidance to hold it in advance.A schedule is indicated separately.

Autonomous Adaptive Systems Engineering

2 units

Norihiko Ono · PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING
Yoshio Mogami · ASSOCIATE PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) This class provides the knowledge and skills necessary for understanding the basic concepts, theories and application techniques concerning the emergent systems design methodologies for autonomous and adaptive intelligent agent systems.

Outline) Recently, autonomous adaptive systems have been studied that are able to improve their own performance autonomously, adaptively and incrementally during the course of interactions with the environments, and those design methodologies have been explored for the systems. This class covers the emergent design methodologies for autonomous adaptive agents and multi-agent systems, mainly based on machine learning and evolutionary computation.

Style) Portfolio

Keyword) autonomous adaptive systems, emergent systems design, reinforcement learning, evolutionary computation, multi-agent systems

Fundamental Lecture) "Autonomous Intelligent Systems"(0.5, ⇒p.76)

Relational Lecture) "Applied Knowledge Systems"(0.5, ⇒p.149)

Goal) This class aims at the understanding of an overview of the emergent design methodologies for autonomous adaptive agents and multi-agent systems, mainly based on reinforcement learning, evolutionary computation, genetic programming, and neural networks, as well as the applicabilities and limitations of the methodologies.

Schedule) 1. Emergent systems design methodologies 2. Foundations of emergent systems design: reinforcement learning (1) 3. Foundations of emergent systems design: reinforcement learning (2) 4. Foundations of emergent systems design: evolutionary computation (1) 5. Foundations of emergent systems design: evolutionary computation (2) 6. Foundations of emergent systems design: genetic programming 7. Foundations of emergent systems design: neural networks 8. Emergent systems design methodologies based on reinforcement learning (1) 9. Emergent systems design methodologies based on reinforcement learning (2) 10. Emergent systems design methodologies based on neuro-evolution (1) 11. Emergent systems design methodologies based on neuro-evolution (2) 12. Emergent systems design methodologies based on genetic programming 13. Emergent systems design methodologies based on co-evolution 14. Emergent systems design methodologies for multi-agent systems (1) 15. Emergent systems design methodologies for multi-agent systems (2)

Evaluation Criteria) Assignment count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169578>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Ono (D106, +81-88-656-7509, ono@is.tokushima-u.ac.jp) (Office Hour: 金曜日 15:00~ 17:30)
- ⇒ Mogami (D102, +81-88-656-7505, moga@is.tokushima-u.ac.jp) (Office Hour: Tue. 17:00~18:00, Wed. 15:30~17:30 (Refer to the notice of the department in every year.))

Visual pattern processing

2 units

Shunichiro Oe · PROFESSOR / APPLIED INFORMATION MEDIA ENGINEERING, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING
Kenji Terada · ASSOCIATE PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) The basic technologies which replace the visual pattern processing function of man by computer and their applied technologies are made to master.

Outline) The advanced processing techniques of visual pattern, i.e., the pre-processing techniques, the feature extraction techniques, the classification techniques of visual pattern, the processing techniques of color image and their application examples are lectured.

Style) Lecture in combination with Portfolio

Keyword) pattern recognition, vision, image processing

Fundamental Lecture) “Applied Image Processing”(1.0, ⇒p.76)

Goal) Acquisition of knowledge about the processing theories of visual pattern and their various applied technologies, and the processing technologies of color image

Schedule) 1. Concept of pattern recognition 2. Statistical pattern classification method1 3. Statistical pattern classification method 2 4. Pattern classification method by the structural analysis technique 5. Pre-processing method of visual pattern 6. Feature extraction method of visual pattern 1 7. Feature extraction method of visual pattern 2 8. Segmentation method of visual pattern 1 9. Segmentation method of visual pattern 2 10. Pattern classification method by neural network 11. Pattern classification method by GA 12. Security image processing 13. Tracking of moving object 14. Texture analysis 15. The feature extraction method of color image and its application 16. Periodic examination

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169560>

Student) Able to be taken by only specified class(es)

Multimedia Communication Theory and Technology

2 units

Yasutada Oohama · PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING
Seishi Kitayama · PROFESSOR / INTELLIGENT NETWORKS AND COMPUTER SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING
Hitoshi Tokushige · ASSOCIATE PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) This class provides the knowledge necessary to understand fundamental technics for multimedia information and communication systems, such as coding method of multimedia data, information security, network security, user authentication, cryptology

Outline) This lecture is focused on multimedia communication theory and technology. Particular, Internet Technology, Computer Networks, Satellite Communications, Information Security and Cryptology, Multimedia Coding Theory and Its Applications are explained in this lecture.

Style) Lecture

Keyword) Internet Technology, Computer Networks, Satellite Communications, Information Security, Multimedia Coding Theory

Fundamental Lecture) “Advanced Exercise on Intelligent Science”(1.0, ⇒p.150)

Requirement) 特になし

Goal)

1. fundamental technics for multimedia information and communication systems can be learned
2. Development method for multimedia information and communication systems can be learned

Schedule) 1. Multimedia Communication Theory and Technology 2. Coding Theory for Multimedia data (1) 3. Coding Theory for Multimedia data (2) 4. Coding Theory for Multimedia data (3) 5. Digital data Transmission (1) 6. Digital data Transmission (2) 7. Cryptology (1) 8. Cryptology (2) 9. Cryptology (3) 10. Information Security 11. Network Security (1) 12. Network Security (2) 13. Contents Protection for Multimedia Data 14. User Authentication 15. Digital Signature 16. Assignment

Evaluation Criteria) Assignments count 100%.

Textbook) Printed synopses of lecture are distributed.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169635>

Student) Able to be taken by only specified class(es)

Contact)

- ⇒ Oohama (C302, +81-88-656-9446, oohama@is.tokushima-u.ac.jp)
- ⇒ Kitayama (E 棟 3 階南 D-6, +81-88-656-7482, kitayama@ee.tokushima-u.ac.jp) (Office Hour: (月)16:00-19:30, (金)16:00-18:00)
- ⇒ Tokushige (C303, +81-88-656-9447, tokusige@is.tokushima-u.ac.jp) (Office Hour: 月曜日, 火曜日 (17:00-18:00))

Integrated Information System Design

2 units

Norio Akamatsu · PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING
Minoru Fukumi · PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING
Takashi Shimamoto · ASSOCIATE PROFESSOR / INTELLIGENT NETWORKS AND COMPUTER SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) The aim of this lecture is to master the modern design technologies of very large scale integrated circuits.

Outline) Very large scale integrated circuit (V-LSI) design and production method. Using CAD technology, VLSI logic design, testing and fabrication are explained. Design of high-speed algorithm and parallel distributed processing system. Neural network and genetic algorithm for integrated circuit design.

Style) Lecture and exercise

Requirement) It is necessary to get the unit of the mos integrated circuits in master course.

Notice) In order to get the unit of this lecture, the graduate course students should have learned the-state-of-the-art of the modern hardware technology, especially C-MOS integrated circuits.

Goal) This lecture is designed to provide engineers and scientists with an introduction to the field of VLSI neurocomputing.

Schedule) 1. Embedded software architecture 2. Real-time schedule method 3. System description language 4. Application specific integrated circuits 5. Power consumption and speed of very large scale integrated circuits 6. Shared memory and communication method 7. Cache memory and main memory 8. System modeling and documentation 9. Partitioning and performance 10. data flow graph and finite state machine 11. Behavior description language and Spec C 12. Control data-flow graph and function synthesis 13. Neural computing board diagram using EEPROM-style programmable synapses 14. Layout pattern example 15. Gate-sizing wiring and timing driven 16. Boundary scan and delay estimation

Evaluation Criteria) Unit evaluation contains test and design of VLSI

Textbook) Hardware Annealing in Analog VLSI Neurocomputing, Kluwer Academic Publishers

Reference) Electronics Circuits, written by Norio Akamatsu

Webpage) <http://www.A3.is.tokushima-u.ac.jp>

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169574>

Student) Able to be taken by student of other department and faculty

Contact)

- ⇒ Akamatsu (D209, +81-88-656-7493, akamatsu@is.tokushima-u.ac.jp) (Office Hour: on Wednesday afternoon)

Note) Lecturer will show the schedule of this lecture and design technologies.

Parallel and Distributed Processing Systems

2 units

Takao Shimomura · PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING
Kenji Ikeda · ASSOCIATE PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING
Masahiko Sano · ASSOCIATE PROFESSOR / APPLIED INFORMATION MEDIA ENGINEERING, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) This class introduces the knowledge and design skills necessary for developing parallel and distributed processing systems, and parallel and distributed algorithms.

Outline) Architectures of parallel and distributed processing systems, fault tolerance of distributed control systems and the development techniques of distributed systems for Web applications.(Portfolio style).

Style) Lecture in combination with Portfolio

Keyword) WWW, fault tolerance, Parallel and Distributed Processing architecture

Fundamental Lecture) “Web Programming”(1.0, ⇒p.77)

Goal) 1. To understand the architecture of parallel and distributed processing systems, decentralized adaptive control systems and their fault tolerance, and the design of distributed WWW systems.

Schedule) 1. Parallel and distributed processing architectures 2. Memory and communication architectures 3. Parallel and distributed operating systems 4. Client server model 5. Cluster computing 6. linear space and normed space 7. small gain theorem and its applications 8. decentralized systems composed of interconnected subsystems 9. stability of decentralized control systems 10. fault tolerance of decentralized control systems 11. Servlets and JavaServer Pages 12. Web application servers 13. Web application systems 14. Web programming frameworks 15. Web programming design patterns 16. Assignment

Evaluation Criteria) Assignment count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169632>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Shimomura (C402, +81-88-656-7503, simomura@is.tokushima-u.ac.jp) (Office Hour: Wed 15:00~ 8:00)

Applied Knowledge Systems

2 units

Jun-ichi Aoe · PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Kenji Kita · PROFESSOR / APPLIED INFORMATION MEDIA ENGINEERING, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Fuji Ren · PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Masami Shishibori · ASSOCIATE PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Shingo Kuroiwa · PROFESSOR / 千葉大学大学院 融合科学研究科

Masao Fuketa · ASSOCIATE PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Kazuhiro Morita · ASSOCIATE PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) The course introduces the basic principle and theory of knowledge-based systems, including natural language processing systems, voice language processing systems, information retrieval systems.

Outline) Knowledge systems to natural language processing, voice language processing, information retrieval and document database. Artificial natural language processing systems, such as automatic building systems of intelligent dictionaries, text understanding and summarization systems, dialog systems, natural language interface systems, text classification systems, natural language analysis systems and knowledge-based machine translation systems.

Style) Portfolio

Keyword) knowledge-based system, natural language processing system, speech and language processing system, information retrieval system, machine translation system

Fundamental Lecture) “Language Modeling”(1.0, ⇒p.75), “Natural Language Understanding”(1.0, ⇒p.77)

Relational Lecture) “Multimedia Systems and Applications”(0.5, ⇒p.149)

Goal) To learn various methods for constructing knowledge-based intelligent information systems.

Schedule) 1. Natural language processing systems 1: design and retrieval methods of dictionaries 2. Natural language processing systems 2: design and implementation of parsers 3. Natural language processing systems 3: design and implementation of language understanding systems 4. Machine translation systems 1: rule-based and example-based approaches 5. Machine translation systems 2: super-function 6. Machine translation systems 3: integrated methods 7. Speech and language processing systems 1: design of language models 8. Speech and language processing systems 2: design of acoustic models 9. Speech and language processing systems 3: design of search algorithms 10. Information retrieval systems 1: document retrieval based on vector space models 11. Information retrieval systems 2: retrieval methods based on inverted index files 12. Information retrieval systems 3: design and implementation of intelligent

document retrieval systems 13. Intelligent multimedia contents processing systems 1 14. Intelligent multimedia contents processing systems 2 15. Recent topics 16. Assignment

Evaluation Criteria) Assignment count 100%.

Textbook) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169534>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Aoe (Dr604, +81-88-656-7486, aoe@is.tokushima-u.ac.jp) (Office Hour: Tuesday 12:50 - 14:20)

⇒ Kita (Dr503, +81-88-656-7496, kita@is.tokushima-u.ac.jp) (Office Hour: Tuesday 12:50 - 14:20)

⇒ Ren (C204, +81-88-656-9684, ren@is.tokushima-u.ac.jp) (Office Hour: Tuesday 12:50 - 14:20)

Intelligent Information Systems

2 units

Yoneo Yano · PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Kazuhide Kanenishi · ASSOCIATE PROFESSOR / APPLIED INFORMATION MEDIA ENGINEERING, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Hiroaki Ogata · ASSOCIATE PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Teruaki Ito · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Hiroyuki Mitsuhashi · ASSOCIATE PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) Learning the design methods of intelligent information systems such as educational software and interactive systems.

Outline) Intelligent systems and their mechanics. Intelligent CAI. Intelligent interface. Micro-worlds in intelligent CAI. Learner-teacher modelling. Knowledge acquisition models. Empirical and analytical machine learning, e. g., ID3, similarity-, explanation-, and case-based learning. Genetics-based machine learning, e. g., genetic evolution and co-evolution of production systems, finite state machines, recurrent neural networks, and strategic knowledge. Concepts of collaborative interface systems based on intelligent interactions, and their implementation for design support systems.

Style) Lecture and exercise

Keyword) Intelligent Interface, Intelligent Educational Systems, Intelligent Agents, CSCW, CSCL, Interactive Interface

Fundamental Lecture) “Human Factors”(1.0, ⇒p.144)

Relational Lecture) “Applied Knowledge Systems”(0.5, ⇒p.149), “Autonomous Adaptive Systems Engineering”(0.5, ⇒p.147)

Goal) Acquisition of the design methods of educational systems and interactive systems

Schedule) 1. Overview of Intelligent Information Systems 2. Intelligent CAI 3. Cognitive model for Learning 4. Design of ITS(Intelligent Tutoring System) 5. ILE(Interactive Learning Environment) 6. CSCL 7. Ubiquitous and Mobile Learning Environment 8. Design of Intelligent Interactive System 9. Collaborative Interface 10. Design of Intelligent Information System (1) 11. Design of Intelligent Information System (2) 12. Design of Intelligent Information System (3) 13. Design of Intelligent Information System (4) 14. Design of Intelligent Information System (5) 15. Conclusion

Evaluation Criteria) We will grade based on reports and interactive presentation among students.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169594>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Yano (C511, +81-88-656-7495, yano@is.tokushima-u.ac.jp) (Office Hour: 火曜日 16 時 ~ 17 時, 水曜日 16 時 ~ 17 時, 金曜日 16 時 ~ 17 時)

⇒ Kanenishi (院生棟 506, +81-88-656-7285, marukin@cue.tokushima-u.ac.jp)

⇒ Ogata (C507, +81-88-656-7498, ogata@is.tokushima-u.ac.jp) (Office Hour: 月曜日 ~ 金曜日:午後 5 時 ~ 6 時)

⇒ Ito (M316, +81-88-656-2150, ito@me.tokushima-u.ac.jp)

Multimedia Systems and Applications

2 units

Shunichiro Oe · PROFESSOR / APPLIED INFORMATION MEDIA ENGINEERING, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Kenji Kita · PROFESSOR / APPLIED INFORMATION MEDIA ENGINEERING, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) Multimedia has become an indispensable part of modern computer technology. This course covers the theories, models, and systems of basic and advanced methods for designing and implementing multimedia systems. Latest multimedia Web technologies and some advanced topics will also be discussed.

Outline) The course introduces the theories, models, and systems of basic and advanced methods for next generation digital contents processing, including (1) intelligent processing for texts, speech, images, and movies, (2) intelligent media integration, and (3) intelligent human-computer interfaces.

Style) Portfolio

Keyword) multimedia, digital contents, human-computer interface, media integration

Fundamental Lecture) “Language Modeling”(1.0, ⇒p.75), “Applied Image Processing”(1.0, ⇒p.76)

Relational Lecture) “Applied Knowledge Systems”(0.5, ⇒p.149)

Goal) To learn advanced methods in design and implementation of next generation digital contents processing systems.

Schedule) **1.** Multimedia contents fundamentals **2.** Image, video, and audio compression **3.** Intelligent document processing (1) **4.** Intelligent document processing (2) **5.** Intelligent image and video processing (1) **6.** Intelligent image and video processing (2) **7.** Intelligent speech processing (1) **8.** Intelligent speech processing (2) **9.** Multimedia storage systems and databases (1) **10.** Multimedia storage systems and databases (2) **11.** Multimedia information retrieval (1) **12.** Multimedia information retrieval (2) **13.** Multimedia Web Technologies (1) **14.** Multimedia Web Technologies (2) **15.** Recent topics **16.** Assignment

Evaluation Criteria) Assignment count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169577>

Contact)

⇒ Oe (C204, +81-88-656-7500, oe@is.tokushima-u.ac.jp) (Office Hour: Tuesday 12:50 - 14:20)

⇒ Kita (Dr503, +81-88-656-7496, kita@is.tokushima-u.ac.jp) (Office Hour: Tuesday 12:50 - 14:20)

⇒ Committee Member of School Affair

Advanced Research on Intelligent Science

2 units

Teachers in other colleges or departments

Target) To obtain broad information on recent engineering

Outline) To research a theme in a technology, which is different from the main technology in your field.

Style) Portfolio, Lecture in combination with Portfolio, Lecture and exercise

Keyword) Engineering, Technology, Different field

Requirement) N/A

Notice) N/A

Goal) To learn a recent technology, which is different from the main technology in your field.

Schedule) Choose a theme on technology or engineering, which is different from that in your field.

Evaluation Criteria) Evaluated with portfolio or examination.

Textbook) Ask to teachers.

Reference) Prints

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169653>

Student) Able to be taken by only specified class(es)

Advanced Exercise on Intelligent Science

2 units

All teachers

Target) To conduct research leading to the awarding of doctoral degrees.

Outline) To conduct research in the Natural Language Understanding, Document Processing, Multimedia Information Retrieval, Image Processing, Movie Image Processing, Voice Recognition, Autonomous Agents Design, Internet Security, Intelligent Software, etc (seminars, portfolios etc).

Style) Lecture in combination with Portfolio

Keyword) Information Science, Software Engineering

Notice) Course plan differs depending on the laboratory you choose.

Goal) To present the results of your research related conferences, departmental research meetings, etc.

Schedule) **1.** After the student selects the subjects, research can be carried out at the laboratory. However, the course contents are as shown below. **2.** コーパスからスーパー関数の自動抽出及び機械翻訳への応用 **3.** 話者認識における長・短期間の音声変動に関する研究 **4.** カットシーン間の距離分布に基づくCM映像検出手法に関する研究 **5.** 進化的RBFネットワークによる三次元物体認識 **6.** リカレントニューラルネットワークの構造と重みの同時最適化のための進化計算手法に関する研究 **7.** メモリ展開されたコードを使う未知ウイルス解析支援システム **8.** ウイルスの感染挙動と感染環境の状態を把握するための仮想ウイルス感染ネットワークに関する研究 **9.** PZTカメラを用いた教材コンテンツ作成のための講演者追跡システムの開発 **10.** 自由文からの感性情報解析技術に関する研究 **11.** 固有商品の好評不評情報抽出に関する研究 **12.** Web上での学習活動を再現・共有可能にするWBLシステム **13.** ペン入力インタフェースにおけるジェスチャー評価実験 **14.** 自然言語処理技術を用いた中学理科教授学習システム **15.** 脳見運転防止のための近赤外線カメラを用いた顔の向き検出 **16.** 単音節認識のための基本周期を用いた母音認識

Textbook) None

Reference) Using papers for each research field.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169592>

Student) Able to be taken by only specified class(es)

Contact)

Systems Innovation Engineering — Optical Systems Engineering

SYLLABUS OF SUBJECTS

● Integrated Subjects

Human Factors ...Yoshida	151
Life Science ...Takagi · Tsuji	151
Social Science ...Goto	151
Science and Technology Studies ...Goto	152
Management Theory of New Business ...Vice chairperson of School Affairs Committee , Faculty of Engineering · First-line men with experience of practical business	152
Introduction to Intellectual Property ...Sakai · Osame · Fujii · Toyosu · Kubota	152
Presentation Method (D)	153
Internship (D)	153
Venture Business (D)	153
Long-term Internship (D) ...Yamanaka	153
Advanced Lecture in Theory of Business Models ...Deguchi · Yasumuro · Touma · Yamaguchi · Nishii ...	153
Management of Technology ...Yamanaka	154

● Specialized Subjects

Radio Frequency Solid State Physics ...Ohno · Nakamura	154
Engineering of Correlated Electron Matter ...Kishimoto · Kawasaki	154
Nonlinear Optical Devices ...Fukui · Haraguchi	155
Crystal Growth of Optical Materials ...Mori	155
Organic Photo-functional Materials ...Tanaka · Tezuka	155
Advanced Optical Information Systems ...Suyama · Goto	156
Medical Information Systems ...Niki · Kawata	156
Photonic Semiconductor Device Physics ...Sakai · Naoi · Nishino	156
Optical and Functional Inorganic Materials ...Ohno · Tominaga	156
Medical and Biological Engineering ...Kinouchi · Akutagawa	157
Visual pattern processing ...Oe · Terada	157
Applied Knowledge Systems ...Aoe · Kita · Ren · Shishibori · Kuroiwa · Fuketa · Morita	157

● Specialized Exercise and Experiments

Advanced Exercise on Optical System Engineering ...All teachers	158
Advanced Research on Optical System Engineering ...All teachers	158

Human Factors

2 units
Atsuya Yoshida · PART-TIME LECTURER / FACULTY OF INTEGRATED ARTS AND SCIENCES

Target) The objective of this class is to provide students with sufficiently thorough appreciation of the many facets of the human factors discipline so that they may make use of it to their own doctoral works.

Outline) This class offers a broad and comprehensive overview of the human factors/ergonomics discipline with four areas of emphasis, (1) historical review of human factors research, (2) human physical, perceptual and cognitive capabilities and limitations, (3) application of human factors research data in design, especially in the interface design of computer-based systems, and (4) discussion about the relationship between the designed system (technology) and people.

Schedule) **1.** What is Human Factors **2.** Historical Overview of Human Factors **3.** Multi-Disciplinary Aspect of Human Factors **4.** Health and Safty Issue of Human Factors **5.** Human Psychological Capability **6.** Task Analysis **7.** Human Error **8.** Universal Design **9.** Cognitive Artifact **10.** Visibility and Affordance **11.** Human-Computer Interaction **12.** Human Information Processing **13.** Knowledge and Mental Model **14.** Usability Paradigms and Principles **15.** Evaluation and Testing **16.** Making system that makes us smart

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169608>

Life Science

2 units
Hiroshi Takagi · PART-TIME LECTURER / FUKUI PREFECTURAL UNIVERSITY
Akihiko Tsuji · PROFESSOR / BIOLOGICAL REACTIONS, BIOLOGICAL SCIENCE AND TECHNOLOGY, EARTH AND LIFE ENVIRONMENTAL ENGINEERING

Target) Understanding of significance of protein in biotechnology

Outline) Basics of structure, function and application of protein are introduced

Style) Lecture

Keyword) Protein, Enzyme, Biotechnology

Goal)

1. Understanding of multiple functions of proteins
2. Understanding of principle of protein engineering and its application

Schedule) **1.** Introduction of life science **2.** History of life science **3.** Structure and function of DNA and RNA **4.** mRNA is a template of protein **5.** Duplication of DNA **6.** Regulation of protein expression **7.** Human Genetics **8.** Genetic disease **9.** DNA diagnosis **10.** Structure and function of protein **11.** Principle of gene technology (1) **12.** Principle of gene technology (2) **13.** Protein engineering **14.** Future of life science (1) **15.** Future of life science (2) **16.** Preparation of report

Evaluation Criteria) Evaluation by report

Textbook) To be introduced in the class

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169586>

Contact)

⇒ Tsuji (G710, +81-88-656-7526, tsuji@bio.tokushima-u.ac.jp) (Office Hour: Monday 16:20-17:50)

Social Science

2 units
Shuzo Goto · PART-TIME LECTURER / SHIKOKU UNIVERSITY

Target) The mutual relationship of economic activities, the structure and function of economic society, and the concept and technique of mathematical programming modelling are lectured.

Outline) Not only the mutual relationship of economic activities is explained from domestic and international points of view, but also the technique of case studies by application of mathematical programming models is taught using the various kinds of materials and examples.

Keyword) Economic activities, Structure and function, Mathematical programming model

Goal) To understand the mutual relationship of economic activities, empirically explain them using the mathematical programming model and evaluate the model.

Schedule) 1. Guidance and purpose of this subject 2. Examples of economic activities 1 3. Examples of economic activities 2 4. Examples of economic activities 3 5. Change in structure of economic society 1 6. Change in structure of economic society 2 7. Function of economic society 1 8. Function of economic society 2 9. Mutual relationship of economic activities 1 10. Mutual relationship of economic activities 2 11. Concept of mathematical programming model 12. Technique of model construction 13. Modelling of economic activities 1 14. Modelling of economic activities 2 15. Evaluation of modelling

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169569>

Contact)

⇒ Kondo (ECO602, +81-88-656-7339, kondo@eco.tokushima-u.ac.jp)

Science and Technology Studies

Kunio Goto · PART-TIME LECTURER / MOMOYAMA GAKUIN UNIVERSITY

Target) Students are expected to learn the minimum essentials of science and technology studies and their functions in contemporary society.

Outline) Science and technology studies deal with science and technology research and its outcomes by means of various methods of social sciences and humanities. They have emerged in 1930s when social importance of science and technology became evident. Since 1970s, the science and technology studies have developed as mission oriented learning for government policy, business administrations and civic activity. In the first half of this lecture, the outline of the science technology studies is given. The involved topics are philosophy, history, sociology, and economics of science and technology.

Style) Lecture

Goal)

1. Understanding of the minimum essentials of the science and technology studies
2. Understanding of the social meaning of each student's research

Schedule) 1. Introduction: A brief history of the science and technology studies since 1930s 2. Philosophical understanding of science: (1) From Greek Classics to German Classical Philosophy 3. Philosophical understanding of science: (2) Rise of the philosophy of science the early twentieth century 4. Historical investigation of science and technology : (1) Emergence of the modern Western science 5. Historical investigation of science and technology : (2) From the Power Revolution of the Medieval West to the modern the Industrial Revolution 6. Sociology of science and technology: (1) Normative structure and Paradigm 7. Sociology of science and technology: (2) Social constructivism and Laboratory life analysis 8. Economics and science and technology : (1) Market and planning economies 9. Economics and science and technology : (2) Innovation and economic policy 10. The 1950s model of science and technology policy in the Cold War 11. Knowledge industrial society since 1970s: (1) Environmental problem and energy problem 12. Knowledge industrial society since 1970s: (2) Computer science and Information society 13. Policy issues in the transform of industrial structure and role of university 14. Science and technology in the global economy since 1990s 15. Concluding remark: Science, technology and society in the future

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169536>

Contact)

⇒ Kawamura (410 Chem Bldg, +81-88-656-7401, kawamura@chem.tokushima-u.ac.jp)

Management Theory of New Business

2 units

Vice chairperson of School Affairs Committee , Faculty of Engineering

First-line men with experience of practical business · PART-TIME LECTURER

Target) New business is the word which means the business to make the most of technical knowledge, technology, the new idea and which is developed creatively, and that main bearer is the enterprise called a venture. There is a purpose of this class in providing the knowledge which is necessary, and know-how and a spirit so that a taking lecture student may establish a venture business.

Outline) The regeneration of the Japanese society with the vitality is being asked. Government enforced "a university venture 3 years 1000 companies plan" over Heisei 14-the 16th year. Though that goal

was almost attained, it is very important to promote entrepreneur education continuously from now on. Tokushima Prefecture supports this class based on the recognition done like this, and it is established.

Requirement) The person whom the one with the classroom is constructed by the class start time in the person who doesn't learn the unit of "Introduction to new business" in the college, and a group are organized, and it is limited to the person with the intention to make a business plan, and taking lecture is recognized.

Notice) Being late and a whisper in class should be prohibited strictly. Be careful over and again because it should dispose of exit and future taking lecture may not be recognized when it is wicked.

Goal) Learning of the necessary knowledge to establish venture business, and the ability which can make a business plan.

Schedule) 1. Guidance 2. What is the new business? 3. Keynote lecture 4. Theory of a stand-alone version venture success 5. The law knowledge which is necessary for entrepreneur 6. Fund-raising and capital policy 7. Indirect finance 8. Direct finance 9. The basis of the company management 10. The elementary knowledge of the business accounting 11. The point of the business plan preparation 12. Management strategy and marketing 13. Product development and intellectual property 14. Business plan preparation practice 15. Examination 16. Business plan announcement meeting

Evaluation Criteria) It is evaluated by the presentation (40%) of the written examination (60%) and the business plan. And, the presentation of the written examination and the business plan is decided to be recognized only for the taking lecture student who attended it for 2/3 and more of the classes that it is opened.

Textbook) The summary is distributed every time.

Reference) Several are introduced in the school hours.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169607>

Student) he person who hasn't learned the unit of the new business outline that it is opened with this learning in all the students enrolled in the graduate school yet is made the target. The number of completion people may be restricted in the method such as a lottery in case of a taking lecture applicant many. As for the details, an applicant for taking lecture is to follow those directions because the notice which showed attention in taking lecture is done.

Contact)

⇒ Vice chairperson of School Affairs Committee , Faculty of Engineering

Note) The man of business that it is active in the forefront every time, and an adviser are invited as an instructor, and working knowledge is provided for theory plus practice in this class from the specialist's position. This class is the thing which is useful enough even if it is taken to the person who aims at a general enterprise and a laboratory, the employment to the self-governing body and so on.

Introduction to Intellectual Property

2 units

Tohru Sakai · PART-TIME LECTURER / (助)工業所有権協カセンター, Juichiroh Osame · PART-TIME LECTURER

Akio Fujii · PART-TIME LECTURER / INTELLECTUAL PROPERTY OFFICE, Yasushi Toyosu · PART-TIME LECTURER, Kuniaki Kubota · PART-TIME LECTURER

Target) Understanding the basic systems and importance of protection and practical use of intellectual property based on some examples.

Outline) It is necessary for a working staff in a company, a university, etc., in a future. It is introduced the importance to protect and practical use of intellectual property at governments , industrial circles, universities and institutes in Japan using potential on scientific techniques. This lecture is treated the basic systems of protection and practical use of intellectual property particularly based on strategy and invasion of patent in an organization such as company, university, etc.

Style) Lecture

Keyword) Intellectual property, Patent Law, Protect and Use of Intellectual Property

Relational Lecture) "Introduction to Intellectual Property"(0.5)

Requirement) No requirement

Notice) It is necessary to be present at two concentrated lecture.

Goal)

1. Understanding concept of intellectual property right.
2. Understand the Patent Act, the Trademark Act, the Design Act and the Copyright Act.
3. Understanding on basical practical use of intellectual property.

Schedule 1. Concept of intellectual property(Sakai) 2. Outline of intellectual property(Patent and Trademark)(Sakai) 3. Outline of intellectual property(Design and Copyright)(Sakai) 4. Patent, invention and invasion of patent (Sakai) 5. Management of intellectual property and use (Sakai) 6. A way of research and development and intellectual property in a future(Sakai) 7. The midterm examination and its comment for Target and 8. History of system of intellectual property (Osame) 9. International trend of system of intellectual property (Osame) 10. Acquisition method of intellectual property right(Fujii) 11. Use of intellectual property(Watanabe) 12. Strategy of intellectual property on development of techniques(Y.Higuchi) 13. Effective intellectual property in development of techniques (Kubota) 14. Special lecture on a use of intellectual property by a chief executive officer(1) 15. Special lecture on a use of intellectual property by a chief executive officer(2)

Evaluation Criteria) Passing mark is over 60% on the examinations and the reports for each reaching level, respectively.

Textbook) To be used textbooks made by lecturers.

Reference) Nobuhiro Nakayama:Titeki Shoyuken, Nikkan Kohgyo Shinbunsha

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169591>

Student) For the course students and other graduate school students.

Contact)

⇒ Sakai (+81-3-5600-2631,)

⇒ Mizuguchi (A501, +81-88-656-7349, mizuguch@ce.tokushima-u.ac.jp) (Office Hour: Monday,11:00-12:30, 17:00-18:00)

Presentation Method (D)

2 units

Target) Poster and oral presentations, and journal publications are common means of appealing the research work in various scientific and technological disciplines. It's undoubtedly important for activating the research work. The lecture is intending for students to learn most efficient way to appeal their findings and discussions in scientific community.

Outline) Credits are acknowledged to the students who are supervised to give conference speech by themselves and do actually the lectures.

Goal) The lecture is aiming at having knowledge and experience of the presentation in international conferences.

Evaluation Criteria) Students' achievement is evaluated by portfolios submitted showing the progress in preparation of international conferences as well as by presentation records.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169628>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Internship (D)

2 units

Target) This program is provided to increase knowledge and experience in the actual industrial technology in various fields. Through the practical experience, the program will allow students to become discerning and well-balanced researchers or engineers with deeper understanding of technological societies.

Outline) Credits are acknowledged to students who experienced the internship in companies and/or government offices. Their fulfillment is evaluated by activity reports during internship.

Goal)

1. Grasping internal systems of a company, management, action and strategy to achieve the company's goal. (2)
2. Understanding human relationship and communicative manner in a working society and a company.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by supervisors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169542>

Student) Able to be taken by only specified class(es)

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Venture Business (D)

2 units

Target) Aims of the lecture are doing collaborative works with private enterprises and establishing venture businesses through such works.

Outline) The lecture is aiming at founding a venture business company as well as establishing collaborative research works with private enterprises. It's worth to apply their accomplishment to an actual society beyond the range of a laboratory work.

Goal) Objective of the lecture is to have experience and knowledge of collaborative works with private enterprises and to mature the works to venture businesses.

Evaluation Criteria) Credits are acknowledged in case of doing collaborative works with enterprises and/or maturing them to venture businesses. Handouts, reports, and presentation materials, etc. are evaluated to approve credits.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169539>

Note) A possible student should submit portfolios which are evidenced for his/her 90 hours' extensive work. Students are advised to ask details about this lecture to their supervisors.

Long-term Internship (D)

6 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This program is provided long-term internship in the actual industrial companies and so on, doing a joint study between companies and university on practical problems proposed by the company and practical experience of management of technologies. Through the long-term internship, the program will allow students to become a engineer with a core role in researches and companies

Outline) Credits are acknowledged to students who experienced the internship in companies or government offices of 270 hours during three months or more and presentation to executive officer of the company. Their fulfillment is evaluated by activity reports during internship and appraisal and interviewed report from a mentor.

Goal) Grasping abilities for practical engineers by studying activities in company and so on.

Evaluation Criteria) Achievement is evaluated by how you tackled, activity reports, and an evaluation record submitted by mentors in company and/or government.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169697>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Nishida (K409, +81-88-656-7630, nishida@kg.tokushima-u.ac.jp)

⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

⇒ Morimoto (A407, +81-88-656-7619, emi.morimoto@kg.tokushima-u.ac.jp) (Office Hour: 月～木(10時～15時))

Note) Students who register the coop-education program for "Pai-shape" engineers with sense for management of technology, are able to have a grant-in-aid for travel and so on. Ask committee members of long-term internship in your course or coordinators of this program.

Advanced Lecture in Theory of Business Models

2 units

Tatsuya Deguchi · PART-TIME LECTURER, Kenichi Yasumuro · PART-TIME LECTURER, Katsuo Touma · PART-TIME LECTURER
Takahide Yamaguchi · PART-TIME LECTURER, Shingou Nishii · PART-TIME LECTURER

Target) There is a purpose of this class in providing the knowledge which is necessary, and know-how so that students may achieve a business model in establishing enterprises based on the lecture of "Management Theory of New Business", and in making students understood the profit generating stream by studying on the frame work of companies in several business fields.

Outline) Business Model is a remarkable term in modern economic and organizational theories in these days but describes a broad range of definitions. In this lecture, Business Model is defined as "System which converts technology and know how into profit for the purpose of customers' satisfaction" and aims at providing the ability for the design of profitable system, by learning cost issues in establishing business strategies of companies.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business"

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of business model design is learned
2. Understanding of the concept of business model by case study analysis are appreciated
3. It learns forming ability of business plan through the case study on business models

Schedule) 1. Guidance 2. Keynote lecture "Business Model Thinking" 3. Questions and answers, Discussions 4. Lecture "Theory of Business Models" 5. Lecture "Design principles of Business Models" 6. Lecture "Evaluation of Business Models" 7. Case Study "Business Model in a R&D company" 8. Case Study "Business Model in a manufacturing industrial company" 9. Case Study "Business Model in a company of service industry" 10. Case Study "Business Model in a company of information industry" 11. Business plan practice, Present situation analysis and alternatives. 12. Business plan practice, Concept ad design of business. 13. Business plan practice, Financial analysis . 14. Business plan practice, Concluding and submitting 15. Presentation(1) of Business plan practice. 16. Presentation(2) of Business plan practice, Comments and summary.

Evaluation Criteria) Participation in class(20%) Group work and its report(80%)

Textbook) Ken-ichi Amuro and Study Group of Business model "Case Book: Business Model Thinking" Bunshindo

Reference) Several are introduced in class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169696>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the course. And, the number of taking lecture person is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Contact)

- ⇒ Tatsuya Deguchi (Wakayama University)
 ⇒ Yamanaka (A410, +81-88-656-7350, yamanaka@ce.tokushima-u.ac.jp) (Office Hour: オフィスアワー:年度ごとに学科の掲示板を参照のこと)

Note) This class is supported by Tokushima Prefecture Government

Management of Technology

2 units

Hideo Yamanaka · PROFESSOR / PLANNING AND DESIGN SYSTEMS ENGINEERING FOR INFRASTRUCTURES, CIVIL AND ENVIRONMENTAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) About the production management of the automobile industry, it is understood variously from the point of view such as "research and development", "production management", "purchasing" and "quality control" "marketing" and "cross-cultural management".

Outline) It learns about the production management. This time, "the automobile industry" specially takes up the production management of "Honda Motor Co.,Ltd. (following Honda)" even of that in the case, and the class to appreciate that importance with ranking of technology in management is taken.

Requirement) Finish "Introduction to new business" or "Advanced Lecture in management Theory of new business"

Notice) Face a class when a taking lecture person surely does enough preparation every time. And moreover, be the worst, but one person one time is to do some remarks every time.

Goal)

1. The elementary knowledge of management is learned.
2. Ranking of the technology in management and that importance are appreciated.
3. It learns how to solve the various problems which always occur in the spot of the management through the case study and the business game.

Schedule) 1. Guidance 2. Lecture "What in Management of Technology?" 3. Case report "Research and development of Honda" 4. Case study "Plan an overseas factory." "A new car development order" 5. Lecture "Production management and purchasing" 6. Lecture "Quality control" 7. Case report "The production management of Honda","The supply chain management of Honda" 8. Case study "Plan an overseas factory." 9. Case report "The quality control of Honda" 10. Case study "Don't make material defects flare up again." 11. Lecture "Marketing strategy" 12. Lecture "Cross-cultural management" 13. Case report "Around the products project of Honda - the two-wheeled vehicle" 14. Case report "The path of internationalization of Honda" 15. Case report "The personnel management of Honda" 16. Summary and questions and answers

Evaluation Criteria) It is evaluated in the remark (20%) in class and the middle, end of a term report (80% in total).

Textbook) It doesn't specially use.The summary and so on is distributed every time.

Reference) Several are introduced in class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169698>

Student) The person who finished "Introduction to new business" or "Advanced Lecture in management Theory of new business" in all the students enrolled in the doctor former term course. And, the number of taking lecture person is restricted to do intensive learning. (20-25 people will be made an upper limit.) It is selected with some means in case of a taking lecture person many.

Note) This class invites seven Honda alumnuni who did work in "research and development", "production management", "purchasing", "quality control", "marketing", "cross-cultural management", and so on as an instructor, and it is the class to do case report. Even if it is seen nationwide, the trial done like this is very rare, and it is a precious class. And, an applicant for taking lecture is to attend it in the guidance to hold it in advance.A schedule is indicated separately.

Radio Frequency Solid State Physics

2 units

Takashi Ohno · PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Koichi Nakamura · ASSOCIATE PROFESSOR / PRODUCTION SYSTEMS ENGINEERING, MECHANICAL ENGINEERING, INTELLIGENT STRUCTURES AND MECHANICS SYSTEMS ENGINEERING

Target) This class introduces basis of NMR and applications to studies on superconductivity, magnetism and ionic diffusion in solid.

Outline) The spectrum, spin-lattice relaxation, spin-spin relaxation, chemical shift etc., which are obtained by NMR measurements, are introduced and discussed in connection with various physical properties of solids.

Keyword) Nuclear Magnetic Resonance, Nuclear magnetic moment, Magnetism, Diffusion, Superconductor, Spin - lattice relaxation, Knight shift

Goal)

1. To understand basis of NMR.
2. To understand relationship between various problems in solid state physics and relaxation phenomena observed using NMR.

Schedule) 1. Introduction 2. Spin-echo and NMR spectrum 3. Equipments 4. Dipole interaction 5. Hyperfine interaction and spectrum 6. Chemical shift 7. Quadrupole interaction and quadrupole resonance 8. Spin-lattice relaxation 9. Internal magnetic field in ferro and antiferro magnets 10. Spin-lattice relaxation in metals 11. NMR studies on superconducting state 12. NMR studies on High Tc superconductors 13. Diffusion in solid and spin-lattice relaxation 14. NMR studies on lithium ionic conductors 15. NMR studies on protonic conductors 16. Summary

Evaluation Criteria) Report 100%

Textbook) 遍歴電子系の核磁気共鳴 (朝山邦輔著, 裳華房)

Reference) To be introduced in the class

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169601>

Contact)

- ⇒ takashi Ohno (A201, 656-7549)
 ⇒ Nakamura (A216, +81-88-656-7577, koichi@pm.tokushima-u.ac.jp)

Engineering of Correlated Electron Matter

2 units

Yutaka Kishimoto · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Yu Kawasaki · ASSOCIATE PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) In many solid-state materials, new phenomena evolve due to strong electron interactions. In this Lecture, review will be given on some advanced topics and their applications, including high temperature superconductivity, metal-insulator transition and strongly correlated electronics.

Outline) New types of superconducting and magnetic phenomena emerge in correlated electron matters. The term "correlated electron" represents the state of matter where many electrons are strongly interacting with each other. After an introductory talk on magnetism and superconductivity, review will be given on some advanced topics, including high temperature superconductivity, metal-insulator transition and colossalmagneto resistance. Potential application of correlated electron matters to technology is also presented focusing on spintronics or strongly correlated electronics.

Style) Lecture

Keyword) strongly correlated electron systems, Mott insulator, colossalmagneto resistance, high temperature superconductor

Goal) To understand basic concepts of correlated electron matter and its application

Schedule) 1. Introduction to correlated electron matters 2. Perspectives of magnetism and superconductivity in correlated electron matters 3. Electronic states of atoms and ions 4. Magnetic ions in crystal electric field 5. Introduction to superconductivity 6. How to probe rich properties in correlated electron matters 7. Mott insulator and metal-insulator transition 8. Spin, charge and orbital in transition metal oxides 9. Colossal magneto resistance in transition metal oxides 10. Application of transition metal oxides with correlated electrons 11. High temperature superconductivity 12. Heavy-fermion superconductivity 13. Electronic states of organic conductors 14. Application of superconductors with correlated electrons 15. Towards strongly correlated electronics

Evaluation Criteria) Reports on several subjects in lecture

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169546>

Contact)

⇒ Kishimoto (A202, +81-88-656-7548, yutaka@pm.tokushima-u.ac.jp) (Office Hour: 金曜日 16:00-17:30)
⇒ Kawasaki (A217, +81-88-656-9878, yu@pm.tokushima-u.ac.jp)

Nonlinear Optical Devices

2 units

Masuo Fukui · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Masanobu Haraguchi · ASSOCIATE PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) To understand the principle, typical structure, advantages and disadvantages of current nonlinear optical devices. To develop ability to design new devices and solve various problems for applications.

Outline) Physics of second-order and third-order nonlinear optical phenomena. Principles of electro-optics. Optical nonlinearities in fibers. Photorefractive materials. Nonlinear optical media. Anisotropic nonlinear optical media. Dispersive nonlinear optic media. Coupled-wave theory. Electro-optic and acousto-optic devices. Second-order and third-order nonlinear optic devices. Photonic switches. All-optical switches. Bistable optical devices. Optical connections.

Style) Portfolio

Keyword) nonlinear optics, harmonic generation, nonlinear optical device, optical switch

Relational Lecture) "Optical and Functional Inorganic Materials"(0.5, ⇒p.138), "Crystal Growth of Optical Materials"(0.5, ⇒p.155)

Requirement) Student should have fundamental knowledge of electromagnetic theory, waveoptics, optical properties of materials and lasers.

Notice) The following plan of this course is an example. Plans may be modified depending on knowledges and experiences of students.

Goal)

1. Possible to explain principles, structure and characteristics of optoelectronic devices.
2. Possible to explain principles, structure and characteristics of the second-order nonlinear optical devices.
3. Possible to explain principles, structure and characteristics of the third-order nonlinear optical devices.

Schedule) 1. Introduction & interview 2. nonlinear optical phenomena 3. Electrooptic effect and its applications 4. Magneto-optic effect and its applications 5. Acousto-optic effect and its applications 6. principle of second-order nonlinear effects 7. Second-order nonlinear optical materials 8. Second-order nonlinear optical devices 9. principle of third-order nonlinear effects 10. third-order nonlinear optical materials 11. Third-order nonlinear devices 12. Experiment for nonlinear optical phenomena 13. Current application of nonlinear devices 14. Photonic crystal 15. Integrated optical devices

Evaluation Criteria) Activity:20%, reports:40% and oral examinations:40%

Textbook) After interview, we will decide suitable text books.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169622>

Contact)

⇒ Haraguchi (Opt.209, +81-88-656-9411, haraguti@opt.tokushima-u.ac.jp) (Office Hour: 月曜16:30-17:30, 木曜16:30-17:30)
⇒ Fukui (Opt.208, +81-88-656-9410, fukui@opt.tokushima-u.ac.jp)

Crystal Growth of Optical Materials

2 units

Atsushi Mori · ASSOCIATE PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) Lectures will be given on crystallography and crystal optics. Topics on photonic crystal will be introduced.

Outline) After introducing the concept of the symmetry through the lectures on crystallography, propagation of electromagnetic wave in an anisotropic medium will be explained on the basis of the Maxwell equation. Topics on photonic crystal will be introduced; particularly, regarding the colloidal photonic crystals the method of their preparation will be dealt.

Keyword) crystal symmetry, anisotropy, Maxwell equation, photonic crystal, colloidal crystal

Relational Lecture) "Photonic Semiconductor Device Physics"(0.5, ⇒p.137), "Optical and Functional Inorganic Materials"(0.5, ⇒p.138), "Organic Photo-functional Materials"(0.5, ⇒p.155)

Goal)

1. Fresnel's equation of wave normal
2. colloidal photonic crystal

Schedule) 1. crystallography 2. symmetry 3. The Maxwell equation in homogeneous case 4. polarization of light 5. Jones' calculus 6. Fresnel's equation of wave normal 7. exercise 8. exercise, report 9. The Maxwell equation in inhomogeneous case 10. Photonic crystal 11. colloidal dispersion 12. colloidal dispersion 13. colloidal crystal 14. colloidal crystal 15. exercise 16. exercise, report

Evaluation Criteria) exercise and report

Textbook) Teaching materials

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169551>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Mori (Opt.407, +81-88-656-9417, mori@opt.tokushima-u.ac.jp) (Office Hour: オフィスアワーは、学科の掲示板等をご覧ください。)

Note) ◇結晶光学とコロイダルフォトニック結晶を主とし、結晶成長学は主とはしない。(内容を大幅に変更しましたので、ご注意ください。) ◇マクスウェル電磁気学を捨てて掛かっている者は、受講をご遠慮下さい。(思い出せれば大丈夫です。)

Organic Photo-functional Materials

2 units

Hitoshi Tanaka · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Yoshihiko Tezuka · ASSOCIATE PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) The objective of this course is to develop basic and practical knowledge of chemistry that is required to design, synthesize, and construct organic materials with desired functionality.

Outline) Physical and chemical properties of molecules and molecular assemblies. Molecular design for functional materials based on the molecular structure. Synthetic method for constructing desired molecular structures. Molecular design, and characteristics of organic photo-functional materials (Tanaka). Physical and chemical properties of conjugated π -electron system and its application for opto-electronic devices (Tezuka).

Style) Portfolio

Relational Lecture) "Optical and Functional Inorganic Materials"(0.5, ⇒p.138)

Goal)

1. to enable a student to understand functionality of organic materials in terms of their molecular structures.
2. to enable a student to construct practical routes for synthesizing desired molecules.

Schedule 1. Introduction to organic materials 2. Atomic groups expressing photo-functionality (1) 3. Atomic groups expressing photo-functionality (2) 4. Generation of photo-functionality by molecular assembly 5. Chemical modification (1): incorporation of functional atomic groups 6. Chemical modification (2): incorporation of functional atomic groups 7. Chemical modification (3): polymerization and polymer reaction 8. Spectroscopic analysis of molecular structure 9. Introduction to π -electron conjugated molecules 10. Synthesis of π -electron conjugated molecules 11. Properties of π -electron conjugated molecules (1) 12. Properties of π -electron conjugated molecules (2) 13. Applications to organic conducting materials 14. Applications to organic electroluminescence devices 15. Applications to organic solar cells

Evaluation Criteria Term papers and oral examination.

Textbook Text books will be decided after interview.

Reference – to be introduced in the class.

Contents <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169642>

Contact

- ⇒ Tanaka (Opt.211, +81-88-656-9420, tanaka@opt.tokushima-u.ac.jp)
- ⇒ Tezuka (Opt.307, +81-88-656-9423, ytezuka@opt.tokushima-u.ac.jp)

Advanced Optical Information Systems

2 units

Shiro Suyama · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING
Nobuo Goto · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target To understand an architecture, design, and device in optical information systems.

Outline Information processing systems using optoelectronics devices and technologies which include lasers, light emitting diodes, spatial light modulators, nonlinear recording devices and holographic technology: holographic systems, optical computing systems, three-dimensional display systems, optical recording systems, and optical measurement systems. This course is performed with lecture in combination with portfolio.

Keyword Information photonics, Optical computer, Optical information processing, Information optics

Goal

1. To understand the availability of light in optical information system
2. To understand the relation between information photonics and other technology
3. To develop a new architecture of optical information system

Schedule 1. Introduction to optical information system 2. Optics in optical information system (1) 3. Optics in optical information system (2) 4. Light source and detector in optical information system 5. Optical modulator in optical information system (1) 6. Optical modulator in optical information system (2) 7. Analog optical information system (1) 8. Analog optical information system (2) 9. Digital optical information system (1) 10. Digital optical information system (2) 11. Optoelectronic information system (1) 12. Optoelectronic information system (2) 13. Information communication technology and optical information technology 14. Biomedical optical measurement technology and optical information technology 15. Biotechnology and optical information technology 16. Examination

Evaluation Criteria Report 100%

Contents <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169615>

Medical Information Systems

2 units

Noboru Niki · PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING
Yoshiki Kawata · ASSOCIATE PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target To understand the fundamental concepts of digital environment for medical diagnosis. To learn the design methods of medical information systems.

Outline This course introduces the design and the implementation of digital environment for medical diagnosis based on the various technologies including medical image data acquisition and retrieval, computer aided diagnosis using multimodal medical data sets.

Style Portfolio

Keyword Imaging technology, Computed-aided diagnosis systems, Digital environment for medical diagnosis

Relational Lecture “Medical and Biological Engineering”(0.5, ⇒p.142)

Goal

1. To understand medical imaging techniques.
2. To understand various techniques of computer-aided diagnosis.
3. To understand the fundamentals of digital environment for medical diagnosis.

Schedule 1. Introduction 2. Imaging techniques 3. Image processing techniques 4. Pattern recognition techniques 5. Visualization techniques 6. Virtual reality/Mixed reality techniques 7. Design of computer-aided diagnosis systems 8. Implementation of computer-aided diagnosis systems 9. Design and implementation of fundamentals of digital environment for medical diagnosis and therapy 10. Design of medical information systems (1) 11. Design of medical information systems (2) 12. Design of medical information systems (3) 13. Design of medical information systems (4) 14. Design of medical information systems (5) 15. Advanced medical information systems

Evaluation Criteria Report 100%

Textbook Reference books are introduced to each topics.

Contents <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169529>

Contact

- ⇒ Niki (Opt.507, +81-88-656-9430, niki@opt.tokushima-u.ac.jp)
- ⇒ Kawata (Opt.508, +81-88-656-9431, kawata@opt.tokushima-u.ac.jp)

Photonic Semiconductor Device Physics

2 units

Shiro Sakai · PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING
Yoshiki Naoi · ASSOCIATE PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING
Katsushi Nishino · ASSOCIATE PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target To understand the device physics and fabrication technique of photonic semiconductor devices..

Outline Interaction of photons and electrons in semiconductors, physics of superlattice semiconductors and their applications as photonic devices. Crystal growth of semiconductors and heteroepitaxy.

Style Lecture

Keyword Semiconductor, Photonic device

Relational Lecture “Optical and Functional Inorganic Materials”(0.5)

Goal

1. To understand device physics of photonic devices in terms of interaction of photons and electrons
2. To understand device physics of quantum effect devices
3. To understand crystal growth and related technologies for fabrication of photonic devices

Schedule 1. Introduction 2. Energy band structure of semiconductors 3. Quantum statistics of electrons in semiconductors 4. Carrier transport in semiconductors 5. Quantum devices and superlattice 6. Light absorption in semiconductors (interaction of electrons and photons) 7. Photocinductivity, photovol and photodiode 8. Physics of light emission of semiconductors 9. Radiative recombination, non-radiative recombination, stimulated emission and spontaneous emission 10. Light emitting diodes and lasers 11. Devices for optical communication 12. Crystal growth of substrates for photonic semiconductor devices 13. MOCVD and MBE 14. Fabrication of Ohmic contact 15. Nano-photonic devices and fabrication technology 16. Examination

Evaluation Criteria Report 50%, Examination 50%. More than 60% is required to pass this class.

Textbook To be introduced in the class.

Contents <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169617>

Contact

- ⇒ Sakai (E 棟 2 階南 A-3, +81-88-656-7446, sakai@ee.tokushima-u.ac.jp)
- ⇒ Naoi (E 棟 2 階南 A-4, +81-88-656-7447, naoi@ee.tokushima-u.ac.jp) (Office Hour: 年度ごとに学科の掲示を参照すること.)
- ⇒ Nishino (E 棟 2 階南 A-5, +81-88-656-7464, nishino@ee.tokushima-u.ac.jp)

Note This lecture will be given in English.

Optical and Functional Inorganic Materials

2 units

Yasuo Ohno · PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING
Kikuo Tominaga · ASSOCIATE PROFESSOR / MATERIAL AND DEVICE SCIENCE, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) This course aims to learn the fundamentals of material science of such as single crystals, polycrystals or amorphous films for optical and functional materials. At the same time, the synthesis methods of various films, their evaluation techniques and the propagating optical beam and acoustic waves in crystals are lectured. Apart from above, semiconductor device physics is also included.

Outline) Fundamentals of crystal science is lectured at first. Optical and electronic processes in optical and functional materials such as single crystals, polycrystals or amorphous films are followed. Advanced solid state physics of semiconductors, dielectric and ferroelectric materials are included. Synthesis methods of optical and functional crystals and films, evaluation methods of film properties are also contained. Electro-optical and piezo-electrical effects and solid state physics relating with their effects, characterization of crystals, symmetry elements of crystals and material constants, optical properties of crystals, electro-optical effects and nonlinear effects, piezoelectricity, acoustic waves in crystal, interaction of photons and phonons in crystal, synthesis methods of thin films (PVD method; electron beam evaporation, MBE, sputtering, laser ablation), film properties (characterizations of electrical, optical and mechanical properties) are included. In addition, modern semiconductor device physics, such as hot carrier effects, deep trap effect, short channel effects, etc will be lectured.

Style) Lecture and exercise

Keyword) Functional material, semiconductor device, crystal optics, thin film technology, deposition techniques of thin films

Relational Lecture) "Photonic Semiconductor Device Physics"(0.5), "Nonlinear Optical Devices"(0.5)

Goal) Understanding of the solid state physics of piezoelectric materials and functional thin films

Schedule) 1. Characterization of crystals 2. Symmetry elements of crystals and material constants 1 3. Symmetry elements of crystals and material constants 2 4. Optical properties of crystals 1 5. Optical properties of crystals 2 6. Electro-optical effects and nonlinear effects 1 7. Electro-optical effects and nonlinear effects 2 8. Piezoelectricity 1 9. Piezoelectricity 2 10. Acoustic waves in crystal 1 11. Acoustic waves in crystal 2 12. Interaction of photons and phonons in crystal 13. Synthesis methods of thin films 1(PVD method; electron beam evaporation, MBE, sputtering, laser ablation) 14. Synthesis methods of thin films 2(PVD method; electron beam evaporation, MBE, sputtering, laser ablation) 15. Film properties (Characterizations of electrical, optical and mechanical properties) 16. Exercise

Evaluation Criteria) Reports for each theme and examination

Textbook) Tomoya Ogawa: Fundamentals in Crystal Engineering, Shoukabou (in Japanese) and Shunichi Gonda, Applied Handbook of Thin Film Depositions, (NTS) (in Japanese)

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169640>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Ohno (E 棟 2 階南 A-7, +81-88-656-7438, ohno@ee.tokushima-u.ac.jp)

⇒ Tominaga (E 棟 2 階南 A-6, +81-88-656-7439, tominaga@ee.tokushima-u.ac.jp)

Note) This lecture will be given in English.

Medical and Biological Engineering

2 units

Yohsuke Kinouchi · PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING
Masatake Akutagawa · ASSOCIATE PROFESSOR / ELECTRICAL AND ELECTRONIC SYSTEMS, ELECTRICAL AND ELECTRONIC ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) Various applications of electronic technologies to medical fields are described.

Outline) Fundamental approaches to apply engineering such as electronics to medical fields including diagnosis, treatment and alternative function are described in relation to life sciences such as physiology, biomechanics and so forth. Typical systems of medical instruments are introduced. The development of new technologies based on the intelligent functions of living bodies are presented. Functional characteristics of the nervous system and their application to information processing and control are discussed.

Style) Lecture in combination with Portfolio

Goal) 1 Biological signal measurement 2 Biological signal processing 3 Medical systems

Schedule) 1. Introduction of medical engineering 2. Introduction of measurement of biological signal 3. Electrical measurement methods 4. Magnetic measurement methods 5. Ultrasonic measurement methods 6. Other measurement methods 7. Biological signal processing methods 8. Examples of biological signal processing 9. Biological system identification 10. Measurement of brain functions 11. Measurement of other functions 12. Biological monitor 13. Analysis of electrical properties of tissue 14. Examples

of medical diagnosis technology 15. Examples of medical treatment technology 16. Medical prosthesis technology

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169531>

Contact)

⇒ Kinouchi (E 棟 3 階北 C-4, +81-88-656-7475, kinouchi@ee.tokushima-u.ac.jp)

⇒ Akutagawa (工学部電気棟 3 階北 C-5, +81-88-656-7477, makutaga@ee.tokushima-u.ac.jp) (Office Hour: Wed. 18:00 - 20:00, Fri. 17:00 - 18:00)

Note) This lecture will be given in English.

Visual pattern processing

2 units

Shunichiro Oe · PROFESSOR / APPLIED INFORMATION MEDIA ENGINEERING, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING
Kenji Terada · ASSOCIATE PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) The basic technologies which replace the visual pattern processing function of man by computer and their applied technologies are made to master.

Outline) The advanced processing techniques of visual pattern, i.e., the pre-processing techniques, the feature extraction techniques, the classification techniques of visual pattern, the processing techniques of color image and their application examples are lectured.

Style) Lecture in combination with Portfolio

Keyword) pattern recognition, vision, image processing

Fundamental Lecture) "Applied Image Processing"(1.0)

Goal) Acquisition of knowledge about the processing theories of visual pattern and their various applied technologies, and the processing technologies of color image

Schedule) 1. Concept of pattern recognition 2. Statistical pattern classification method 1 3. Statistical pattern classification method 2 4. Pattern classification method by the structural analysis technique 5. Pre-processing method of visual pattern 6. Feature extraction method of visual pattern 1 7. Feature extraction method of visual pattern 2 8. Segmentation method of visual pattern 1 9. Segmentation method of visual pattern 2 10. Pattern classification method by neural network 11. Pattern classification method by GA 12. Security image processing 13. Tracking of moving object 14. Texture analysis 15. The feature extraction method of color image and its application 16. Periodic examination

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169561>

Student) Able to be taken by only specified class(es)

Applied Knowledge Systems

2 units

Jun-ichi Aoe · PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING
Kenji Kita · PROFESSOR / APPLIED INFORMATION MEDIA ENGINEERING, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING
Fuji Ren · PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING
Masami Shishibori · ASSOCIATE PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING
Shingo Kuroiwa · PROFESSOR / 千葉大学大学院 融合科学研究科
Masao Fuketa · ASSOCIATE PROFESSOR / INTELLIGENT SYSTEMS, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING
Kazuhiro Morita · ASSOCIATE PROFESSOR / INFORMATION SCIENCE, INFORMATION SCIENCE AND INTELLIGENT SYSTEMS, SYSTEMS INNOVATION ENGINEERING

Target) The course introduces the basic principle and theory of knowledge-based systems, including natural language processing systems, voice language processing systems, information retrieval systems.

Outline) Knowledge systems to natural language processing, voice language processing, information retrieval and document database. Artificial natural language processing systems, such as automatic building systems of intelligent dictionaries, text understanding and summarization systems, dialog systems, natural language interface systems, text classification systems, natural language analysis systems and knowledge-based machine translation systems.

Style) Portfolio

Keyword) knowledge-based system, natural language processing system, speech and language processing system, information retrieval system, machine translation system

Fundamental Lecture) "Language Modeling"(1.0), "Natural Language Understanding"(1.0)

Relational Lecture) "Multimedia Systems and Applications"(0.5)

Goal) To learn various methods for constructing knowledge-based intelligent information systems.

Schedule) **1.** Natural language processing systems 1: design and retrieval methods of dictionaries **2.** Natural language processing systems 2: design and implementation of parsers **3.** Natural language processing systems 3: design and implementation of language understanding systems **4.** Machine translation systems 1: rule-based and example-based approaches **5.** Machine translation systems 2: super-function **6.** Machine translation systems 3: integrated methods **7.** Speech and language processing systems 1: design of language models **8.** Speech and language processing systems 2: design of acoustic models **9.** Speech and language processing systems 3: design of search algorithms **10.** Information retrieval systems 1: document retrieval based on vector space models **11.** Information retrieval systems 2: retrieval methods based on inverted index files **12.** Information retrieval systems 3: design and implementation of intelligent document retrieval systems **13.** Intelligent multimedia contents processing systems 1 **14.** Intelligent multimedia contents processing systems 2 **15.** Recent topics **16.** Assignment

Evaluation Criteria) Assignment count 100%.

Textbook) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169535>

Student) Able to be taken by only specified class(es)

Contact)

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⇒ Kita (Dr503, +81-88-656-7496, kita@is.tokushima-u.ac.jp) (Office Hour: Tuesday 12:50 - 14:20)

⇒ Ren (C204, +81-88-656-9684, ren@is.tokushima-u.ac.jp) (Office Hour: Tuesday 12:50 - 14:20)

Advanced Exercise on Optical System Engineering

2 units
All teachers

Target) This subject is especially provided in order to deepen the study, and must be taken under the guidance of a faculty in major field of study.

Outline) Exercises related to research theme are performed.

Style) Portfolio

Keyword) Optical engineering

Goal) To obtain deeper knowledge regarding research theme.

Schedule) **1.** Guidance **2.** Exercise **3.** Report

Evaluation Criteria) Assignments count 100%.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169613>

Student) Able to be taken by only specified class(es)

Contact)

⇒ Inoue (Opt.310, +81-88-656-9416, inoue@opt.tokushima-u.ac.jp)

Advanced Research on Optical System Engineering

2 units
All teachers

Target) This subject is essentially provided in order to deepen the research, and must be taken under the guidance of a faculty in other field of study.

Outline) Exercises related to research theme are performed.

Keyword) Research, Optical Engineering

Goal) To have wider knowledge regarding research theme.

Schedule) **1.** Guidance **2.** Research **3.** Report

Evaluation Criteria) Assignments count 100%.

Textbook) To be introduced in the class.

Reference) To be introduced in the class.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=169614>

Student) Able to be taken by only specified class(es)

Contact)

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