メディカル工学セミナー　　Medical Engineering Seminar
[Instructor] To be announced (Class teacher for freshmen)
[Credits] 2
[Semester] 1st year-Spring-Thurs 2
[Course code] T1L001001
[Room] Bldg. ENG-17-111
[Course enrollment] 45
[Candidate] Only students of Department of Medical System Engineering may take this course.
[Course description] The student shall learn about the research on the forefront of Medical System Engineering Fields. He/she shall take lectures for about 30 - 45 min per each laboratory from faculty members of the Center for Frontier Medical Engineering (CFME), which specifically includes the joint research with the medical school. Together with the lectures about the above-mentioned forefront of biomedical engineering research, the practical training of electrocardiogram and electromyogram using BIOPAC will be conducted. The practical training of presentation using a PC will be also performed.
[Course objectives] First, to listen to the topics of forefront medical system engineering, and help the students orientate their future. Secondly, as well as learning the basis of biometry through practical training of electrocardiogram and electromyogram using BIOPAC, to learn about the presentation skills towards future graduation research or conference presentations.
[Plans and Contents]
1. Guidance of Biomedical Engineering Seminar and explanation of the contents of this lecture.
2. Tutorial about an English e-learning system and an English level diagnostic test
3. Research introduction by faculty members of Department of Medical System Engineering 1
4. Research introduction by faculty members of Department of Medical System Engineering 2
5. Research introduction by faculty members of Department of Medical System Engineering 3
6. Research introduction by faculty members of Department of Medical System Engineering 4
7. Research introduction by faculty members of Department of Medical System Engineering 5
8. Research introduction by faculty members of Department of Medical System Engineering 6
9. Research introduction by faculty members of Department of Medical System Engineering 7
10. Guidance for BIOPAC practical training and presentation
11. BIOPAC Practical Training (electrocardiogram), 5 minutes presentation and the evaluation
12. BIOPAC Practical Training (electromyogram), 5 minutes presentation and the evaluation
13. BIOPAC Practical Training (electrocardiogram), 5 minutes presentation and the evaluation
14. BIOPAC Practical Training(electromyogram),5 minutes presentation and the evaluation
15. Presentations by high achieving students, report writing and submission
[Keywords] High school physics, practical training, safety education, BIOPAC, presentation
[Textbooks and Reference Books] High school textbook for Physics IB and Physics II
[Evaluation] Evaluate comprehensively the attitude towards lectures and exercises, works, and reports etc.
[Course requirements] Not particularly

医療現場体験　Meet the Professionals in Clinical Practice and Basic Research
[Instructor] To be announced (Class teacher for freshmen)
[Credits] 2
[Semester] 1st year Spring-Fall Intensive
[Course code] T1L002001
[Room]
[Candidate] Students of Faculty of Engineering, and Specially Registered Non-Degree Student
[Course objectives] The purpose of this intensive course is to experience personally how to utilize medical systems, and how to interact with patients, medical professionals and medical ethics through a medical setting.
[Plans and Contents] Practical training on communication with simulated patient, bioethics, excursion in dissection practice, and excursion to medical departments of Chiba University Hospital, excursion experience to Hitachi Medical Corporation.
1. Practical training on communication with simulated patient and bioethics [scheduled around July]. Student absent from this lecture cannot participate in the observation of dissection practice. Tardiness will not be tolerated.
2. Excursion to Chiba University Hospital [scheduled around September]. The students should bring white gown wearing a respectable suit of clothes (Jeans, T-shirt, sandal, sneakers, etc. are not allowed) during their excursion. Each student shall have their health checked, and any student found to have a fever on the excursion day will not be able to participate in the excursion because of the likelihood of an influenza epidemic. Each person shall wear a mask at the time of visit.
[Schedule of the day] (1) Gather at an appointed place in the University Hospital and roll call, change into white gown, and orientation. (2) 12:55 Depart for the excursion together with the whole group. (3) 16:40 Change from the white gown to casual wear at the baggage place after the excursion. (4) Disperse.
3. Excursion with practical experience to Hitachi Medical Corporation [scheduled around September]. Students should wear a respectable suit of clothes (Jeans, T-shirt, sandal, sneakers, etc. are not allowed) during their excursion. [Schedule of the day] (1) Gather at the Kashiwa-no-ha Campus Station (Tsukuba express). (2) Arrival at Hitachi Medical Research Corporation (3) Greetings, and company information through DVD. (4) Factory tour. (5) Product description: (a) Diagnostic ultrasound system, (b) X-ray system, (c) CT system, (d) MRI system, (e) Optical topography system (6) Questions and answers, (7) Desperse.
4. Excursion to observe dissection practice [scheduled around September].
5. Students are required to submit a report following the instructions by the teacher in charge.
[Evaluation] Students will be evaluated upon attendance and the submitted report, and require 60% or higher to pass the course.
[Remarks] Practical training dates can be changed depending on conditions at the medical facility.

ディジタル回路　Digital Circuit
[Instructor] Kazuhiko Ohnuma
[Credits] 2
[Semester] 3rd year-Spring-Mon 2
[Course code] T1L101101
[Room] Bldg. ENG-15-109
[Course enrollment] 50
[Candidate] Students of Faculty of Engineering, and Specially Registered Non-Degree Student
[Course description] The basic structure and operating principles of digital circuit are to be explained. As a mathematical foundation, a lecture about the simplification of logical function as well as logical operation and Boolean algebra will be given, and the basic structure of a computer, arithmetic algorithm, sequential circuit and combinational circuit shall be explained base on that.
[Course objectives] While understanding the foundation of a digital circuit, its objective is to be able to test the design of a simple digital circuit through a timing chart. 1. The operation using two values of 1 and 0 is the foundation of digital circuit. Using its foundation, the student will be able to simplify complicated logic. 2. The circuit that changes a decimal number into a binary number, and the circuit that compares large and small are learned so that the student will be able to design a simple logic circuit. 3. The basic principles of the stored circuit (flip-flop circuit) and various memories are studied, and the students are able to design practical problem using that. In addition, the reading of the time chart that shows how the value changes with time shall be learned. 4. Study the operating principles and computer structure based on the knowledge acquired until now.
[Plans and Contents] Starting from mathematical foundation of digital circuit, the simple logic circuit and simplification of logical function will be explained, and the students will be given assignments that will allow them to design a simple logic circuit. Furthermore, to introduce the principles of memory and various flip-flop circuits conducting that, and to learn how to make complicated circuit using memory. Finally to give a lecture on the principles of computers
1. Digital circuit boards – lecture on difference between digital and analog, converting from decimal to binary, complement of binary number, addition, and subtraction. Understand characteristics of binary numbers.
2. Lecture on OR, AND, and NOT in Boolean algebra – commutative law, idempotent law, associative and distributive properties, absorption law, De Morgan's theorem. With this base of knowledge, practice writing Boolean expressions from a truth table.
3. Lecture and problem practice on simplifying Boolean expressions using a Karnaugh map, and on using it for 2, 3, 4, and 5 variable expressions.
4. Combination circuits 1 – Explain encoders, decoders, multiplexer, and parity check circuits.
5. Combination circuits 2 - Explain binary addition and subtraction circuits including half-adders and full adders. Explain how to use them in multi-bit circuits.
6. Sequential circuits –Introduce basic flip-flop circuits and explain in detail how to use NOR circuits to record information.
7. Explain various developments of D, T, JK flip-flop sequential circuits. In addition, use a time chart to explain the timing of their operation. Explain stability of master-slave design.
8. Applications of sequential circuits – Process of making automatic vending machine circuits using sequential circuits: explain step-by-step state transition diagrams, excitation tables and circuits, output circuits. Also, gain
9. Counters1 - Explain operating principles for circuits formed of various flip-flops using binary counter circuits
10. Counters2-Explain how to build quinary counters, decimal counters.
11. Transistors and CMOS-Explain the principles of diodes and transistors, and how PMOS, NMOS, and CMOS operate. Introduce NOT circuits using transistors, and NAND and NOR circuits built with PMOS, and NMOS.
12. Digital calculators – Introduce a simple calculator circuit built using the sequential and combination circuits already discussed. Also, explain the assembly language used to make the calculator work.
13. AD and DA convertors: Explain how to convert analog signals to digital and vice versa.
14. Summary and comprehensive Seminar 1: Solve practice problems using the knowledge gained thus far, and explain those problems.
15. Summary and comprehensive Seminar 2: Solve practice problems using the knowledge gained thus far, and explain those problems.
16. End-of-term exam. ●Necessary preparation: Refer to materials from comprehensive seminars and review class lecture material.
[Keywords] Boolean algebra, combinational logic circuit, sequential circuit, computer basics
[Textbooks and Reference Books] (Reference Books): Digital circuit Mitsuhiro Ihara coronasha, Plain logic circuit Kunihiko Mihori coronasha
[Evaluation] Evaluated based upon level of achievement regarding above goals. A number of reports will be assigned during class, and they must be submitted two classes after. 80% of mark will come from the result of the final exam, and 20% from reports. Students must receive an overall mark higher than 60% to gain credit in the course.
[Related courses] Electronic Circuit, Mathematics for Information Science
[Course requirements] Not particularly

回路理論 Ⅰ　Electric Circuit Theory I
[Instructor] (Masahiro Uehara)
[Credits] 4
[Semester] 3rd year-Spring-Fri 1, 2
[Course code] T1L103001, T1L103002
[Room] Bldg. ENG-17-112
[Candidate] Students of Faculty of Engineering, and Specially Registered Non-Degree Student
[Course description] The minimum requirement for alternating current circuit and direct current circuit among the foundations of circuit shall be explained. As the lecture proceeds the student would be able to understand the most simple direct current circuit. The student will understand that using the concept of impedance would similarly perform the analysis of alternating current circuit.
[Course objectives] (General Objective) To learn the basics of Electrical and Electronic Engineering such as meaning of physics and analysis method, expression method, and basic approach of electric circuit. Furthermore, the object is to learn the required electrical sense, and to further intensify the student's understanding on this basic knowledge by solving exercises repeatedly. (Target Achievement) (1) To acquire knowledge regarding the structure of an alternating current circuit, and understanding direct current circuit, and a knowledge, so that the work can be understood (2) the student have to develop their judgment constructing circuit equation which analyses thinking and judgment for circuit diagram. When performing analysis of alternating current circuit, optimal theorem can be utilized. (3) The student shall show a stance to work on raising their hand diligently when interested and willing to practice. The student can participate diligently when conducting a discussion regarding circuit during the class. (4) The behavior towards attendance should be satisfactory. In addition, students should refrain from whispering, etc. during class. Homework report, etc. can be submitted until the deadline for submission. (5) When creating skills and expression of an equivalent circuit, the student would be able to work out the equivalent circuit by an effective and original way of thinking and would be able to describe that deriving process it could be easily understood.
[Plans and Contents] The basics such as Kirchhoff's law, Ohm's law, series multiple connection, physical meaning of electricity, electric current and voltage regarding direct current circuit shall be learned. Then, the concept of admittance and impedance, functions of the inductor and capacitor, definition of electric current, and voltage regarding alternating current circuit shall be understood, and expressions of complex number in alternating current circuit shall be learned. Furthermore, the analytical method of linear circuit shall be acquired through studying theorems of electric circuit, nodal analysis and half-tone analytical method. Exercises for learning outside the class shall be given out except for exercises conducted during the class. The students will be able to sufficiently understand the material by utilizing exercises outside the class for self-learning with preparation and review. It is possible to check the class progress status and materials online at an exclusive site only for the participant who attends the lecture on the following Website (teacher's homepage). The questions and suggested answer about the exercises and lessons can be found in this homepage.
1. Introduction – outline on how circuit theory is used in medical engineering
2. Basics of electrical circuits (power, voltage, and current) – learn the definitions of power, voltage and current, and gain a physical understanding of what their values mean. Resistance circuits – resistance and Ohm's law, direct voltage sources.
3. Power from resistance, resistance connections, sources of voltage and current - Seminar circuit elements and their behavior
4. Circuits and differential equations
5. Sine waves and complex numbers – sine wave AC complex numbers, sine wave phasors
6. AC circuits and symbolic calculations
7. Impedance and admittance
8. Power and series-parallel circuits, exercises
9. Equivalent circuits
10. Resonance circuits
11. Mutual inductance and transformers – Mutual inductance circuit transformers
12. Circuit equations – circuit graphs and Kirchhoff's laws
13. Impedance matrices and admittance matrices, circuit duality, power conservation laws, exercises
14. Circuit theorems – principles of superposition
15. Reciprocity theorem, Thevenin's theorem, exercises
16. End-of-term exam
[Keywords] Electronic Circuit, Circuit element, Equation of the circuit
[Textbooks and Reference Books] It will be introduced when class is offered.
[Evaluation] Points are evaluated by the final exam, report submission and attendance. Show the percentage of each item used for authorized assessment of unit. (100 points overall when it is a full mark) [20%]: Can the student acquire fundamental knowledge regarding the structure of alternate current circuit and direct current circuit, and can the student understand its functions? (Scoring based on the result of the final test, mid quiz, active participation on exercises during lectures, and exercise report). [40%]: Can the student develop judgment constructing circuit equation which analyses circuit diagram? Can the student utilize optimal theorem when performing analysis of alternating current circuit? (Scoring based on the result of the final test, mid quiz, active participation on exercises during lectures, and exercise report) [30%]: Was the student able to work out equivalent circuit by an effective and original way of thinking and were they able to describe that the deriving process is easy to understand. (Scoring based on the result of the final test, mid quiz, active participation on exercises during lectures, and exercise report) [10%]: Attendance.
[Related courses] Intro to Electromagnetism 1, Intro to Electromagnetism 2, Electronic Circuits, Digital Circuits

[Course requirements] It is not necessary to have taken Intro to Electromagnetism 2 or Electronic Circuits to take Circuit Theory 1. *Knowledge of linear algebra is absolutely necessary, so students should have taken classes in linear algebra by the time Circuit Theory classes start, but they do not have to have received credit.

生体生理工学I　　Biological and Physiological Engineering　I

[Instructor] Tatsuo Igarashi
[Credits] 2
[Semester] 1st year-Spring-Mon 4
[Course code] T1L104001
[Room] Bldg. ENG-17-113
[Course enrollment] about 40
[Candidate] Students of Faculty of Engineering, other Faculties, and Specially Registered Non-Degree Student
[Course description] Understand the physical structure of human as an individual, and learn the basic knowledge required for the intervention of engineering to organisms. Analyze the development and evolution of organism in both anatomically and physiologically aspects to understand the human body and organs as integrity of environmental conformity and biological functions. Examine contributions of engineering devices for medical care at present.
[Course objectives] To understand the physiology and anatomy of human from each section, time and scale, and environmental aspects, and to acquire the ability to examine the prospect of its result and intervention of engineering to medical care.
[Plans and Contents] A class shall be conducted through tutorial method, and then the team shall be decided and shall conduct group discussion. Mini-lecture shall be conducted to make up for the points after the presentation of each group.
1. Emergence and purpose of organisms
2. Significance of skeletons
3. Mechanisms of motion
4. Motion control
5. Senses and information processing
6. Vision, hearing, taste
7. Metabolism and energy
8. Absorption (digestive systems)
9. Excretion (renal and urinary systems)
10. Respiratory organs circulatory organs
11. Immunological and hematopoietic systems, information processing
12. Reproduction/endocrine secretion and information propagation
13. Organisms and external physical forces 1
14. Organisms and external physical forces 2
15. Bioethics, medical equipment, and evolution of medical treatment
16. End-of-term exam

[Keywords] Anatomy, Physiology, Biochemistry, Nutrition, Medical Engineering
[Textbooks and Reference Books] G.J.Tortora, B. Derrickson. “Introduction to the human Body”; W.F. Ganong. “Reviewof medical physiology”; Alberts, Johnson, Lewis, Raff, Roberts, Walter. “Molecular Biology of the Cell”. (Garland Publishing, Inc.)
[Evaluation] Reports will be submitted each lecture and student will be evaluated on understanding of accurate anatomy, physiology, and on discussions; applied medical equipment skills will also be evaluated through submitted reports and the exam results.
[Related courses] Anatomy, Physiology, Nutrition, Comparative Anatomy, Surgery, Mechanical Engineering

データ構造とアルゴリズム　Data Structure and Algorithm
[Instructor] Mikio Suga
[Credits] 2
[Semester] 2nd year-Fall-Wed 3
[Course code] T1L105001
[Room] Bldg. ENG-17-111
[Course enrollment] 45
[Candidate] Students of Faculty of Engineering, and Specially Registered Non-Degree Student
[Course description] Master the basic technique for planning and analyzing algorithm through basic algorithm that deals with it, and various data structure such as a list, a stack, and a tree diagram. In addition, learn the way to capture the true nature of the problem through various superior way of thinking algorithm.
[Course objectives] To learn about the data structure and algorithm through a lecture, and to understand the methodology of programming.
[Plans and Contents] A lecture will be given on the basic algorithm which deals with it, various data structure such as a list, and a stack and a tree diagram.
1. Algorithms ● Necessary preparation – read section 1.4 of the text
2. Algorithms and computational complexity ● Necessary preparation –Read over handouts from first class
3. Basic data structures● Necessary preparation –Review handouts from previous classes
4. Arrays, pointers, links ● Necessary preparation –Review handouts from previous classes
5. Lists (stacks and queues) ● Necessary preparation –Review handouts from previous classes
6. Recursive procedures ● Necessary preparation –Review handouts from previous classes
7. String matching (simple matching processes, KMP algorithm) ● Necessary preparation –Review handouts from previous classes
8. String matching (review KMP method, learn BM method) ● Necessary preparation –Review handouts from previous classes
9. Tree structures● Necessary preparation –Review handouts from previous classes
10. Graph structure● Necessary preparation –Review handouts from previous classes
11. Data arrays (bubble sort, etc.) ● Necessary preparation –Review handouts from previous classes
12. Data arrays (quick sort) ● Necessary preparation – Review handouts from previous classes
13. Data exploration (hash table searches) ● Necessary preparation –Review handouts from previous classes
14. Data exploration (hash tree searches) ● Necessary preparation –Review handouts from previous classes
15. Overall summary Data exploration
16. The end-of-term exam ● Necessary preparation –Review entire course
[Keywords] data structure, algorithm, programming
[Textbooks and Reference Books] Textbook: data structure and algorithm, authors:Nobuo Saito, Kiyokazu Nishihara, publisher:Corona publishing Co. Ltd., ISBN:4339000442
[Evaluation] Evaluated based upon achievement of above goals. 80% of final mark will come from the final exam, and 20% from reports and attendance. Students must receive an overall mark over 60% to earn credit.
[Related courses] Fundamentals of Computer Programming, Advanced Computer Programming, Experiment of Biomedical Engineering I, Experiment of Biomedical Engineering II ,Experiment of Biomedical Engineering III

専門英語Ⅰ　Technical English Ⅰ
[Instructor] Machiko Ohta
[Credits] 2
[Semester] 2014-2015 First [Day, Time] Tuesday 12:50 PM - 2:20 PM
[Course code] T1L108001
[Room] Bldg. ENG-17-212
[Course enrollment] Limited to 3rd year students at the Department of Medical System Engineering.
[Course description] This course employs a three-tier English proficiency model: grammar and everyday English vocabulary as the basic tier, general academic vocabulary as the middle tier, and technical vocabulary as the top tier. This course trains students to build general academic vocabulary through weekly assignments and expose students to technical terms through reading documents on biomedical engineering.
[Course objectives]
The course is designed to help students to build a solid foundation for writing academic papers.
Students will:
embrace grammar as the infrastructure for better communication,
understand the importance of building general academic vocabulary before learning technical terms and expressions,
learn effective methods for building and expanding general academic vocabulary, and
be encouraged to search for and read research reports, journal articles, and other technical materials on their own interests.
[Keywords] autonomous learning, general academic vocabulary, technical terms, technical writing
[Textbooks and Reference Books]
Required textbook: Academic Vocabulary in Use (ISBN: 9780521689397)
The other materials will be offered as handouts in class or as PDF files through Moodle.
Recommended book: Science Research Writing: A Guide for Non-Native Speakers of English (ISBN: 978-1848163102)
[Evaluation]
Examination 1 (35%), Examination 2 (65%)
[Related courses]
The instructor is also responsible for English IW6 and English IR21, courses focusing on grammar and basic academic vocabulary; English for Science (7 & 8) focusing on general academic vocabulary and general scientific vocabulary; Technical English II focusing on technical vocabulary and the structure of the IMRAD sections.
[Remarks]
An absence from an Examination will justified only by emergencies, as specified by Chiba University.
Examination 1 (35%), Examination 2 (65%)

生体生理工学Ⅰ　Biological and Physiological Engineering I
[Instructor] Tatsuo Igarashi
[Credits] 2
[Semester] 1st year-Spring-Mon 4
[Course code] T1L104001
[Room] Bldg. ENG-17-113
[Course enrollment] about 40
[Candidate] Students of Faculty of Engineering, other Faculties, and Specially Registered Non-Degree Student
[Course description] Understand the structure of human as an individual, and learn the basic knowledge required for the intervention of engineering to organisms. Analyze anatomically and physiologically the development and evolution of organism, understand the existence of humans as individual from considering the integrity of environmental conformity and biological functions, and examine the technique of contribution for medical care of engineering devices.
[Course objectives] To understand the physiology and anatomy of human from each section, time and scale, and environment as an axis, and to acquire the ability to examine the prospect of its result and intervention of engineering to medical care.
[Plans and Contents] A class shall be conducted through tutorial method, and then the team shall be decided and shall conduct group discussion. Mini-lecture shall be conducted to make up for the points after the presentation of each group.
1. Emergence and purpose of organisms
2. Significance of skeletons
3. Mechanisms of motion
4. Motion control
5. Senses and information processing
6. Vision, hearing, taste
7. Metabolism and energy
8. Absorption (digestive systems)
9. Excretion (renal and urinary systems)
10. Respiratory organs circulatory organs
11. Immunological and hematopoietic systems, information processing
12. Reproduction/endocrine secretion and information propagation
13. Organisms and external physical forces 1
14. Organisms and external physical forces 2
15. Bioethics, medical equipment, and evolution of medical treatment
16. End-of-term exam
[Keywords] Anatomy, Physiology, Biochemistory, Nutrition, Mechanical Engineering
[Evaluation] Reports will be submitted each lecture and student will be evaluated on understanding of accurate anatomy, physiology, and on discussions; applied medical equipment skills will also be evaluated through submitted reports and the exam results.
[Related courses] Anatomy, Physiology, Biochemistory, Nutrition, Comparative Anatomy, Surgery, Mechanical Engineering

デザイン論（メディカル）Theory of Design for Medical Equipments
[Instructor] Kubo Mitsunori
[Credits] 2
[Semester] 3rd year-Fall-Wed 4
[Course code] T1L111101
[Room] Innovation Plaza, Faculty of Engineering 2F
[Course enrollment] about 30
[Candidate] Only students of Department of Medical System Engineering
[Course description] Verification from 3 viewpoints of people, goods and environment in the development of medical devices are required. Use of system engineering techniques that have been developed and applied for handling complex problems, conduct problem searching and present data analysis. Conduct trials for design proposals for analysis of clarified problems and consider the possibility of medical equipments.
[Course objectives] At the same time, the student learns about a few general methods and ideas of designs, they will consider the possibility in the near future through present understanding of the medical equipment.
[Plans and Contents] Simple lecture and group exercises for design experience, as a base of the System Mechanical Techniques.
1. Division into briefing groups for the implementation method of these lectures
2. Imaging structure for medical devices – Outline of ISM method and selection of keywords
3. Imaging structure for medical devices – Implementation of ISM method and investigating the ISM-structure
4. Imaging structure for medical devices – Presentation of ISM method
5. Analysis of current situation of medical devices – Selection of medical device which will be analyzed for each group
6. Analysis of current situation of medical devices – Prepare the item category data in accordance with the surveyed items for each group.
7. Analysis of current situation of medical devices – Implement mapping of the medical devices in accordance with Quantification Theory Class III and find out the directionalities of the devices
8. Analysis of current situation of medical devices – Conduct a presentation based on the mapping results and directionality of medical devices in accordance with Quantification Theory Class III.
9. Development of simulation medical devices – Extraction of design requirements (scene setting)
10. Development of simulation medical devices – From design requirements to formal development initiatives
11. Development of simulation medical devices – Design using CAD 1
12. Development of simulation medical devices – Design using CAD 2
13. Development of simulation medical devices – Creation 1
14. Development of simulation medical devices – Creation 2
15. Evaluation of medical devices produced
[Keywords] Medical Device, Systems Engineering, Design
[Evaluation] Evaluation is given by multiple small reports and final presentation ・report.

生体生理工学 II　Biological and Physiological Engineering II
[Instructor] Hiroshi Kawahira
[Credits] 2
[Semester] 1st year-Fall-Tues 5
[Course code] T1L112001
[Room] Bldg.ENG-17-111
[Course enrollment] about 40
[Candidate] Students of Faculty of Engineering, other Faculties, and Specially Registered Non-Degree Student
[Course description] Understand biological tissues, molecular biology, anatomy and physiology to learn the basic knowledge of required organism in the engineering interventions to the area of medicine.　Understand the biological function from a medical point of view and consider the involvement of a medical engineer.
[Course objectives] To understand the biological function from the scientific point of view and the engineering point of view, and clinical medicine. Students also understand and practice presentation, self-expression, and question & answer.
[Plans and Contents] As the basics, (clinical surgery, embryology, embryology organ, immunology), to be able to widely understand from the organization of biological function until the level clinical medicine, questions and discussions shall be conducted. Attendance only is incomplete; the student has to participate in presentations and discussions. The lecture is sometimes changed to be a self-study from the schedule adjustment of the professor.
1. Orientation
2. Surgical theory
3. Stomach cancer diagnosis and treatment
4. Esophageal disease overview, diagnosis, treatment
5. Benign esophageal disease diagnosis and treatment
6. Benign intestinal disease diagnosis and treatment
7. Malignant intestinal disease diagnosis and treatment
8. Liver disorder diagnosis and treatment
9. Biliary disorder diagnosis and treatment
10. Pancreatic disorder diagnosis and treatment
11. Breast disorder diagnosis
12. Breast disorder treatment
13. Anti-cancer drug treatment for breast disorders
14. Pancreatic development and its relationship with disease
15. Immunology and the role of bodily functions
16. Exam
[Keywords] histology, anatomy, physiology, immunology, developmental biology, pathology, surgery, gastroenterological surgery
[Textbooks and Reference Books] Dale Carnegie [How to Win Friends and Influence People]. Sabiston Essentials of Surgery,Lawrence Essentials of General Surgery.
[Evaluation] Conduct a question and answer sessions on the contents of the lecture and will be evaluated on the contents of debate. Submissions of report are to be appropriately considered. Group study will also be conducted.
Understanding/Comprehension and active participation on the lecture are more important that the contents of the report.
Evaluate the degree of understanding and discussion on exact biology and molecular biology, and aim for understanding of the basic knowledge of medicine and medical care.
[Related courses] Surgery, Biochemistry, Physiology, Pathology, Molecular Biology, Medical Science

数値計算　Numerical Computation
[Instructor] Masaharu Takahashi
[Credits] 2
[Semester] 3rd year-Spring-Tues 2
[Course code] T1L115001
[Room] Bldg. ENG-17-211
[Course enrollment] 50
[Candidate] Students of Faculty of Engineering, and Specially Registered Non-Degree Student
[Course description] Numerical calculation is essential in the latest image processing and medical diagnostic equipment, simulator and such. In this lecture, basic idea of numerical calculation which is the bridge between mathematics and programming, which focuses on learning the calculation method. Assuming that the student has mastered the basic knowledge, such as mathematical calculus, learning would proceed.
[Course objectives] Familiarize with mathematical sophistication, formula handling, acquire the ability for discrete thinking and logical thinking to be able to apply this in the future. To learn the basics of numerical calculation and be able to select the appropriate solution when required.
[Plans and Contents]
1. Outline and examples of numerical calculation
2. Interpolation
3. Numerical integrals
4. Transient phenomena
5. Ordinary differential equations 1
6. Ordinary differential equations 2
7. Non-linear equations
8. Comprehensive Seminar – Review of first 7 class lectures
9. Higher order algebraic equations
10. Simultaneous linear equations
11. Inverse matrices
12. Partial differential equations 1
13. Partial differential equations2
14. Partial differential equations3
15. Comprehensive Seminar – Review of first 14 class lectures
16. Exam
[Textbooks and Reference Books] [Numerical Computation Method] Hayato Togawa, Corona Publishing
[Evaluation] Achievements will be evaluated by above objective. Exercises and reports shall be given in the lecture. Exams 80%: exercises & reports etc. 20%.
[Related courses] Linear Algebra A, Calculus, Partial Differential Equations, Applied Math
[Course requirements] Linear Algebra A, Calculus, Partial Differential Equations

回路理論 II　Electric Circuit Theory II
[Instructor] (Masahito Uehara)
[Credits] 2
[Semester] 2nd year-Fall-Fri 1
[Course code] T1L116001
[Room] Bldg. ENG-17-112
[Course description] Based on the contents learned in Circuit Theory Ⅰ, the student will learn the knowledge useful in dealing with the mechanical system.
[Course objectives] In the field of electronic circuit and measuring circuit used in the medical system, it is important to learn about the electric circuit which is the basis of those circuits. The aim of this course is to create a basis that can accommodate all applications by learning the basic concept.
[Plans and Contents]
1. Circuit Theory I Review – Basic circuit principles, learn about impedance, phasors, etc. in sine wave AC circuits.
2. Two terminal pair circuit 1 – Matrix representation of two terminal pair circuits, and application in circuit analysis. Introduce symmetry circuit Z and Y matrices and their
3. Two terminal pair circuit2　Introduce F matrices, which are useful in cascade arrangements for two terminal pair circuits, and look at the F matrices for T-networks, pi networks, lattice circuits, and ideal transformer. Learn the relationships between F, Z, and Y matrices.
4. Two terminal pair circuit 3 Learn about and hold seminar on applications of parallel and serial connections and cascade arrangement in two terminal pair connections.
5. Distributed-parameter circuits 1 – When electrical signal wavelength is the same size or smaller than circuit size, impedance and other constants must be treated as distributed constants within the circuit. Learn the basic principles of distributed constant circuits, basic formulas for transmission lines, voltage and current distribution in transmission lines, and characteristic impedance.
6. Distributed-parameter circuits 2 Learn about voltage and current distribution in transmission lines under load at the terminals, and about input impedance. Learn about reflection and transmission at transmission line connections.
7. Distributed-parameter circuits3 Learn about maximum and minimum voltage and current values in transmission lines, and about standing wave ratio, and application of the　Smith chart.
8. Distributed-parameter circuits4 Summary and seminar for distributed-parameter circuits, and exercise.
9. Transient phenomena 1 – During sudden changes in voltage or when switches are turned on or off, the resulting phenomena differ from those that have been learned so far regarding stable circuits. Symbolic methods used previously become unusable, and it is necessary to use analytical methods particular to transient phenomena. Learn how to analyze transient phenomena in RC and LC circuits, and the concepts of time constants and energy.
10. Transient phenomena2 Learn solutions to transient phenomena differential equations, and understand vibration and attenuating characteristics in transient phenomena in RLC circuits.
11. Transient phenomena3 Learn how to solve transient phenomena differential equations using the Laplace transform. Learn how to apply the Laplace transform to circuits and find s-circuits, which incorporate initial conditions.
12. Transient phenomena4 Summary and exercises for transient phenomena.
13. Non-sine wave AC circuits 1 – Electrical signals transmit information, and wave shape becomes non-sinusoidal (i.e. distorted). In this case, the signal can be shown as a combination of multiple sine waves (in a Fourier series expansion.) This is applied to square waves, triangular waves, saw-tooth waves and other electrical signals.
14. Non-sine wave AC circuits2 - Learn about RMS, distortion factors, power, and power factors of non-sinusoidal wave circuits. As an analytical method when non-sinusoidal waves are input into a circuit, learn how to do a Fourier series expansion on the non-sinusoidal waves, how to compute response for each frequency component, and how to synthesize those results.
15. Non-sine wave AC circuits 3 - Learn applications of non-sinusoidal wave circuits and conduct exercise.
16. Final exam.
[Keywords] Two terminal pair circuit, distributed constant circuit, transient phenomenon, Non-sine wave AC circuits
[Textbooks and Reference Books] (Ref) The basics of electric circuit, Continued Masao Nishimaki, Hirofumi Shimokawa, Noriko Okumura, joint works, Morikita Shuppan
[Evaluation] Evaluation is given by seminar conducted by each section (20%), end-of-exam (80%).
[Related courses] Electric Circuit Theory I

感覚情報処理　Sensory Information Processing
[Instructor] Masahiko Suzuki
[Credits] 2
[Semester] 3rd year-Fall-Tues 4
[Course code] T1L117101
[Room] Bldg. ENG-17-215
[Course enrollment] about 50
[Candidate] Students of Faculty of Engineering
[Course description] Based on the physiological basis of biological engineering, the sensory information processing, muscle, bone, and cartilage of the nervous system is elucidated, and the student will learn the method of analysis and measurement method of the biological signal.
[Course objectives] Understand the detailed structure and function of the nervous system, muscles, bones, and cartilage, to be able to grasp the outline of biology control mechanism, included in the sensory information processing.
[Plans and Contents] The 15 lectures will be divided in control of vision, hearing, taste and smell, bone, cartilage, and muscular, then, the distribution items of the prints and such shall proceed in the order of the indication above.
1. Neurons and synapses
2. The nervous system and brain structure
3. Sensory organs and information processing in the visual system
4. The auditory system and linguistic cognition
5. The sensory bodies in the nose and on the tongue
6. Neurological diseases and their treatment
7. Emergence of bone, cartilage and muscle, and their developmental physiology
8. Anatomy of bone, cartilage and muscle and their cellular physiology – 1
9. Anatomy of bone, cartilage and muscle and their cellular physiology-2
10. Bone, cartilage and muscle treatments – 1
11. Bone, cartilage and muscle treatments –2
12. The spine
13. Motor function control – 1
14. Motor function control –2
15. Motor function control and rehabilitation
[Keywords] central nerve system, peripheral nervous system, Sensory Information Processing, muscle, bone, and cartilage of the nervous system
[Evaluation] Total score of paper test (final) conducted once, and attendance must be over 60 points to achieve a credit.
[Remarks] This course is written as Digital Circuit on the syllabus of FY 2004.

信号処理論　Signal Processing
[Instructor] Tadashi Yamaguchi
[Credits] 2
[Semester] 3rd year-Spring-Thurs 2
[Course code] T1L118001
[Room] Bldg. ENG-17-211
[Candidate] Students of Faculty of Engineering, other Faculties, and Specially Registered Non-Degree Student
[Course description] The student will learn about the technique of the theory of signal processing and signal analysis which is necessary to take in the Department of Medical Systems. The student will present an example on the contents learned in this course on how to apply the actual research and technology, as contents that can be developed in the signal analysis theory and method by studying on their own.
[Course objectives] In this lecture, the student shall learn the method of signal processing, theoretical foundation, signal analysis techniques and application, aiming for knowledge and skills on the signal processing method in the least.
[Plans and Contents] The power point format documents that were created based on the reference shall be used from time to time in the lecture. To be able to help in deepening the understanding of the course content, there are plans of imposing homework on appropriate issues and exercises.
1. Basics of signal processing
2. Revision of Fourier transforms and Laplace transforms
3. Z-transforms
4. Filter design 1
5. Filter design 2
6. Fundamentals of digital signal processing 1
7. Fundamentals of digital signal processing 2
8. Practical applications of digital signal processing 1
9. Practical applications of digital signal processing 2
10. Practical applications of digital signal processing 3
11. Wavelet transforms
12. Digital image/voice processing 1
13. Digital image/voice processing 2
14. Signal processing in health care 1
15. Signal processing in health care2
16. Final exam
[Keywords] Fourier Transform,Laplace Fourier,Z Transform,Image Processing, Filter,Spectrum
[Textbooks and Reference Books]
[Evaluation] In correspondence to the progress in class, homework in appropriate report challenges and exercise problems shall be given, and check and evaluation shall be conducted on the understanding degree. Give out test in the final lesson, and evaluate the comprehensiveness through participation in class, attitude and learning reports and answers. It would not be acceptable if there were any non-conformity in the test, report and the like.
[Related courses] Information Mathematics, Numerical Analysis, Precalculus, Statistical Analysis, etc.
[Course requirements] Students must have taken Industrial Mathematics (T1L155001) and have minimum knowledge of basic mathematics.

空間設計論 （旧名称「医療空間設計論」）Spatial Design
[Instructor] Shigeki Nakayama
[Credits] 2
[Semester] 3rd year-Spring-Tues 1
[Course code] T1L122101
[Room] Bld.ENG-17-211
[Course description] The difference in the mechanisms of spatial composition and its application of medical facilities is revealed qualitatively and quantitatively on the huge impact on work, medical and nursing care of patients, the students will learn the rationalization of spatial composition. For residential and improved response to the growth
[Course objectives] The students will know what regulates the various activities that are deployed in the space and the environment, and learn the law and its corresponding relationship, and explain with regards to the new facilities. Then the student will understand how the efficient spatial form and arrangement is assembled. In addition, the student will learn the knowledge involved in the design of the space required by the latest medical technology and medicine.
[Plans and Contents] The logic of architectural planning will be described. At that time, along with the number of cases, including overseas, it also include the introduction of environment architectural space. There are also work exercises for spatial planning.
1. Technical developments in the aim and planning of architectural space
2. Interactive relationship between human activities and space (including field work)
3. History and future development of medical space
4. Problems of hospital construction in Japan
5. Predictions in the near future that affects the planning of medical space
6. Overall planning of medical facilities
7. Change in the use of medical facilities
8. Ward planning - From the viewpoints of patients
9. Ward planning - From the viewpoints of doctors and nurses
10. Planning of diagnostic & treatment departments – Space planning for external departments
11. Planning of diagnostic & treatment departments – Space planning for D & T facilities
12. Space planning for supply and management departments
13. Space planning for welfare facilities
14. Future of space planning for treatment and welfare facilities
15. Exam
[Keywords] medical environment, hosuital architecture, architectural programming and design, universal design
[Textbooks and Reference Books] Handouts provided in each class.
[Evaluation] Evaluation is given by attendance, seminar assignment in the lecture, and final exam.

専門英語 II Technical English II
[Instructor] Machiko Ohta
[Credits] 2
[Semester] 2014-2015 Second [Day, Time] Tuesday 12:50 PM - 2:20 PM
[Course code] T1L130001
[Room] Bldg. GEN-A-327
[Course enrollment] Limited to students who completed the course Technical English I.
[Course description] This course continues to help students to establish a solid foundation for writing academic papers.
[Course objectives]
The course is designed to encourage students to develop their own learning methods.
Students will:
understand the importance of being a good reader before being a good writer,
grasp the structure of the IMRAD sections,
be more motivated to learn general academic vocabulary as well as technical terms and expressions,
be encouraged to search for and read academic papers on their own interests,
give presentations on their target papers, and
engage in peer review.
[Plans and Contents] The course starts with English proficiency test. Following classes use the required textbook and on-the-spot exercises to understand the structure of the IMRAD sections. Two classes on January have presentations by students.
[Keywords] autonomous learning, general academic vocabulary, technical terms, technical writing, IMRAD, Introduction, Materials and Methods, Methodology, Result, Discussion, Conclusion, Abstract, Title
[Textbooks and Reference Books]
Required textbook: Science Research Writing: A Guide for Non-Native Speakers of English (ISBN: 978-1848163102)
Some books are recommended in class. The other materials will be offered as handouts in class or as PDF files through Moodle.
[Evaluation]
On-the-spot exercises and presentations.
[Related courses]
The instructor is also responsible for English IW6 and English IR21, courses focusing on grammar and basic academic vocabulary; English for Science (7 & 8) focusing on general academic vocabulary and general scientific vocabulary; Technical English I introducing technical vocabulary and the structure of the IMRAD sections.
[Remarks]
An absence will justified only by emergencies, as specified by Chiba University.

医用支援機器　Therapeutic Medical Devices
[Instructor] Ryoichi Nakamura
[Credits] 2
[Semester] 3rd year-Fall-Thurs. 2
[Course code] T1L131001
[Room] Bldg. ENG-17-212
[Candidate] Students of Faculty of Engineering, other Faculties, and Specially Registered Non-Degree Student
*Course time of this lecture is changed from the 4th year spring semester to the 3rd year fall semester. The 4th year students of the previous curriculum may take this course.
[Course description] Describes the medical devices that are essential in the current hospital. Description will be about the included products and research development, regarding general ME equipment and research activities in computer aided surgery area including surgical navigation and surgical robot, focusing on the equipment used in the operating room, especially in the treatments.　Discussion will be about the current state of commercialization and practical application development.
[Course objectives] (1) The student will understand the adaptation effect, and principle of operation of the ME equipment.
(2) The student will understand the trends and development of systems and adaptation benefits of Computer Aided Surgery.
(3) The student will understand the safety standards of the medical support equipment.
(4) To understand the practical application and commercialization process of general medical support equipment.
(5) Understand the current state of medical device industry in Japan and consider the outlook.
[Plans and Contents]
1. Introduction: Medical support equipment used in surgical care
2. ME Medical Equipment I: Electromagnetic medical device – electric scalpels, pacemakers 1
3. ME Medical Equipment II: Electromagnetic medical device - pacemakers 2, defibrillators
4. ME Medical Equipment III :Optical medical device – surgical laser device, endoscopes
5. ME Medical Equipment IV :Therapeutic ultrasonic device – ultrasound suction device, ultrasonically activated scalpels
6. ME Medical Equipment V:Thermal therapy device – Cryotherapy, hyperthermia
7. ME Medical Equipment VI:Mechanical therapy device – ESWL, infusion pumps, cardiovascular intervention
8. Computer-aided surgery, navigation devices, mid-term exam
9. Computer-aided surgery I: Surgical robots and manipulators
10. Computer-aided surgery II:Surgical navigation
11. Computer-aided surgery III:Model-based CAS systems
12. Medical device and pharmaceutical laws 1: fabrication, sale, and certification of medical equipment
13. Medical device and pharmaceutical laws2:GLP,GCP and Safety evaluation
14. Medical device and pharmaceutical laws3:Indications and product documents, post-purchase safety evaluation
15. Medical device and pharmaceutical laws4:Post-purchase safety validation
16. Medical support equipment and pharmaceutical laws5:Regulatory science for medical device
[Keywords] Minimally invasive surgery, medical device, ME, compute aided surgery, surgical robotics, surgical navigation, regulatory affair
[Textbooks and Reference Books] Text: handout　Reference book: (1) Rinsho-kougaku-kouza Iyouchiryoukiki, Kazuhiko Shinohara(eds), ISHIYAKU Shuppan Co. (2) Yokuwakaru Kaisei Yakujihou Iryoukikihen, YAKUJINIPPOSHA Co.
[Evaluation] Evaluated based upon attendance, mid-term exam (30%), and final report (70%). The mid-term exam will assess level of understanding and application of knowledge regarding objective 1, and the final report will assess objectives 2-4.

応用電磁工学　Applied Electromagnetics
[Instructor] Koichi Ito
[Credits] 2
[Semester] 3rd year-Fall-Wed 2
[Course code] T1L133101
[Room] Bldg. ENG-5-104
[Candidate] Students of Faculty of Engineering, other Faculties, and Specially Registered Non-Degree Student
[Course description] First off, review the important points of electromagnetics necessary for the study of this lecture. Next, expound its basic and concrete examples regarding various radio wave applications including communication and medical applications. Subsequently, explain about the influence that electromagnetic wave may give to the living tissue or to the electronics, and that is the electromagnetic environmental problems.
[Course objectives] First, after understanding the important points of electromagnetics, it aims to study from the basics to examples on how the electromagnetic waves have been used in various purposes such as medical care, communication and broadcasting. Furthermore, to understand correctly about the electromagnetic environmental problems that has become a social problem.
[Plans and Contents] (EM: electromagnetic)
1. Introduction (Gist, lecture plan, and evaluation methods for the course)
2. Types of EM wave applications (information transmission, exploration and observation, energy use)
3. Important points of Electromagnetics (1)
4. Important points of Electromagnetics (2)
5. Important points of Electromagnetics (3)
6. Basic EM application and examples (communication 1)
7. Basic EM application and examples (communication 2)
8. Basic EM application and examples (broadcasting)
9. Basic information transmission technologies
10. Basic EM application and examples (Industrial applications)
11. Basic EM application and examples (Medical applications: diagnosis)
12. Basic EM application and examples (Medical applications: treatment)
13. Electromagnetic environmental issues (influences on EM equipment)
14. Electromagnetic environmental issues (influences on living tissue)
15. Course summary/End-of-term exam
[Keywords] Electromagnetics, radio wave applications, medical applications, environmental issues
[Textbooks and Reference Books] It will be introduced as needed.
[Evaluation] Evaluation is given by the end-of-term exams, reports, attendance and attitude of lecture.

メディカルシステム実験 Ⅰ　Experiment of Biomedical Engineering I
[Instructor] Toshiya Nakaguchi, Tothiaki Osuga, Mikio Suga, Kazuya Kawamura, Kahori Kita
[Credits] 3
[Semester] 2nd year-Fall-Tues 3, 4, 5
[Course code] T1L135004, T1L135005, T1L135006
[Room] Bldg. ENG-17-212
[Course enrollment] 40
[Course description] An experiment on biometric, analogue circuit, programming, drafting which is the main element in advancing the research and development of medical engineering field. In biometric, it is carried out various measurements, such as respiration and electrocardiogram. In analogue circuit, comparison with the theory is conducted, and amplifier is created.　In the programming, it is performed from the training signal processing base, and the optimization process. In drafting, it is performed the practice of mechanical drawings.
[Course objectives] To deepen the understanding through conducting experiment on necessary knowledge about diagnostic device used in medical setting.　Specifically, to deepen the knowledge and conduct experiment about digital signal processing which performs processing of acquired living body signals, analog circuit focusing on an amplifier and perform actual measurement using BIOPAC experimental device for biometrics, dealing with living body signals, and programming processing of the signal obtained, and drawing for hardware design.
[Plans and Contents] Experimentation in the biomedical instrumentation, analog circuits, programing, and drawing. 1) Biomedical measurement using BIOPAC and the electrocardiogram. 2) Analog circuits – build amplifying circuits and other circuits using op-amp ICs and compare them to theory. 3) Digital signal processing – build noise removal, process signals as peak detection, programming of numerical calculations, such as the optimization process. 4) Drafting -mechanical drawing. Experiment will be conducted in four teams. A sample schedule for one team can be found below. In addition, students should read the experiment text as preparation, and confirm the necessary experimental knowledge through the lecture text and notes.
1. Guidance of the class and basic instruction of report writing
2. Biomedical measurement using BIOPAC 1 (Kita) Bldg. ENG-17 Experimental lab of Department of Medical System Engineering
3. Biomedical measurement using BIOPAC 2 (Kita) Bldg. ENG-17 Experimental lab of Department of Medical System Engineering
4. Biomedical measurement using BIOPAC 3 (Kita) Bldg. ENG-17 Experimental lab of Department of Medical System Engineering
5. Analog circuits 1 (Osuga) Bldg. ENG-17 Experimental lab of Department of Medical System Engineering
6. Analog circuits2 (Osuga) Bldg. ENG-17 Experimental lab of Department of Medical System Engineering
7. Analog circuits3 (Osuga) Bldg. ENG-17 Experimental lab of Department of Medical System Engineering
8. C language 1 (Nakaguchi) General Studies Complex A-3 Study room
9. C language 2 (Suga) General Studies Complex A-3 Study room
10. C language 3 (Suga) General Studies Complex A-3 Study room
11. C language 4 (Nakaguchi) General Studies Complex A-3 Study room
12. C language 5 (Nakaguchi) General Studies Complex A-3 Study room
13. Drawing (kawamura) 17-212
14. Optional date
15. Optional date
[Keywords] Biomedical measurement, Amplifier, Counter, Noise removal, Optimization, Drafting
[Textbooks and Reference Books] Please refer to the Department of Medical System Engineering website for information on the experiment booklet.
[Evaluation] Evaluation is given by submitted reports.　Students must score over 60 points to achieve a credit.
Students are evaluated through the submitted reports. Students must score 60% or higher to receive credit.
[Related courses] Circuit Theory I, Electronic Circuits, Programming Seminar, Algorithms and Data Structures,

メディカルシステム実験 II　Experiment of Biomedical　Engineering II
[Instructor] Toshiya Nakaguchi, Masaharu Takahashi, Kazuhiko Saito, Takashi Onishi, Kazuhiko Onuma, Kazuya Kawamura, Ryoichi Kawamura, Tadashi Yamaguchi
[Credits] 3
[Semester] 3rd year-Spring-Mon 3, 4, 5
[Course code] T1L136001, T1L136002, T1L136003
[Room] Bldg. ENG-17-214
[Course enrollment] about 40
[Course description] Divided into small groups, students will conduct various experiments relating elements of electronics, informatics, and mechanics, preparing the reports of the experimental results.
[Course objectives] The aim of this lecture is to acquire information by wrestling each item of electronics, informatics, and mechanics needed to conduct the graduation research (Undergraduate Research).
[Plans and Contents] The class will be divided into three groups conducting experiments by each group. The organization of group and details of the experiment shall be presented by the time when the orientation is conducted at the first lesson. As a preparation for a lesson, experiment text shall be read, and a reference book and notes on the lecture shall carry out verification on the knowledge necessary for the experiment.
(Electronics experiments): Amplifier circuit 1, 2 / Digital circuit 1, 2 (Takahashi, Saito);
(Information science experiments): Image processing programming 1, 2, 3, and 4 (Onishi, Onuma);
(Mechanics experiments): Control practical training / material, design, fabrication / 3D position measurement / medical instrument experiences (Kawamura, Nakamura, Yamaguchi).
[Textbooks and Reference Books] Please refer to the Department of Medical System Engineering website for information on the experiment booklet.
[Evaluation] Evaluation is given by submitted reports. Students must score over 60 points to achieve a credit. Students are evaluated through the submitted reports. Students must score 60% or higher to receive credit.

卒業研究　Undergraduate Research
[Instructor] Faculty members
[Credits] 8
[Semester] 4th year Spring-Fall Intensive
[Course code] T1L137001
[Room] Each lab
[Course objectives] To carry out a one-year research for the purpose of developing the basic ability that is learned in Junior. The goal is for the student to perform a detailed draft of a research subject, and also for him/her to understand by his/her own ability the problems arising through research. During the execution of a research, the student reports the situation at any time to the teacher in charge, and he/she performs development and revision of a plan while evaluating the progress of research. The student aims to enhance the level of research achievement while discussing closely with the teacher in charge, and for him/her to master a high application which can contribute to society.
[Plans and Contents] Detailed research plan will be performed in assigned laboratories. The research progress must be presented periodically in a laboratory, thorough discussion by the student and the teacher of the laboratory must be carried out, and judgment from the teacher in charge about the validity of the plan and significance of the research must be taken out. One-year research result must be submitted as a graduation thesis and must be presented in the conference presentation of graduation results for medical system engineering department.
1. The technological background of society and the acquired findings which involve the research about the theme of graduation research will consider its wider impact in the society, and a graduation thesis which has fully mastered the social significance of research will be created.
2. The Oral presentation of the details of graduation research shall be done using a slide, a poster, and a distributed handout, and the evaluation will be received from those who ask whether it is a fully intelligible presentation.
3. A training that explains qualitatively and quantitatively that a research method adapted by the student itself is an outstanding method as compared to other methods and will be accumulated by several evaluation methods and a research method to enable it to receive an evaluation that is reasonable from a third party.
4. The execution situation of graduation/graduate research can be evaluated at any time, and the future research problem can be set up and carried out.
5. The necessary experiment in research will be enumerated; each necessity will be examined thoroughly, and will perform efficient research by narrowing the actual experiment being conducted.
6. The student will be able to create technical documentation, examination document, and project document about the future plan, the contents of work, and the subject which were investigated by each person in the research.
7. The student can be able to freely digest domestic and international English documents related to graduation research, and he/she can be able to express the contents of his/her graduation research in English.
[Evaluation] Students will be evaluated by their performance at the Undergraduate Research Presentation, the contents of the submitted Graduation Thesis, and his/her study attitude.
[Course requirements] Students must have taken Specialized Course 102 credits, and General Course 24 Credits.

臨床医学概論　Introduction to Clinical Practice for Young Engineers
[Instructor] Tasuo Igarashi
[Credits] 2
[Semester] 1st year-Fall-Thurs 5
[Course code] T1L138001
[Room] Bldg. ENG-17-111
[Course enrollment] 40
[Candidate] Students of Faculty of Engineering, and other Faculties
[Course description] Give an outline of a typical disease in a routine clinical practice and explains the today's medical system with special attention on medical devices and apparatuses.
[Course objectives] To understand a common diseases and traumas comprehensively and acquire the ability to contribute to the well-being and fitness of the humans by supporting medical activities from engineering's viewpoint.
[Plans and Contents] The actual contribution and functions required for engineering equipment in medical practice will be stated by experts of each medical department.
1. Medical devices and treatment
2. Renal/urinary organs I
3. Cutting-edge surgery and medical devices
4. Respiratory and circulatory systems
5. Metabolism/endocrine secretion II
6. Renal/urinary organs II
7. Metabolism/endocrine secretion I
8. Transfusion, clinical testing
9. Anesthesia
10. Emergency resuscitation
11. Psychoneurology
12. Head / Neck Ⅰ
13. Head / Neck Ⅱ
14. Infectious disease
15. Exam
[Keywords] Hemodialysis, Artificial organs, Pace maker, Robots that assist medicine or handicapped people.
[Textbooks and Reference Books] Handouts provided in class.
[Evaluation] Reports will be submitted each class. Students are evaluated through submitted reports and the exam results.
[Related courses] Ethics, Internal Medicine, General Surgery, Pathology.

医用機器産業概論 Introduction of Medical and Welfare Industries
[Instructor] Koichi Ito
[Credits] 2
[Semester] 3rd year-Fall-Wed 5
[Course code] T1L139001
[Room] Bldg. ENG-17-112
[Course enrollment] 50
[Candidate] Students of Faculty of Engineering
[Course objectives] To understand further the latest technical trend in the industry of medical equipment.
[Plans and Contents] Researchers and technologists who are active in the industrial world regarding medical engineering will introduce the advanced technology and examples of medical equipment. Every week by a lecture.
1. Orientation
2. Medical equipment evaluation
3. MRI measurement and research
4. Research and development of medical equipment
5. Invention and intellectual property
6. Development of medical ultrasound diagnostic equipment
7. Research and development of endoscopes
8. Medical information displays
9. Internationalization of medical and health care industry in Japan
10. Measuring devices in ophthalmology clinic
11. Development of medical-use and nursing-use beds
12. Japan’s medical insurance system and evaluating medical instruments
13. Skin imaging analysis
14. Development of x-ray flat panel detectors
15. Overall summary
[Evaluation] Students will be provided last 10 minutes of every lecture to write and submit a report. Evaluation is given by attendance and these reports.
[Course requirements] Not particularly.

医学研究概論　Introduction to Clinical and Medical Research
[Instructor] Tatsuo Igarashi
[Credits] 2
[Semester] 4th year-Spring-Fri 4
[Course code] T1L141001
[Room] Bldg. ENG-17-211
[Course enrollment] 40
[Candidate] Students of Faculty of Engineering
[Course description] Medicine is "imperfect science" that targets the human body, based on bioethics, medical research is done scientifically. It outlines the research results that have been established in the course of the medical establishment of the current prospects and direction the role of engineers in the medical.
[Course objectives] Now, the goal is to explain the reality and principle of technique used on a daily basis in cases of life science research and clinical test. It aims to be able to understand the significance of various life science researches, and to be able to understand this when reading articles of biological system.
[Plans and Contents] Each lecture will have an overview of that day's theme, and then an overall discussion.
1. Medical Science and Bioethics
2. Evidence Based Medicine (EBM) and Medical statistics
3. Quality of Life (QOL) I: Food, clothing and shelter for those who had a handicap
4. Quality of Life (QOL) II: Excretion
5. The biology of cancer: I Cancer and gene, carcinogenesis
6. The biology of cancer II : Growth and metastasis of cancer
7. Cancer treatment I: Topical therapy
8. Cancer treatment II: Systemic therapy
9. Inflammation and Immunity I:What is the Inflammation ?
10. Inflammation and Immunity II: Commentary of the immune classic
11. The role of diagnostic imaging
12. Minimally invasive treatment I: Benign diseases
13. Minimally invasive treatment II: Malignant disease
14. Advanced treatment
15. Health care system and Health economics
16. Exam
[Keywords] Bioethics, Clinical Medicine, Basic Medicine, Diagnostic Imaging, Medical statistics
[Textbooks and Reference Books] Textbook is not specified, Projector and handouts will be used for lecture.
[Evaluation] Evaluation is given by reports and comprehensive exam.
[Related courses] Bioethics, Clinical Medicine, Basic Medicine, Diagnostic Imaging, Statistics

計測工学　Measurement Engineering
[Instructor] Etsuji Yamamoto
[Credits] 2
[Semester] 3rd year-Fall-Wed 3
[Course code] T1L147001
[Room] Bldg. ENG-15-109
[Course enrollment] 50
[Candidate] Students of Faculty of Engineering, other Faculties, and Specially Registered Non-Degree Student
[Course description]　Learn the foundation, which is focused on biological measurement, and learn the application in recording of daily life activity.
[Course objectives] To study the fundamental of biological measurement.
[Plans and Contents]
1. Biological measurement and electrical safety
2. Basic electronic circuit
3. Electronic circuit for biological measurement
4. Operation of differential amplifier, etc.
5. Advanced electronic circuits
6. Biomedical electrode and sensor – bioelectricity 1
7. Biomedical electrode and sensor – bioelectricity 2
8. Biomedical electrode and sensor – electrode
9. Biomedical electrode and sensor – sensor
10. Source of electronic noise and reduction of the noise
11. Sensor for physiological measurement
12. Motion sensor for measurement in daily life activity
13. Monitering system for daily life activity
14. Measurement in daily life activity
15. Measurement in physical activity, the end of term exam
[Keywords] biological measurement, sensor, transducer, electronic circuit
[Textbooks and Reference Books] Biological Measurement (Corona Publishing Co., Ltd.) M. Makikawa et al.
[Evaluation] Evaluation is comprehensively given by regular exam, attendance, and the attitude. To gain a credit, over 70% of attendance is required.
[Related courses] Electronic Circuits, Electromagnetism, Biomechanics
[Course requirements]
[Remarks] This subject replaces Medical Application Nanotechnology, which was offered until 2009.

通信工学概論　Introduction to Network Engineering
[Instructor] Masaharu Takahashi
[Credits] 2
[Semester] 3rd year-Spring-Wed 3
[Course code] T1L148001
[Room] Bldg. ENG-17-211
[Course enrollment] 40
[Candidate] Students of Faculty of Engineering, and Specially Registered Non-Degree Student
[Course description] The communication function is essential in the latest medical diagnosis equipment, and electronics. In this lecture, details in radio communication are narrowed down, and a principle to an application is widely studied.
[Course objectives] Through this study, it aims to learn the basics of radio communication and to acquire the knowledge that can think of an application to medical care equipment properly.
[Plans and Contents]
1. Communication around us
2. What are EM waves?
3. The wave equations
4. Plane waves
5. Transmission lines
6. Waveguides
7. EM wave emission 1
8. EM wave emission 2
9. Wire antennas
10. Planar antennas
11. Array antennas 1
12. Array antennas 2
13. Radio wave propagation
14. Radio wave applications 1
15. Radio wave applications2
[Keywords] Wireless Communication, Radio Wave, Antenna
[Textbooks and Reference Books] “Introduction to Electromagnetic wave engineering”, Masaharu Takahashi, SUURIKOUGAKUSHA-SHA Co. Ltd. ISBN 978-4-901683-83-8
[Evaluation] Students will be based evaluated through an examination to test their understanding of the above points.
[Related courses] Applied Electromagnetics (Previous course titled “Electrogmagnetic Engineering in Medicine”) (T1L133101)

プログラミング基礎　Fundamentals of Computer Programming
[Instructor] Mikio Suga
[Credits] 2
[Semester] 2nd year-Spring-Tues 4
[Course code] T1L151001
[Room] Bldg.GEN-A-4F, Information Processing Seminar Room 2
[Course enrollment] 55
[Candidate] Students of Faculty of Engineering
[Course description] Discuss on the basics of programming, using a C language for a person who is learning programming language for the first time.
[Course objectives] To know a programming language (C language). To be able to understand the basic of C language which is a widely prevalent programming language, and to be able to read and write C language.
[Plans and Contents]
Explanations will be provided with concrete examples in order for students to learn the basic grammar for the C language. The necessary content for Advanced Computer Programming I, which runs parallel with this course, will also be provided.
1. C language explanation, simple programs. ● Necessary preparation: Review the materials provided in previous courses.
2. Variables and data format (char, int, float, and double); arrays (numerical arrays, character arrays, initializing methods) ● Necessary preparation: Review the materials provided in previous courses.
3. Operators (=, +, -, *, /, %, ++, –, <=, >=, ==, != ,　! , &&, ||, cast, size of) ● Necessary preparation: Review the materials provided in previous courses.
4. Control structures (if, switch) ● Necessary preparation: Review the materials provided in previous courses.
5. Control structures (for, while, do-while, breake, continue) ● Necessary preparation: Review the materials provided in previous courses.
6. Console input/output (getchar ( ), gets ( ), printf ( ), scanf ( )) ● Necessary preparation: Review the materials provided in previous courses.
7. Functions (basic form, arguments and return values) ● Necessary preparation: Review the materials provided in previous courses.
8. Functions (Local and global variables, storage class) ● Necessary preparation: Review the materials provided in previous courses.
9. Pointer basics ● Necessary preparation: Review the materials provided in previous courses.
10. Arrays and pointers● Necessary preparation: Review the materials provided in previous courses.
11. Functions and pointers● Necessary preparation: Review the materials provided in previous courses.
12. Structures and unions Functions● Necessary preparation: Review the materials provided in previous courses.
13. Processing with preprocessors ● Necessary preparation: Review the materials provided in previous courses.
14. Library functions● Necessary preparation: Review the materials provided in previous courses.
15. File input/output● Necessary preparation: Review the materials provided in previous courses.
16. Exams ● Necessary preparation: Review the materials provided in previous courses.
[Keywords] Programming language, C language
[Textbooks and Reference Books] Textbook: new introduction of C language, beginner edition (new revision), author: Haruhiko Hayashi, publisher: Softbank creative, ISBN: 4797325615, Reference bookThe C Primer(revised 3), Les Hancock, et al, publisher: ASCII SOFTWARE SCIENCE Language, ISBN: 4756102700
[Evaluation] Achievement of objective of this course is evaluated. Evaluation will be consist of the end of-term exams 80%, small test, reports, and attendance 20% .The total score must be over 60points to achieve a credit.
[Related courses] Advanced　Computer Programming I, Data Structure and Algorithm, Experiment of Biomedical Engineering I, Experiment of Biomedical　Engineering II, Experiment of Biomedical Engineering III

プログラミング特講 Ⅰ　Advanced Computer Programming I
[Instructor] Mikio Suga
[Credits] 2
[Semester] 2nd year-Spring-Tues 5
[Course code] T1L152001
[Room] Bldg. GEN-4F Information Processing Seminar Room 2
[Course enrollment] 55
[Candidate] Students of Faculty of Engineering
[Course description] The lecture will use the C language for program fundamental, targeting students learning the programming language for the first time. The student will be able to create a basic algorithm by learning the data structures and algorithms offered in the first four semesters.
[Course objectives] The student will learn the program language (C Language). The student will understand the basic C language used in program language that is widely used and will be able to represent the procedures learned in
[Plans and Contents] Firstly, the student will learn the Fundamental Operating Method under Linux environment, and will acquire the knowledge of Language C grammar through exercises. The lecture will be about the basic algorithm using the/a calculator.
1. Explain the calculator used during the seminars, UNIX commands, editors, and the C language.
2. How to write a program in C. How to compile and debug. (How to read error and warning messages.)
●Necessary preparation: Read over the materials handed out during the previous class.
3. Writing simple programs with variable declarations and basic operators● Necessary preparation: Review the materials provided in previous courses.
4. Writing programs with arrays and control structures (if, switch) ● Necessary preparation: Review the materials provided in previous courses.
5. Writing programs with control structures (for, while, do-while, break, continue) ● Necessary preparation: Review the materials provided in previous courses.
6. Writing programs with console input/output (getchar ( ), gets ( ), printf (), scanf ()) ● Necessary preparation: Review the materials provided in previous courses.
7. Writing programs with functions (basic form, arguments and return values) ● Necessary preparation: Review the materials provided in previous courses.
8. Writing programs with functions (Local and global variables, storage class) ● Necessary preparation: Review the materials provided in previous courses.
9. Writing programs with basic pointers● Necessary preparation: Review the materials provided in previous courses.
10. Writing programs with arrays and pointers ● Necessary preparation: Review the materials provided in previous courses.
11. Writing programs with functions and pointers ● Necessary preparation: Review the materials provided in previous courses.
12. Writing programs with structures and unions● Necessary preparation: Review the materials provided in previous courses.
13. Writing programs with preprocessors ● Necessary preparation: Review the materials provided in previous courses.
14. Writing programs with library functions ● Necessary preparation: Review the materials provided in previous courses.
15. Writing programs with file input/output ● Necessary preparation: Review the materials provided in previous courses.
16. Exam● Necessary preparation: Review the materials provided in previous courses.
[Keywords] e program language, C Language
[Textbooks and Reference Books] Textbook: new introduction of C language, beginner edition (new revision), author: Haruhiko Hayashi, publisher: Softbank creative, ISBN: 4797325615, Reference book: The C Primer(revised 3), Les Hancock, et al., publisher: ASCII SOFTWARE SCIENCE Language, ISBN: 4756102700
[Evaluation] Achievement of objective of this course is evaluated. Evaluation will be consist of the end of-term exams 80%, small test, reports, and attendance 20% .The total score must be over 60 points to achieve a credit.
[Related courses] Fundamentals of Computer Programming, Data Structure and Algorithm, Experiment of Biomedical Engineering I, Experiment of Biomedical Engineering II,Experiment of Biomedical Engineering III

回路理論Ⅰ　Electric Circuit Theory I
[Instructor] (Masahiro Uehara)
[Credits] 2
[Semester] 2nd year-Spring-Fri 1
[Course code] T1L153001
[Room] Bldg. ENG-17-112
[Candidate] Students of Faculty of Engineering, and Specially Registered Non-Degree Student
[Course description] The minimum requirement for alternating current circuit and direct current circuit among the foundations of circuit shall be explained. As the lecture proceeds the student would be able to understand the most simple direct current circuit. The student will understand that using the concept of impedance would similarly perform the analysis of alternating current circuit.
[Course objectives] (General Objective) To learn the basics of Electrical and Electronic Engineering such as meaning of physics and analysis method, expression method, and basic approach of electric circuit.Furthermore, the object is to learn the required electrical sense, and to further intensify the student's understanding on this basic knowledge by solving exercises repeatedly. (Target Achievement) (1) To acquire knowledge regarding the structure of an alternating current circuit, and understanding direct current circuit, and a knowledge, so that the work can be understood (2) the student have to develop their judgment constructing circuit equation which analyses thinking and judgment for circuit diagram. When performing analysis of alternating current circuit, optimal theorem can be utilized. (3) The student shall show a stance to work on raising their hand diligently when interested and willing to practice. The student can participate diligently when conducting a discussion regarding circuit during the class. (4) The behavior towards attendance should be satisfactory. In addition, students should refrain from whispering, etc. during class. Homework report, etc. can be submitted until the deadline for submission. (5) When creating skills and expression of an equivalent circuit, the student would be able to work out the equivalent circuit by an effective and original way of thinking and would be able to describe that deriving process it could be easily understood.
[Plans and Contents] The basics such as Kirchhoff's law, Ohm's law, series multiple connection, physical meaning of electricity, electric current and voltage regarding direct current circuit shall be learned. Then, the concept of admittance and impedance, functions of the inductor and capacitor, definition of electric current, and voltage regarding alternating current circuit shall be understood, and expressions of complex number in alternating current circuit shall be learned. Furthermore, the analytical method of linear circuit shall be acquired through studying theorems of electric circuit, nodal analysis and half-tone analytical method. Exercises for learning outside the class shall be given out except for exercises conducted during the class. The students will be able to sufficiently understand the material by utilizing exercises outside the class for self-learning with preparation and review. It is possible to check the class progress status and materials online at an exclusive site only for the participant who attends the lecture on the following Website (teacher's homepage). The questions and suggested answer about the exercises and lessons can be found in this homepage.
1. Introduction – outline on how circuit theory is used in medical engineering
2. Basics of electrical circuits (power, voltage, and current) – learn the definitions of power, voltage and current, and gain a physical understanding of what their values mean. Resistance circuits – resistance and Ohm's law, direct voltage sources.
3. Power from resistance, resistance connections, sources of voltage and current - Seminar circuit elements and their behavior
4. Circuits and differential equations
5. Sine waves and complex numbers – sine wave AC complex numbers, sine wave phasors
6. AC circuits and symbolic calculations
7. Impedance and admittance
8. Power and series-parallel circuits, exercises
9. Equivalent circuits
10. Resonance circuits
11. Mutual inductance and transformers – Mutual inductance circuit transformers
12. Circuit equations – circuit graphs and Kirchhoff's laws
13. Impedance matrices and admittance matrices, circuit duality, power conservation laws, exercises
14. Circuit theorems – principles of superposition
15. Reciprocity theorem, Thevenin's theorem, exercises
16. End-of-term exam
[Keywords] Electronic Circuit,Circuit element,Equation of the circuit
[Textbooks and Reference Books] [Understanding Electronic Circuit] (Shokoudou), Takao Ozawa
[Evaluation] Points are evaluated by the final exam, report submission and attendance. Show the percentage of each item used for authorized assessment of unit. (100 points overall when it is a full mark) [20%]: Can the student acquire fundamental knowledge regarding the structure of alternate current circuit and direct current circuit, and can the student understand its functions? (Scoring based on the result of the final test, mid quiz, active participation on exercises during lectures, and exercise report). [40%]: Can the student develop judgment constructing circuit equation which analyses circuit diagram? Can the student utilize optimal theorem when performing analysis of alternating current circuit? (Scoring based on the result of the final test, mid quiz, active participation on exercises during lectures, and exercise report) [30%]: Was the student able to work out equivalent circuit by an effective and original way of thinking and were they able to describe that the deriving process is easy to understand. (Scoring based on the result of the final test, mid quiz, active participation on exercises during lectures, and exercise report) [10%]: Attendance.
[Related courses] Intro to Electromagnetism 1, Intro to Electromagnetism 2, Electronic Circuits,Digital Circuits

[Course requirements] It is not necessary to have taken Intro to Electromagnetism 2 or Electronic Circuits to take Circuit Theory 1.
*Knowledge of linear algebra is absolutely necessary, so students should have taken classes in linear algebra by the time Circuit Theory classes start, but they do not have to have received credit.

工業数学 Industrial Mathematics
[Instructor] Tadashi Yamaguchi
[Credits] 2
[Semester] 2nd year-Fall-Fri 2
[Course code] T1L155001
[Room] Bldg. ENG-17-215
[Candidate] Students of Faculty of Engineering
[Course description] Lectures on the representation by a combination of simple waveform of analogue signals and digital signals that are used in the field of Biomedical Engineering. Explanation will be regarding the application from basic concepts of particularly Fourier transformation and Fourier series expansion, after that, will be the explanation of the Laplace conversion and then the mathematical sense in analogue signal. In addition, explanation shall be about the basic concept of the discrete Fourier conversion and Z conversion, which is in the mathematical technique of the digital signal.
[Course objectives] Aims for the understanding of the student on basic concepts on the Fourier series expansion method and the Fourier transform represented by a basic waveform of the analogue signal, so that the student will be able to imagine the intuitive nature of the relationship, and the time and frequency that can be expressed in a formula physics. The student will able to understand the possibility in finding a solution by algebraic equations by using the Laplace transform without solving the differential equation on whether the output is obtained or not for transient phenomena such as impulse or step function in the circuit to be able to evaluate the characteristics of a simple circuit. The student will understand the basics of using the discrete Fourier conversion and Z transform, similarly for digital signals and digital circuits.
[Plans and Contents]
1. Fourier series expansions method 1: Sine waves and Cosine waves
2. Fourier series expansions method2: Numerical preparation and expansion examples 1
3. Fourier series expansions method3: Expansion examples 2
4. Fourier transforms 1: fundamental concepts
5. Fourier transforms2: Various waveform transforms
6. Fourier transforms3: Time and frequency relationships
7. Laplace transforms 1: fundamental concepts
8. Laplace transforms2: Various waveform transforms
9. Inverse Laplace transforms: circuit characterization
10. Outline of industrial mathematics in analog signals
11. Discrete Fourier transforms (DFTs) 1: fundamental concepts of DFTs
12. Discrete Fourier transforms2: Fast Fourier Transforms (FFTs)
13. Z-transforms1: fundamental concepts
14. Z-transforms2: circuit characterization
15. Outline of industrial mathematics in digital signals
16. The end of term exam
[Keywords] Fourier series expansions method,Fourier transform, Laplace transform, Discrete Fourier transform, Z transform
[Evaluation] Report topics and seminar problems will be assigned as the course progresses to confirm student understanding of the topics covered. An exam will be conducted at the end of the course, and students will be evaluated based upon the exam results, class participation, attitude, and report responses. Any cheating on the exam or reports will preclude the student from earning credit.

電子回路 Ⅰ　Electronic Circuit I
[Instructor] Toshiya Nakaguchi
[Credits] 2
[Semester] 2nd year-Fall-Mon 2
[Course code] T1L156001
[Room] Bldg. ENG-17-211
[Candidate] Students of Faculty of Engineering, and Specially Registered Non-Degree Student
[Course description]　The student will learn about the electronic circuit with many features that contributes greatly to the life and industry of today. The student will understand the basic characteristic of p-n junction diode, bipolar transistors, FET and operational amplifier, and learn about the operation of the circuit and circuit design method in these applications.
[Course objectives] To deepen the understanding of equipment's using electronic circuits as well as the basic concepts of an electronic circuit.
[Plans and Contents] Basic knowledge of Electric Circuit such as diode characteristics, switching characteristics of the bipolar transistor, the static characteristics of a bipolar transistor, stable multi-vibrator, mono-stable multi-vibrator, bi-stable multi-vibrator, amplifier circuit using the bipolar transistor, basic of FET (field effect transistor), amplifier circuit using FET, h-parameter equivalent circuit, the differential amplifier circuit and modulation and demodulation circuits.
1. Necessary electric circuit fundaments – touch upon the role and application of electric circuits in engineering, and give awareness of their importance. Discuss attitude needed for this course.
2. Basic characteristics of semi-conductors – Explain semi-conductor structure and current flow
3. Diode Characteristics – characteristics of p-n junction diodes. Characteristics of forward and reverse voltage and current, and behavior while switching.
4. Bipolar transistor switching characteristics – Explain pnp and npn bipolar transistors, and their on-off behavior
5. Bipolar transistor static characteristics – behavior of bipolar transistors in DC circuits, i.e. explain static characteristics
6. Amplifying circuits using bipolar transistors (1) – explain small signal input characteristics in bipolar transistors
7. Amplifying circuits using bipolar transistors (2)continuation from class 6.
8. RC-coupled amplifier circuits
9. Direct-coupled amplifier circuits
10. Transformer-coupled amplifier circuits
11. High-frequency amplifying circuits
12. Fundamental characteristics of FETs – Describe how FETs come in p-channel and n-channel form, and their behavior in DC circuits, i.e. their static behavior
13. Amplifying circuits using FETs – Explain small signal input characteristics of FETs. Also, explain the behaviors and design methods for various amplifying circuits
14. Feedback amplifying circuits
15. Transistor circuit review, seminar
[Textbooks and Reference Books] Reference book: Integrated Electronics: Analog and Digital Circuits and Systems (McGraw-Hill electrical and electronic engineering series)
[Evaluation] Students must receive an average in-class test mark higher than 60% to pass the course. Attendance mark will be added (and determined based upon questions answered regarding content taught in the relevant class).

材料・設計・加工学　Material Mechanics, Mechanical Design and Machining
[Instructor] Ryoichi Nakamura, Kazuya Kawamura
[Credits] 2
[Semester] 2nd year-Fall-Thurs 3
[Course code] T1L157001
[Room] Bldg. ENG-17-211
[Candidate] Students of Faculty of Engineering
[Course description] The student will learn the basics of mechanics of materials, mechanical design and drawing, and machining necessary in the development and design of medical mechanical systems.
[Course objectives]
(1) To learn the basics of stress and strain of material mechanics, bending and deflection on beams.
(2) Based on (1) to understand the concept of machine elements and mechanical strength required for mechanical design.
(3) To understand the basics of construction methods of mechanical drawing, and to be able to create drawings of simple machine elements.
(4) The student will understand the types and characteristics of machining theory, to be able to design a mechanism element bases on machining method, and choice of machining method suitable for mechanical elements and mechanism.
[Plans and Contents]
1. (Materials) Basics of statics and material mechanics
2. (Materials) Axial forces on rods
3. (Materials) moment of inertia and moment of area
4. (Materials) Bending forces on straight beams
5. (Materials) Shearing force diagram and bending moment diagram
6. (Materials) Deflection on straight beams
7. (Design) Mechanical design essentials, machinery strength
8. (Design) Machinery materials, Fundamental mechanical elements I: Rotation I (torque and shaft)
9. (Design) Fundamental mechanical elements II: Rotation II (bearings and gears)
10. (Design) Fundamental mechanical elements III: Screws, actuators
11. (Design) Design and drawings I: Line types, projections and solids
12. (Machining) Machining and design I: Machining accuracy and design
13. (Machining) Machining and design II: Types of machining
14. (Machining) Machining theory (cutting/grinding) I
15. (Machining) Machining theory (cutting/grinding) II
[Keywords] Mechanics of Materials, stress and strain, bending and deflection, Mechanical design, Machining, Mechanical Drawing
[Textbooks and Reference Books] It will be informed later.
[Evaluation] 80% of the final mark will come from the examination and the remainder of the mark from reports and attendance.
[Related courses] T1L154001

医用材料学　Biomedical Materials
[Instructor] Masumi Yamada
[Credits] 2
[Semester] 2nd year-Spring-Mon 2
[Course code] T1L158001
[Room] Bldg. ENG-17-211
[Course enrollment] about 80
[Candidate] Students of Faculty of Engineering, and Specially Registered Non-Degree Student
[Course description] The student will learn from the basics to the advanced level of the characteristics and synthesis methods of various medical materials that are important for medical treatment and biomedical engineering. Mainly from the viewpoint of the relation with medical treatment, lectures will be conducted about polymer materials, tissue-derived biomaterials, medical metal materials etc.
[Course objectives]
(1) The student will acquire the basic knowledge relating medical materials required for biomedical engineering.
(2) The student will obtain the way of thinking about design and selection of various medical materials.
(3) The student will acquire the knowledge relating the effects of various materials on a living body.
(4) The student will understand the basic concept of the safety of medical materials.
(5) The student will acquire the knowledge relating the latest regenerative medicine and tissue engineering.
[Plans and Contents] After 15 lectures, end-of-term exam will be conducted. Basically the lecture will be performed in a blackboard demonstration style and also slides and printouts will be used additionally. Revise basic knowledge relating organic chemistry and inorganic chemistry and prepare the lecture contents by reading reference books. Revise the contents of each lecture to prepare homework and report assigned accordingly.
1. Various kinds of medical materials
2. Type and characteristics of polymer materials
3. Synthesis of polymer materials: condensation polymerization
4. Synthesis of polymer materials: addition polymerization 1
5. Synthesis of polymer materials: addition polymerization 2
6. Biocompatible materials and the in vivo reactions
7. Biodegradable/bioabsorbable materials and the applications
8. Fundamentals and development of cell culture materials
9. Anti−thrombogenic materials and the medical applications
10. Materials of biological origin
11. Sterilization of medical materials, safety of medical materials
12. Applications of hydrogel materials
13. Medical metal materials
14. Medical inorganic materials
15. Examples of medical materials: tissue engineering and regenerative medicine
16. Summary and end-of-term exam
[Keywords]
[Textbooks and Reference Books] Handouts are distributed in each lecture. Reference books:[Iyou zairyou kougaku (Biomedical Material Engineering) (Coronasha Corp.)] [Polymer Biomaterial (Coronasha Corp.)
[Evaluation] Evaluation will be given by considering report submission and the class attitude (30%), and the result of the end-of-term exam (70%).　Attendance of more than 2/3 is requisite, as a general rule. In the event that unfair means is detected, the relevant students will be treated strictly.
[Related courses] Students have preferably taken “Fundamental Chemistry A” or have equivalent knowledge about basic chemistry.
[Remarks] This course is the replacement course of “Theory of macromolecules” until FY 2012 (H24).

プログラミング設計 Programming Design
[Instructor] Toshiya Nakaguchi
[Credits] 2
[Semester] 2nd year-Fall-Thurs 4
[Course code] T1L159001
[Room] Bldg. GEN-5F, Information Processing Seminar Room 1
[Course enrollment] 50
[Candidate] Students must understand C language.
[Course description] Parallel proceeding on lecture and practice about the knowledge and skills necessary to design programming. In the first period, the students will practice programming designed using the C language as a structured language. In the middle, students will learn the features concepts of object-oriented language and grammar. In the third period, master the programming designed to repeat the practice of object-oriented programming.
[Course objectives] The student will aim to acquire skills and knowledge to support the development design to a large-scale programming. The student will also have a basic experience by conducting in parallel lectures and practical training.
[Plans and Contents] Students will be explained history and which has developed object-oriented language from structured language, as sprinkled with practical training and lectures for its effect.
1. History of Programming language and structured language
2. Design Practice 1 by (C language) structured language
3. Design Practice 2 by (C language) structured language
4. Design Practice 3 by (C language) structured language
5. Design Practice 4 by (C language) structured language
6. Object-oriented language1–Class and encapsulation
7. Object-oriented language2– Class (Continuation)
8. Object-oriented language3– Overload
9. Object-oriented language4- Inheritance
10. Object-oriented language5- Interface
11. Object-oriented language6- Operator Overloading
12. Design Practice by object-oriented 1
13. Design Practice by object-oriented 2
14. Design Practice by object-oriented 3
15. Design Practice by object-oriented 4
[Keywords] Programming design, Object-oriented programming
[Textbooks and Reference Books] Reference Book: C++ The Complete Reference, 5th Edition Herbert Schildt
[Evaluation] Evaluation is given by submitted assignments of Practical Training on every week

プログラミング特講 II　Advanced Computer Programming II
[Instructor] Kazuhiko Ohnuma
[Credits] 2
[Semester] 2nd year-Fall-Wed 2
[Course code] T1L160001
[Room] Institute of Management and Information Technologies (IMIT), Computation Training Room 2
[Course enrollment] 40
[Candidate] Only students of Department of Medical System Engineering
[Course description] Here, other software aside from C++ are also aimed for coverage. Here, the student will learn computer software for statistical computing and graphics that can be easily acquired.
[Course objectives] In the field of medicine, statistical processing has been widely practiced in the analysis of data. With minimum knowledge of accuracy and statistics, a simple calculation will be made to become a graph, the effort made in obtaining important information would be loss and a determination could not be done appropriately. The purpose is to learn in the least, the knowledge regarding accuracy and statistics and their applied hypotheses and verification using R and EXCEL. The student will learn the theory and practice at the same time in this course. Then, the three dimension computer graphics (CG) plays a very important role in the presentation. Here, the student will familiarize with the use of the software called POV-RAY that can easily make the CG, to be able to create a task using that.
[Plans and Contents] Statistical processing will be tackled in the first half and three dimension computer graphics (CG) in the second half. In the first half, the student will use R and EXCEL regarding multivariate analysis, statistics and accuracy and in the second half would practice using POV-RAY.
1. Explanation of the basics of probability, permutation and combination, probability concepts, Bayes theorem, R, and how to use EXCEL statistical functions
2. The basics of statistical distributions – averages, dispersion, standard deviation, covariance, correlation factors
3. Least square approach (primary equations, polynomial equations), probability distributions, normal distributions
4. Assumptions and testing – assumptions and testing in normal distribution, assumptions and testing in t-distributions
5. Assumptions and testing in F-distributions and chi-squared distributions
6. Basics of multiple classification analysis – multiple linear regression analysis, discriminant analysis, principle component analysis, factor analysis
7. Assignment
8. Introduction to computer graphics software, Introduction to POV-Ray
9. Introduction to POV-Ray: Basic windows, drawing images, coordinate systems, rotation, setting magnification/reduction cameras, setting light sources, object arrangement, setting ground surfaces and backgrounds, include files, commenting on imperative statements, object scaling, object revolution, object movement, image repetition, using textures, changing object characteristics, setting image output
10. Expressing texture – rock, trees, metal, vitreous material, pigment, expressing texture
11. Making figures – basic drawing, creating with set operations, rotation, creating figures through stretching, 2D contours, 3D contours, Bézier curves
12. Animation, camera movement, object movement
13. Creative work – Create a CG animated work using knowledge gained so far. (1)
14. Creative work – Create a CG animated work using knowledge gained so far. (2)
15. Creative work – Create a CG animated work using knowledge gained so far. (3)
[Keywords] statistical data, CG R, Excel, POV-RAY Computer
[Textbooks and Reference Books] http://www.kogures.com/hitoshi/webtext/
http://www.asahi-net.or.jp/~va5n-okmt/pov/tutorial/index.html
[Evaluation] Students will be evaluated upon attendance, problems sets, CG assignments and their corresponding programs to assess level of understanding of course content and extent of programming abilities.

システム制御工学 Ⅰ　System Control Engineering I
[Instructor] Wenwei Yu
[Credits] 2
[Semester] 3rd year-Spring-Wed 1
[Course code] T1L161001
[Room] Bldg. ENG-17-211
[Candidate] Students of Faculty of Engineering
[Course objectives] In this lecture, the fundamentals of the classical control theory, including the concepts of transfer function, frequency transfer function, and the theory of stability based on these the concepts will be explained as clearly as possible. The students will understand the basic idea and theoretical analysis technique of the feedback control system. The use of Scilab:an open-source software for scientific calculation and analysis, and its application to system control theory, will also be mentioned.
[Plans and Contents]
1. History of control (classical control theory and modern control theory), classification of control objects
2. Block diagrams, feedback and feed-forward control
3. Mathematical preparation: Laplace transforms 1 (review/exercise)
4. Mathematical preparation: Inverse Laplace transforms 2 (review/exercise)
5. Differential equations of electrical, mechanical, and biological systems
6. Transfer functions, block diagram equivalent transformations
7. Seminar 1 (Laplace transforms, inverse transforms, transfer functions, block diagram equivalent transformation)
8. System response, stability, pole-zero
9. Routh–Hurwitz stability criterion
10. Seminar 2 (System response, stability criterion)
11. Frequency response, Frequency transfer functions
12. Vector locus and Nyquist locus
13. Bode plots
14. Seminar 3 (Vector locus, Bode plots)
15. Scientific calculation, use of Scilab: an open-source software for scientific calculation and analysis
[Keywords] Transfer Function, Stability Criterion, Frequency Response, Frequency Transfer Function, Nyquist locus, Bode Plots
[Evaluation] Evaluation is given by reports, score of assignment 1-3, and the end-of-exam.
[Course requirements] T1L155001, T1L155001

システム制御工学 II　System Control Engineering II
[Instructor] Wenwei Yu
[Credits] 2
[Semester] 3rd year-Fall-Tue 2
[Course code] T1L162001
[Room] Bldg. General D (Sogo Kosya D), Room 53.
[Candidate] Students of Faculty of Engineering
[Course objectives] In this lecture, the theory and technique to analyze linear feedback systems shall be explained with the examples of bio locomotion system, mechanical system, and electric system. Lastly, after clarifying the limit of classical control theory, the state equation, which is one of the fundamentals of the modern control theory, will be lectured.
[Plans and Contents]
1. Frequency transfer function and Stability margins, Basics of system control By Scilab
2. Nyquist stability criterion1
3. Nyquist stability criterion 2
4. Seminar 1 (Stability margins, Nyquist stability criterion)
5. Various transfer function
6. Control specifications, transient property, steady state characteristics
7. Pole placement, compensator design using root loci.
8. Seminar 2: transient property, state characteristics, compensator design using root loci.
9. Tuning PID compensator parameters
10. Design of the compensator by the frequency response 1
11. Design of the compensator by the frequency response 2
12. Seminar 3: Inverted pendulum control system structures and Experiment 1
13. Seminar 3: Inverted pendulum control system structures and Experiment 2
14. State equations, deriving state equations (with examples of electrical, mechanical, and biological kinetic systems), relationship between state equations and transfer functions 1
15. State equations, deriving state equations (with examples of electrical, mechanical, and biological kinetic systems), relationship between state equations and transfer functions 2
16. The end of term exam
[Keywords] Nyquist Stability Criterion, Compensator Design, State Equation
[Evaluation] Evaluation is given by reports, score of assignment 1-3, and the end-of-exam.
[Course requirements] T1L161001

電子回路 II　Electronic Circuit II
[Instructor] (Hiroyuki Wasaki)
[Credits] 2
[Semester] 3rd year-Spring-Fri 4
[Course code] T1L163001
[Room] Bldg. ENG-17-212
[Course description] Upon succeeding courses of the electronic circuits, students will be given a lecture on various electronic circuits using semiconductor.　It focuses on the practical and important, for example for the operational amplifier, and the interface of a digital system and performs the commentary. Lecture will be going forwarded on the assumption that has mastered the content of the circuit theory and electronic circuit I, to perform the review or reinforcement in class as needed.
[Course objectives] Understand the basic operation of various electronic circuits; for example, be able to design a simple application circuit using an operational amplifier.
[Plans and Contents]
1. Behavioral principles and basic characteristics of op-amps. Students will learn about the basic characteristics of the operational general amplifier circuit.
2. Differential amplifier circuits. Students will learn about the differential amplifier circuit, which is a basic circuit of the operational amplifier.
3. Application of the operational amplifier circuit (1). Students will learn about the application to the linear circuit of summing and differential amplifier, etc.
4. Application of the operational amplifier circuit (2). Students will learn about the application to non-linear circuit of absolute value circuit and the comparator, etc.
5. Application of the operational amplifier circuit (3). Students will learn about the application to the active filter.
6. Oscillating circuits (1). Students will learn LC/ RC circuits.
7. Oscillating circuits (2). Students will learn crystal-oscillator circuits and square wave oscillator circuits.
8. Modulation and demodulation circuits (1). Students will learn theory and basics of amplitude modulation and basic circuit.
9. Modulation and demodulation circuit (2). Students will learn theory and basics of frequency modulation, phase modulation and basic circuit.
10. Power circuits. Students will learn rectifying circuits and smoothing circuits.
11. Pulse circuits. Students will learn non-stable monostable, bistable multivibrator.
12. Digital IC. Students will learn structure of the logic IC and Electrical properties.
13. Digital interface (1). Students will learn input circuit of a digital circuit.
14. Digital interface (2). Students will learn output circuit of a digital circuit.
15. Students will work on the exercises as a review of “comprehensive exercises" lectures.
[Keywords] Operational amplifier circuits, Oscillating circuits, Modulation and demodulation circuits, Power circuits, Pulse circuits, Digital interface circuits
[Textbooks and Reference Books] Same as Electronic Circuit I
[Evaluation] Evaluation is given by exam/reports and attendance mark will be added.

情報理論 Information Theory
[Instructor] Hideaki Haneishi
[Credits] 2
[Semester] 3rd year-Spring-Fri 3
[Course code] T1L164001
[Room] Bldg. ENG-17-212
[Course enrollment] 50
[Course description] Information theory is an academic subject that attempt to clarify the nature of the information by using a mathematical model. In this lecture, firstly, students will learn the basic content of the information theory: information volume, entropy, information source and coding. Then, as an application, they will learn estimation and learning based on information theory. Several practices using MATLAB will be performed.
[Course objectives] General Goal: To understand through exercises some applications with a grasp on the basic theory of information theory. Attainment target: To understand the implications of amount of information, mutual information, maximum likelihood, and the AIC, and to become available levels for a variety of applications.
[Plans and Contents] Lessons shall be carried out with the following schedule. Preparation is necessary, students must to purchase textbook “An illustrated guide to view point of information theory (Irasuto de manabu jyouhou rion no kan-gae-kata) “
1. Introduction Overview of information theory
2. Expression of information /basic the probability of information
3. Exercise First and 2nd
4. Amounts of information (entropy, entropy simultaneous and conditional entropy Divergence and Mutual information)
5. Exercise 4
6. The nature of the amount of information (Additive entropy, nature of Mutual information, Inequality of Jensen and Its application other)
7. Model of Amounts of information and Entropy rate (model of information source, Markov source, entropy rate, entropy rate of steady source of information)
8. Exercise/mid-term exam
9. Application to data compression
10. Mutual information (1) Basic
11. Mutual information (2) Application
12. Exercise
13. Amount of information statistics (1) maximum likelihood
14. Amount of information statistics (2) AIC
15. Exercise
16. The end of term exam
[Keywords] Entropy, mutual information, coding, Huffman code, prediction, estimation, learning
[Textbooks and Reference Books] Textbook: “An illustrated guide to view point of information theory (Irasuto de manabu jyouhou rion no kan-gae-kata) by Tomohiko Muramatsu (mainly used in the first half period) Reference books: (1) Information theory by Hiroshi Miyagawa, Corona Publishing Co. Ltd. (2) Information Statistics by Sakamoto, Ishiguro, Kitagawa Kyoritsu Publishing
[Evaluation] To evaluate comprehensively by using the result of normal attendance, exercises reports, at the end of the period, such as test. Roughly, 40 points in the report and attendance, 30 points at mid-term exam, and 30 points at the end of term exam.
[Related courses] Signal processing, Applied Mathematics
[Remarks] Active questioning is preferable at any time in the lecture. Personal contact shall be sending e-mail to haneishi@faculty.chiba-u.jp

情 報 ネ ッ ト ワ ー ク （ 旧 名 称 【 医用情報ネットワーク】Telecommunication Networks
[Instructor] Shigeo Shioda
[Credits]　2
[Semester] 3rd year-Spring-Wed 7
[Course code] T1E020102
[Room] Bldg. ENG-17-214
[Candidate] Students of Faculty of Engineering, other Faculties, and Specially Registered Non-Degree Student
[Course description] The instructor outlines computer networks (like the Internet) with related digital technologies, which are imporatnt infastructutres supporting our social and industrial activities.
[Course objectives] To understand elemental technologies constituting computer networks as well as to overview the whole computer networks. [Goals]: (1). To overview the whole computer networks. (2). To understand elemental technologies constituting computer networks (digital technologies, Internet technology, cryptograph, authentication, etc.,)
[Plans and Contents] No preparatory knowledge required. To better understand each lesson, the instructor assigns simple exercises in the respective lessons. The students are permitted to receive the auxiliary materials including some exercises for the review to the lessons.
1. Outline
2. Data encoding (music, voice)
3. Data encoding (image)
4. Network architecture
5. Communication protocol
6. Physical layer, data link layer (1)
7. Data link layer (2)
8. Network layer: internet protocol (1)
9. Network layer: Internet protocol (2)
10. Network layer: Internet protocol (3)
11. Transport layer (1)
12. Transport layer (2)
13. DNS
14. Cryptograph, authentication technology
15. Exam
[Keywords] Computer Networks, Internet, TCP/IP, Data encoding, Cryptograph, Authentication
[Textbooks and Reference Books] Textbook「Internet Protocol」Shiro Sakata, et al. (Ohmsya)， Reference books [Computer Networking]James F. Kurose and Keith W. Ross(Pearson Education）,[Computer Networks]Andrew S. Tanenbaum and David J. Wetherall（Pearson Education）
[Evaluation] The final exam checks how the respective students are attainable. Scores include 75 points for the exam, another 25 points for the exercises and attendance. The total score of 60 or more will be acceptable.
[Remarks]Lectures Note will be opened on the websit

メカトロニクス工学 Mechatronics Engineering
[Instructor] Ryoichi Nakamura, Kazuya Kawamura
[Credits] 2
[Semester] 3rd year-Spring-Thurs. 4
[Course code] T1L166001
[Room] Bldg. ENG-17-111
[Course enrollment] 50
[Candidate] Students of Faculty of Engineering
[Course description] Students will learn the underlying elements of the mechatronics. Given an explanation about the basis of mechatronics, which is applied to the medical system in particular, incuding actuator, sensor, and kinematics, dynamics and control of robotics.
[Course objectives] 1. To acquire a basic knowledge about Mechatronics and Robotics.2. To acquire a basic knowledge of basic elements (sensors, actuators, and mechanical elements) that consist Mechatronics. 3. To acquire the basic knowledge of robot mechanism, mechanical analysis, intelligent control, and to equip a compendium findings of robotics.
[Plans and Contents]
1. What is Mechatronics?/ actuator 1
2. Actuator 2
3. Sensor 1
4. Sensor2
5. Sensor3/Digital control basis
6. Mechanism 1: General
7. Mechanism 2: Kinematics of planar mechanisms
8. Mechanism 3: Link/Come/conduction mechanism
9. Mechanism 4:Analysis of dynamics analysis of plane mechanism and spatial mechanism
10.Application and development of mechatronics
11.What is robotics?
12. Kinematics of Robot.
13. Dynamics and control of Robot 1.
14. Dynamics and control of Robot 2.
15. Applications of Robots
[Keywords] Robot,Kinematics,Dynamics,Control
[Textbooks and Reference Books] Textbook: handout Referencebook: (1) JSME Mechanical Engineers' Handbook: Applied system γ7 Mechatronics and Robotics, Japanese Society for Mechanical Engineering (2) JSME Text Series “Mechanism” , Japanese Society for Mechanical Engineering (3)Introduction of robotics (Addison wesley)
[Evaluation] Reports and Exams

電気電子計測　Electric and Electronic Measurement
[Instructor] Nobuo Sato
[Credits] 2
[Semester] 3rd year-Spring-Thurs. 2
[Course code] T1L167001
[Room] Bldg. ENG-17-211
[Course description] In the lecture, about technology to be "measured" essential in the Medical Systems Engineering, the basis of Electrical and electronic circuit and signal detection and processing by the sensor, and also the microscope to perform imaging of micro and nano-scale are treated as a subject of study.
[Course objectives] Electrical and electronic measurement has contributed greatly to the development of science and technology. In other words, the proof of the techniques and theory, it must be proven to have a reproducible expression of the event by the "measurement" And the success or failure of "measurement", is depend on to properly use measuring device that requires, and continue to correctly validate the data obtained. And this long succession is important. In the future as an engineer that can contribute to the development appropriate science and engineering; students are expected to learn a measurement technology that is essential experiments to demonstrate theory, research, and development in the lecture.
[Plans and Contents]
Various physical quantities: Electrical, magnetic, optical, sonic, ultrasonic, pressure, temperature, etc. are converted into an electrical quantity by a sensor, measured and used. Students who are learning the medical system engineering should have essential background knowledge of electrical and electronic measurement.
That is when performing electrical and electronic measurement, physical quantity conversion and Voltage and current measurement by sensor are closely related, it is emphasize on the lecture.
In order on applied to interest areas, with the understanding the correct measurement technique, introduce a case-lecture on state-of-the art microscopy techniques essential to the medical engineering field.
1. Orientation
2. Kinetic theory of gas for electrical electronic measurement
3. Introduction of an electrical circuit (Basic circuit element)
4. AC circuit I
5. AC circuit II
6. The principles and features of electric indicator
7. Overview of semiconductor engineering (Statistical mechanics and Quantum mechanics)
8. Semiconductor Physics
9. Semiconductor device
10. Filter
11. Optical microscope
12. Electron microscope
13. Scanning probe microscope
14. Exams
15. Commentary of exam
[Keywords] Electric circuit, Electronic circuit, trigonometric function, complex number, microscopic technique
[Textbooks and Reference Books] [Textbook] not appointed. materials are distributed in a URL appropriately [Reference Books]Books for metrology, Electric electronic measurement to understand by explanation by a picture (Omusha) ISBN:4274036146].
[Evaluation] Evaluation is given by attendance, and exams.
[Remarks] If there are any questions, please inquire. [Contact address] Department of Electrical, Electronics and Computer Engineering: Nobuo Sato E-mail: satoh.nobuo + @ + it-chiba.ac.jp.
Delete (+) and send email to the above address.

半導体物性　Semiconductor Physics
[Instructor] Kazuhiro Kudo
[Credit] 2
[Semester] 3rd year-Spring　Wed 2
[Course code] T1L168001
[Room] Bld.Eng. 17- 214
[Course enrollment] No limit
[Candidate] Students of Faculty of Engineering, and Specially Registered Non-Degree Student
[Course description] A semiconductor is an extremely important substance in producing various electronic devices and optical devices, including an integrated circuit as represented by CPUs and memories; control circuits for many home electric appliances; elements for control such as motors and robots; control circuits such as automobiles and electric trains; light-emitting diodes for displays and illuminations; and semiconductors for CDs and DVDs, and the semiconductor is also referred to as “Rice of Industry”. In this lecture, students will learn behaviors of electrons in the semiconductors; basics for understanding an operating mechanism of the semiconductor devices and the design guideline, including the semiconductor properties (electric property and optical property) and the characteristics; and electronic transport property in pn junction.
[Course objectives] It is a purpose that students will understand how the electric properties of the semiconductors differs from those of metals and insulators through the energy band theory. It is a purpose that the students will learn about adding impurities into the semiconductors which makes two types of semiconductors, p-type and n-type; and a rectifying mechanism formed by junctioning both, so that they will understand property in pn junction as a basic structure of a device.

	Targets of the Subject	Related Week	Evaluation Methods of attainment level	Proportion of Total Course Grade
1	Explain solid crystal structural periodicity and symmetry, how to describe them, and explain lattice vibration, physical properties as fundamental parts of understanding the electric properties of semiconductors.	1, 2, 7	Report exam	15 %
2	Learn how to describe semiconductor properties using band theory, and be able to explain the differences between the physical properties of semiconductors and the properties of metallic or insulating materials.	3, 4, 5, 6, 7	Report exam	25 %
3	Be able to explain how to form p-type and n-type semiconductors through the addition of very small amount of impurities, how those properties (i.e. electrical characteristics) can be used in a broad range of applications, and the properties of each type. Will also explain transport and rectifying properties of the two types at contact points between two semiconductors and between a metal and a semiconductor.	8,9,10,11,12, 13, 5, 6,　7	Report exam	40 %
4	Be able to explain optical and thermal properties of direct and indirect transition semiconductors using band theory.	14, 2, 5, 6	Report exam	20 %

[Plans and Contents] Students will describe the semiconductors according to the band theory, and study in details statistic distribution of electrons and transfer mechanism in intrinsic and extrinsic semiconductors, and understand these. They will also study in details and understand behavior of the electrons in the magnetic field, a pn junction of the semiconductors, a transport mechanism of carriers at the contact section between the semiconductors and the metals. They will understand an optical property and a thermal property of the semiconductors from the band theory. They will prepare and review according to a degree of understanding.

1. Fundamental semiconductor properties – go over the role of semiconductor devices in electrical and mechanical engineering and their importance and physical characteristics. Explain solid crystal structural periodicity and symmetry, how to describe them, and explain electrical and physical properties as fundamental parts of understanding the electric properties of semiconductors.
2. Basic properties of lattice vibration – analyze mechanical model of 1D lattices constructed all of same atoms and of different atoms, learn about the different types (modes) of lattice oscillators and their characteristics, and understand how lattice oscillators have a large influence on properties such as those in semiconductors.
3. Band theory in solids I – start with a qualitative understanding of the physical phenomena: electronic states in a solid differing from that in a discrete atom, in that it is not discrete but continuous, i.e. can be described as a band state. Next, use the free electron model as a foundation to analyzing electrons in a crystalline solid, and learn the basics of describing electron behavior.
4. Band theory in solids II Understand how to use solutions to the free electron model, and how to describe electron state density, discuss Fermi energy surfaces, electron state density as energy functions in wave number space.
5. Band theory in solids III Using the Kronig-Penney model, analyze electron behavior in a crystalline solid (in a periodic potential), derive energy band theory, and understand how electron energy can be in a band state.
6. Band theory in solids IV Electrons, holes, and effective mass: analyze the behavior of electrons as carriers in semiconductors, and learn the concepts of effective mass and holes. Understand the energy band structure and characteristics of conductors, semiconductors, and insulators.
7. Overall practice and mid-term exam – do numerical drills to gain a more complete physical image regarding band theory in solids. Will also confirm comprehension through a mid-term exam.
8. Intrinsic and extrinsic semiconductors – understand the reasoning behind adding impurities to control carriers in semiconductors and the physics regarding impurity levels. Learn the concept of effective density of states and how to analyze carrier density.
9. Fermi levels and quasi-Fermi levels – describe the importance of Fermi level in describing semiconductors, and analyze carrier density and the temperature-dependence of Fermi level. Learn how to describe carrier density in a non-thermal equilibrium state using quasi-Fermi level.
10. Semiconductor electron conductor mechanism I – understand conduction mechanism of carriers in a semiconductor (electrons and holes), carrier scattering, drift, diffusion, generation, and recombination. Derive Einstein relation and understand the relationship between carrier diffusion and drift. Understand the behavior of carriers in a magnetic field.
11. Semiconductor electron conductor mechanism II – derive carrier flow in an applied electric field (current), quasi-Fermi level gradient relationship, and minority carrier continuity equations; understand carrier behavior in non-thermal equilibrium under an applied external field.
12. Learn more detail about current and voltage characteristics in semiconductor pn junctions (existence of rectification), understand carrier transport characteristics in junctions. Understand bias voltage dependence in depletion layer capacitance as formed in junctions.
13. Characteristics of semiconductor-metal contact – learn in detail about how current and voltage characteristics change at contact points between semiconductors and metals through semiconductor conductive characteristics and metal work function.
14. Optical physics and thermoelectric characteristics – understand the interaction of semiconductors and light, and the characteristics of direct transition and indirect transition semiconductors. Understand the thermoelectric Seeback and Peltier effects in semiconductors.
15. Review lecture to assess comprehension of the fundamental points of semiconductor properties.
16. Examination to test student knowledge and understanding regarding the purposes and objectives of each lecture in the course.

[Keywords] Crystal Structure, Lattice Vibration, One-electron Approximation Model, Kronig-Penney model, Energy Band, Electron and Hole, Intrinsic Semiconductor, Extrinsic Semiconductor, n-type Semiconductor, p-type Semiconductor, Mobility, Conduction Band, Valence Band, Forbidden Band, Fermi Level, Fermi-Dirac Distribution Function, Effective Mass, Density of States, Minority Carrier, Majority Carrier, Carrier Continuity Equation, Einstein Relation, pn Junction, Schottkey Diode, Depletion Layer, Diffusion Potential, Diffusion Current, Junction Capacitance, Hall Effect, Fundamental Absorption Edge, Direct (Indirect) Transition, Photoconduction, Seebeck Effect, Peltier Effct

[Textbooks and Reference Books]: Semiconductor Physics (Handoutai Kougaku) (Kiyoshi Takahashi: MORIKITA PUBLISHING Co.), Semiconductor Physics (Handoutai Bussei) (Makoto Konagai: BAIFUKAN CO.)

[Evaluation] Exam and report – to assess comprehension of the material, students will be evaluated on their achievement of the course objectives through testing (with exam and report) of their understanding of the fundamental properties of semiconductors (rules regarding cheating and report due dates will be strictly adhered to.)

[Related Subjects] Introduction to Material Science, Semiconductor Devices, Electron Devices, Optical Electronics.

[Requirements for registration] Students are recommended to have taken Introduction to Material Science and Quantum Mechanics, Statistical Dynamics.
[Remarks] Questions (office hours): after lectures or by appointment.

ディジタル画像処理　Digital Image Processing
[Instructor] Hideaki Haneishi
[Credits] 2
[Semester] 3rd year-Fall-Fri 2
[Course code] T1L169001
[Room] Bldg. ENG-17-213
[Course enrollment] 50
[Course description] Targeting medical images such as X-Ray image, MRI, nuclear medicine image, methods of digital image processing are lectured.　Specific contests include mathematical representation of image, sampling and quantization, tone mapping, orthogonal transform, filtering, segmentation, and so on.
[Course objectives] General Purpose
The techniques of digital image processing lectured here are highly universal. The students can use them in various situations in the future.
Target Achievement: (1) Knowledge and Understanding: Ability to explain the basic processing method regarding digital image. The student will understand the two-dimensional Fourier transform and spatial frequency. (2) Opinion and Judgment: The student can understand the processing methods with mathematical expressions. (3) Interest and motivation: Students can hold interest on processing methods through specific examples.
[Plans and Contents]　Lectures are given according to the following schedule.　Reports shall be imposed several times, and each has to be submitted. Teacher uses a computer in class and projects the slides onto a screen using a presentation software. The used material can be downloaded from the homepage of the teachers in charge.
1. Introduction, image sampling and quantization
2. Modeling of imaging, tone mapping
3. intra-image calculations
4. Interpolation process
5. Filtering in real domain
6. 2D Fourier transforms
5. 2D Discrete Fourier transforms
7. Filtering in Fourier domain, Characteristics of the imaging system (Point spread function, frequency response)
8. First half review and mid-term test
9. Non-Fourier orthogonal transforms (KL transforms, wavelets)
10. Segmentation
11. Geometric transformations, registration
12. Image evaluation
13. Color image processing in health care 1
14. Color image processing in health care 2
15. Second half review
16. The end of term exam
[Keywords] image processing, image transform, Fourier transform, medical image
[Textbooks and Reference Books] Reference book: ME Textbook series Image Information Processing(I), Ed. Toriwaki, Corona Publishing Co. Ltd.
[Evaluation] Evaluation is given by attendance, reports, and the mid-term and end-of-term exams. Roughly, 40 points in the report and attendance, 30 points at the mid-term exam, and 30 points at the end of term exam.
[Related courses] Signal Processing Theory, Applied Mathematics
[Course requirements] It is recommended that students know how to perform 1D Fourier transforms. In the class, MATLAB is used for some practices. It is desired that each individual has environment to use MATLAB.
[Remarks] Active questioning is preferable at any time in the lecture. Personal contact shall be sending e-mail to haneishi@faculty.chiba-u.jp .

医用画像機器工学　Medical Imaging Device Engineering
[Instructor] (Kenichi Komatsu)
[Credits] 2
[Semester] 3rd year-Fall-Thurs 4
[Course code] T1L170001
[Room] Bldg. ENG-17-111
[Course enrollment] 50
[Candidate] Students of Faculty of Engineering, other Faculties, and Specially Registered Non-Degree Student
[Course description] Focusing on the MRI, X-ray CT, and ultrasonic diagnostic apparatus, the student will learn process of development of diagnostic imaging equipment technology, operation principle, relation between medical and imaging equipment technology, features of diagnostic images, and limit at his stage.
[Course objectives] Diagnostic imaging equipment technology has advanced significantly, combined with a desire to promote a safer and more advanced medical care.　By learning the development concept of diagnostic imaging systems for medical help, configuration, and the student will learn the necessary knowledge in engineering Medical Systems.
[Plans and Contents] The student will learn MRI, X-ray CT, ultrasonic diagnostic apparatus and an optical measuring apparatus, basic and clinical application of the device which is the current mainstream.
1. Advanced medical image processing – computer aided diagnostics (CAD)
2. Why is diagnostic imaging necessary in health-care
3. Ultrasound diagnosis systems – necessary in perinatal health care
4. The role of the ultrasound diagnosis systems
5. Is it possible to differentiate between organs?　The invention of computed tomography (CT).
6. The invention of spiral computed tomography – opening the road to high-detail, 4D organ observation
7. Can NMR identify cancel cells? Can MRI create images?
8. Application of diagnostic MRI imaging
9. Ideas and creativity
10. The PET challenge: detecting cancer cells
11. Japan’s medical insurance system and medical instruments
12. New Year Roundtable: creative development of medical devices and business potential
13. Learning from Dr. Roentgen
14. Outlook for the future of diagnostic imaging equipment
15. Choosing topics and report
[Keywords] X‐ray equipment, X‐ray CT, MRI, ultrasonic diagnostic equipment
[Textbooks and Reference Books] None specified. Students who wish a deeper understand should read ME Apparatus handbook (Electronic Industries Association of Japan), CT and MRI -The principle and device technology:Kazuo Mori (koronasha) ISBN-10:4339072257, and　Basic power text of MDCT – basic from CT to dual source/until 320th row : Masahiro Jinzaki (Medical science international) ISBN-10:895926524
[Evaluation] Evaluation is comprehensively given by the end of term exam and submission of report and attendance.

メディカルシステム実験 III　Experiment of Biomedical Engineering III

[Instructor] Etsuji Yamamoto

[Credits] 3

[Semester] 3rd year-Fall-Fri 3, 4, 5

[Course code] T1L172001, T1L172002, T1L172003

[Room] Each laboratory

[Course enrollment] 55

[Course description] Learn the foundation of biomedical measurement and therapeutic instrument

[Plans and Contents] Experiment and practical training are made in each laboratory

[Evaluation] Evaluation is comprehensively given by the activity in each laboratory.

造形演習　Design Aesthetics(Lab.)
[Instructor] Akira Ueda
[Credits] 2
[Semester] 1st year-Spring-Tues 5
[Course code] T1Y016001
[Room] Bldg. ENG-2-201
[Course description] Engineering is manufacturing, and manufacturing is a formative activity. The Design Aesthetics (Lab.) course aims to evoke students' interest in Engineering = manufacturing through several formative design projects and to awaken the individual talents in formative arts.
[Course objectives] Specific objectives of this course are as follows: (1) to cultivate the attitude to learn; (2) to develop multilateral observation skills; (3) to recognize the existence of various solutions; (4) to enhance presentation skills. In the Design Aesthetics (Lab.) course, students are required to challenge each of these 4 assignments, and continue until they achieve satisfaction. Students will learn to associate their brain and hands, and "move their hands, work up a sweat, let imagination loose, and create."
[Plans and Contents]
1. Overall guidance.
2. Assignment 1: Precision drawing using a pencil.
3. Assignment 1: Seminar.
4. Assignment 1: Criticism.
5. Assignment 2: Drawing of a solid object based on the elevation drawing.
6. Assignment 2: Seminar.
7. Assignment 2: Criticism.
8. Interim presentation
9. Assignment 3: Production of a tabletop lamp shade.
10. Assignment 3: Seminar.
11. Assignment 3: Criticism.
12. Assignment 4: Modeling of flying object.
13. Assignment 4: Seminar.
14. Assignment 4: Criticism.
15. Exhibition, summary, and criticism.
[Keywords] Observation, Thinking, Design, Presentation
[Textbooks and Reference Books] Not particularly.
[Evaluation] Evaluation is given by attendance works, and presentation.
[Related courses] Not particularly
[Course requirements] Not particularly
[Remarks] Not particularly

造形演習　Design Aesthetics(Lab.)
[Instructor] Takatoshi Tauchi
[Credits] 2
[Semester] 1st year-Spring-Tues 5
[Course code] T1Y016002
[Room] Innovation Plaza, Faculty of Engineering
[Course objectives] When awareness towards an issue leads to some form of result by an engineering means, making something with a better organized form in mind and making something without such cognition will produce very different results. Through exercise, students will learn what better organized forms are. In specific, students will be given assignments for each item shown in the course plan based on the specialized areas of the faculty member.
[Plans and Contents]
1. Overall guidance.
2. Assignment 1: Pencil sketch of a hand.
3. Assignment 1: Seminar.
4. Assignment 1: Seminar/Criticism.
5. Assignment 2:Sketch of a solid object based on the three orthographic views.
6. Assignment 2: Seminar/Criticism
7. Assignment 3:Production of elastic band driven car.
8. Assignment 3: Seminar: Presentation of work based on the research findings.
9. Assignment 3: Production
10. Assignment 3: Presentation.
11. Assignment4: Production of a paper sandal.
12. Assignment4: Presentation of work based on the research findings.
13. Assignment4: Production
14. Assignment 4: Presentation.
15. Exhibition and criticism.
[Evaluation] Evaluation is comprehensively given by attendance, works, and the quality of presentation.
[Remarks] Wearing sandals and high-heeled shoes are strictly prohibited in Innovation Plaza, Faculty of Engineering

造形演習　Design Aesthetics(Lab.)
[Instructor] Yoichi Tamagaki, Yoshihiro Shimomura
[Credits] 2
[Semester] 1st year-Spring-Tues 5
[Course code] T1Y016003

[Room] Bldg. ENG-2–atelier (2–601）

[Course objectives] When awareness towards an issue leads to some form of result by an engineering means, making something with a better organized form in mind and making something without such cognition will produce very different results. Through exercise, students will learn what better organized forms are. In specific, students will be given assignments for each item shown in the course plan based on the specialized areas of the faculty member.
[Plans and Contents]
[Evaluation]

造形演習　Design Aesthetics(Lab.)
[Instructor] YosukeYoshioka
[Credits] 2
[Semester] 1st year-Spring-Tues 5
[Course code] T1Y016004
[Room] Bldg. ENG-1- 110
[Course objectives] When awareness towards an issue leads to some form of result by an engineering means, making something with a better organized form in mind and making something without such cognition will produce very different results. Through exercise, students will learn what better organized forms are. In specific, students will be given assignments for each item shown in the course plan based on the specialized areas of the faculty member.
[Plans and Contents]
[Evaluation]

造形演習　Design Aesthetics(Lab.)
[Instructor] Ueda Edilson Shindi
[Credits] 2
[Semester] 1st year-Spring-Tues 5
[Course code] T1Y016005
[Room] Bldg. ENG-2-102
[Course enrollment] 60
[Candidate] Students of Faculty of Engineering, other Faculties, and Specially Registered Non-Degree Student
[Course description] Engineering is manufacturing, and manufacturing is a formative activity. The Design Aesthetics (Lab.) course aims to evoke students' interest in Engineering = manufacturing through several formative design projects and to awaken the individual talents in formative arts.
[Course objectives] When awareness towards an issue leads to some form of result by an engineering means, making something with a better organized form in mind and making something without such cognition will produce very different results. Through exercise, students will learn what better organized forms are. In specific, students will be given assignments for each item shown in the course plan based on the specialized areas of the faculty member.
[Plans and Contents]
1. Overall guidance.
2. Assignment 1: Precision drawing using a pencil.
3. Assignment 1: Seminar.
4. Assignment 1: Criticism.
5. Assignment 2: Drawing of a solid object based on the elevation drawing.
6. Assignment 2: Seminar.
7. Assignment 2: Criticism.
8. Interim presentation
9. Assessment 3: Select a theme from water, fire, soil, or wind, and freely create a form
10. Assignment 3: Seminar.
11. Assignment 3: Criticism.
13. Assignment 4: Seminar.
14. Assignment 4: Criticism.
15. Exhibition
[Keywords] Observation, Thinking, Design, move their hands, work up a sweat, let imagination loose, and create Presentation
[Textbooks and Reference Books] Not particularly
[Evaluation] Evaluation is given by attendance, works and quality of presentation. Attendance 40%, Presentation 60%.
[Related courses] Not particularly
[Course requirements] Not particularly
[Remarks] Not particularly

工学倫理　Engineering Ethics
[Instructor] Kenta Ono
[Credits] 2
[Semester] 3rd year-Fall-Mon 5
[Course code] T1Z051001
[Room] Large Lecture Room
※Large Lecture Room is located in 2nd Building of Faculty of Educations,
[Candidate] 2nd to 4th year of Faculty of Engineering (Direction is given by each Department)
[Course description] Engineering is a practical area of learning that utilizes various scientific and technological achievements to enhance our lives and living environment. However, if used in an inappropriate manner, it will create major social dislocations and loss which may even jeopardize our personal lives. This course discusses the missions, norms, roles, rights and responsibilities of engineers in relation to the society from a broad perspective.
[Course objectives] The objective of this course is to acquire the basic concepts and knowledge for engineers to promote the advancement of technology and contribute to society based on sound ethics.
[Plans and Contents] * The schedule and contents are subject to alteration.
1. Introduction to ethics (Kyuichiro Takahashi, Center of General Education, Chiba University)
2. Characteristics of engineering ethics (Keizo Kutsuna, the Center for General Education, Chiba University)
3. Compliance and general principles of ethics (Moriyoshi Konami, professional engineer)
4. Product liability (Moriyoshi Konami, professional engineer)
5. Whistleblowing (Moriyoshi Konami, professional engineer)
6. Resolving ethical problems (Moriyoshi Konami, professional engineer)
7. Preparedness as an engineer and professional (Moriyoshi Konami, professional engineer)
9. Information technology and copyright: Private sound recording and the Copyright Levy Framework for audiovisual recordings (Heitoh Zen, Institute of Media and Information Technology, Chiba University)
109. Proprietary rights including intellectual property rights (1) (Masayoshi Takahashi, patent attorney)
10. Proprietary rights including intellectual property rights (2) (Masayoshi Takahashi, patent attorney)
11. Proprietary rights including intellectual property rights (3) (Masayoshi Takahashi, patent attorney)
12. Natural resource consumption and environmental ethics (Motoi Machida, Safety and Health Organization, Chiba University)
13. Safety and risks (1) (Yukinobu Shinoda, Industrial Safety Consultant)
14. Safety and risks (2) (Yukinobu Shinoda, Industrial Safety Consultant)
15. Group Discussion (Education committee member of each department)
[Keywords] Mission of engineers, morals, obligations, discipline, and engineering ethics.
[Textbooks and Reference Books] 1) Norifumi Saitoh et al., HAJIMETE NO KOUGAKU RINRI (Introduction of Engineering Ethics) second edition, Showado, (2005), 1400 yen + Tax, 2) Taiji Sugimoto et al, GIJYUTUSHA NO RINRI NYUMON (Introduction of ethics for engineer) fourth edition, Maruzen Publishing Co., Ltd., (2008), 1700 yen + Tax
[Evaluation] Students will be assessed by results of mini-tests at the end of each lecture. Students must attend a minimum of 12 lectures for accreditation. The yes or no entry to Moodle is treated as attendance. Students need to answer it during every review time.
[Course requirements] Refer to syllabus available online for subject categories of each faculty. Consult a faculty member of Board of Education when the information is not available.
[Remarks] Lecture schedule and contents are subject to alteration depending on availability of lecturers. Students are required to attend the guidance session to be held on the first class.

知的財産権セミナー Seminar: Intellectual Property Rights
[Instructor] (Satoru Asakura)
[Credits] 2
[Semester] Spring Intensive / June-July, Tue 4, 5
[Course code] T1Z052001
[Room] Eng.D-Bld.2-101
[Course enrollment] 32
[Attendees] Students of Faculty of Engineering, and Specially Registered Non-Degree Student
[Course description] Rights to intellectual property that are created through unique intellectually creative activities are protected by law, and effective utilization of these intellectual property rights leads to creation of new intellectual property. Promoting such intellectual creation cycle is lately recognized as an important national strategy. The objective of this course is to acquire the basic knowledge and practical approach to intellectual property rights, mainly focusing on industrial property rights as represented by patents.
[Course objectives] The goals for this course are as follows: 1) to be able to explain the concepts such as intellectual property and intellectual property rights; 2) to be able to understand the requirements for patentability of inventions; and 3) to be able to conduct patent search using the Industrial Property Digital Library.
[Plans and Contents]
Lectures mainly covered patent systems for protecting inventions, and explained other related legislation and recent trends. The lecture contents were subject to change depending on student interests and requests.
1. Outline of patent system.
2. Industrially applicable invention.
3. Potential of industrial use
4. Novelty and inventiveness.
5. Patent categories and prior art search.
6. Using Industrial Property Digital Library.
7. Patent claim and patent specification.
8. Preparing patent application.
9. Patent examination.
10. Patent appeal.
11. Patent litigation.
12. Economic use of patent rights.
13. Outline of utility model system and design system.
14. Summary and examination.
[Keywords] intellectual property, intellectual property rights, industrial property, industrial property rights, invention, patent
[Textbooks and Reference Books] Students were asked to bring a statute book covering the Patent Act. Printed materials and the following title were handed out as-reference textbooks:
INDUSTRIAL PROPERTY RIGHTS, National Center for Industrial Property Information and Training
[Evaluation] Comprehensive evaluation was conducted by means of reports. Students had to obtain over 60 points to achieve credits.
[Course requirements] Although the course taught basic terms of patent laws, knowledge of the law was not required. Any students interested in the subject were welcome.
[Remarks] In 2014, lectures were held in the 4th and 5th time slots, Tuesday, June 3, 10, 17, 24 and July 1, 8, 15.

工業技術概論 Introduction to Industrial Technologies
[Instructor] Yun Lu
[Credits] 2
[Semester] Spring-Mon5
[Course code] T1Z05400
[Room] Eng.D-Bld.17-111
[Candidate] Students of Faculty of Engineering, and other Faculties
[Course description] First, the course will discuss the development of global industrial technologies with focus on Japanese technologies, changes of people's lives caused by technologies, environment and energy situations, and the history, current situation and future of industrial technologies. The course will also provide lectures on the necessary mindset as industrial engineers, resource research, how to write technical papers, and how to give research presentation, as well as guidance on studying and report writing techniques for students majoring in science and engineering.
[Course objectives] The objective is to increase the understanding of foreign exchange student majoring in science and engineering towards the development of industrial technologies and changes of people's lives caused by technology development, environment and energy situations, and to teach students the basic abilities that are required as industrial engineers (mindset, resource research, how to write technical papers, and how to give research presentation, etc.) as well as guidance on studying and report writing techniques for students majoring in science and engineering. At the same time, the course is aimed to enable foreign exchange students to gain a better understanding on the industrial technologies of Japan and to acquire the ability to contribute to the development of industries and technologies in their home countries or to work in Japanese companies in the future.
[Plans and Contents] The lectures will be given in 2 parts. Part 1: History, current situation and future of industrial technologies (Classes 1 – 9), and Part 2: Path to becoming a researcher. To ensure a better understanding, lecture resumes will be distributed on the web and lectures will be given using a projector. Achievements will be evaluated by reports and presentation (Classes 10 – 15).
1. Orientation and discussion about course content
2. Advances in industrial technology worldwide
3. Advances in industrial technology in Japan
4. Unique industrial technology
5. Industrial technology and life
6. Industrial technology and energy, the environment
7. 21st century industrial technology
8. How to write a report
9. Assignment presentation 1
10. Basic R&D thinking 1
11. Basic R&D thinking 2
12. Resource research
13. How to write a technical paper
14. Research presentations
15. Research presentations 2
16. Research presentations 3
[Textbooks and Reference Books] Textbook is not specified. Handouts will be provided via http://apei.tu.chiba-u.jp/Luyun-HP.html. Reference books will be introduced in class time.
[Evaluation] Attendance(30%) and exercises, report (30%) and presentation (40%), the total score 60 accredited.
[Course requirements] Not particularly
[Remarks] Foreign students only, the choice subject (F30 or F36) and no credit for Japanese students(Z99).

居住のデザインと生活技術　Dwelling Design and　Living Technology
[Instructor] Yun Lu
[Credits] 2
[Semester] Fall-Fri 4
[Course code] T1Z055001
[Room] Eng.D-Bld.17-213
[Course enrollment] about40
[Candidate] Students of Faculty of Engineering, other Faculties, and Specially Registered Non-Degree Student
[Course description] This course will be led by grand fellow Atsushi Maruyama.
[Course objectives] In the life of a person, there are various schemes being repeated in our given environment, the various designs that lead to scales of city or region from around us cannot be done elsewhere.　For foreign students aiming to go to form a professional environment, firstly, they need to focus on design and life skills for such residence, then think of the parallel development, also, in the present, they need to understand what is being deployed.
[Plans and Contents] We would like to discuss, in seminar format, examples of native students not only in the case in Japan, regarding the technology and lifestyle design for residential, and deepen the understanding. There are also plans of visits outside the university during the term.
1. October 3 – Orientation: What does “living” mean? How have people designed living spaces thus far?
2. October 10 – What types of houses can be found now in Japanese urban and rural areas?
3. October 17 – What types of houses can be found in Japanese historical rural and fishing areas?
4. October 19 (Sunday) – On-site observation: Boso Hudokinooka Open air Museum. (Bus tour)
5. October 24 – What types of houses can be found in Japanese historical urban areas?
6. November 7 – What trends have been seen in designing dining spaces kichen and family room?
7. November 14 – What trends have been seen in designing drawing rooms to allow for social relationships?
8. November 21 – What trends have been seen in designing amusement spaces for Noh and Kabuki?
9. November 28 – What trends have been seen in designing amusement spaces in Tokyo Disney land?
10. December 5 – How people have designed tea houses and Sukiya houses facing four seasons and nature?
11. December 12 – How people have designed tea gardens and imperial villa facing four seasons and nature?
12. December 19– How people designed religious spaces in dwelling houses and community during Bon and Shogatsu?
13. January 9 – How people designed religious spaces, Temples and Shrines in community?
14. January 23 – How people designed religious monument such as five storied pagodas ?
15. January 30 – Summary and Overall Discussion
[Keywords] Dwelling house, Design, Living Technology, Mealtime, Relationship, Religious Belief
[Textbooks and Reference Books] Textbook is not specified. Reference books will be introduced with the process of class on appropriate time.
[Evaluation] Evaluation will be given by small questionnaire with attendance sheet, presentation of the report in seminars at each research room, and the final report.
[Course requirements] Not particularly
[Remarks] Foreign students only, subject of choice(F30 or F36)and no credit for Japanese students(Z99)