画像科学セミナーIntroduction to Image sciences
[Instructor] Kenichi Kuge,Katsuhiko Miyamoto
[Credits] 2
[Semester] 1st year-Spring Wed 2
[Course code]T1T001001
[Room] Bldg. Eng.-5-104
[Candidate]1st year of Department of Image Sciences
[Course description] This is an orientation course in the small class for new students. It is guide to students about how to learn and study in the university as well as help to improve their interpersonal skills.
[Course objectives] To help new students to get overview on Image Science studies and encourage them to build their own objective in future.
[Plans and Contents] One group including ~5students and a faculty staff, they can freely communicate with each other and exchange opinions and information.
Specific activities will be organized by each staff. The themes of lecture are as follows,

1. Attitude to study in the University
2. Characteristics of Image Science courses and lectures
3. Research activity of Image Science courses
4. Introduction of the graduate school

In addition, students are encouraged to guide into future careers through discussion with the faculty staff and within the group.
[Keywords] Small Group Seminar, Orientation
[Textbooks and Reference Books] None in particular.
When it is necessary, reference materials and discussion handouts will be distributed and collected information from the students will be shared within the group.
[Evaluation] Attendance
[Course requirements] None in particular.

イメージサイエンス総論　Overview of Image Science
[Instructor] Each teacher
[Credits] 2
[Semester] 1st year-Fall Thu 2
[Course code] T1T002001
[Room]Bldg.Eng. 9- 106
[Candidate] 1st year of Department of Image Science
[Course description]Overview the image science and learn the grounds of imaging from a viewpoint of fundamental science.
[Course objectives]　Learn fundamentals to treating images, and overviewing main imaging technology. And then, understand the relationships to fundamental sciences, such as chemistry, physics and mathematics
[Plans and Contents] Learning basic items for imaging technology, and overviewing principle of main imaging technology from a viewpoint of fundamental sciences.

1. Introduction: From paintings to photographs, and current situation (H.Kobayashi)
2. Basics of imaging:　Analog and digital systems in Imaging　(H.Kobayashi)
3. Basics of imaging: Imaging and psychology (H.Kobayashi)
4. Basics of imaging: Imaging, light and materials　(Kuge)
5. Basics of imaging: Imaging and electronics　(Koseki)
6. Physics in imaging: Imaging and mathematics　(Omatsu)
7. Physics in imaging: Imaging and mechanics, electromagnetics(Omatsu)
8. Physics in imaging: Imaging and light (Tateda)
9. Physics in imaging: Imaging and transmission(Tateda)
10. Chemistry in imaging: Imaging and photochemistry(Koseki)
11. Chemistry in imaging: Formats for optical recording　(Kuge)
12. Chemistry in imaging: Basics of interfacial electric phenomena and printings(Hoshino)
13. Chemistry in imaging: Basics of electron transfer and electrophotography　(Hoshino)
14. Chemistry in imaging: Phase transition in materials and Liquid crystals - Chemistry in molecular assembly - (N.Kobayashi)
15. Chemistry in imaging: Optical and electrical properties of molecular assembly and liquid crystal displays (N.Kobayashi)
16. Exam(all)

[Keywords] Imaging technology, Chemistry, Physics, Mathematics, Recording, Display, Transmission, Evaluation
[Evaluation] Evaluation will be given by Examination and attendance

情報画像リテラシー Computer Literacy for Information and Image Sciences
[Instructor] Takashi Imaizumi
[Credits] 2
[Semester] 1st year-Fall Tue 2
[Course code] T1T 003001
[Room] Bldg.GEN. A-4F Information Processing Seminar Room 2
[Course enrollment] 50
[Course description] Learn about spreadsheet software to use and have good command of computer as a tool. Prepare for programming and learn about C language programming
[Course objectives]Your computer does not automatically performs necessary calculation for you, the user must designate how to calculate. As a software for this purpose, we will learn about spreadsheet software, how to designate to calculate complicated process. Also learn C language structure sentences for basic programmingability. Third semester course ”Program Design and Realization” along with this course enables you to understand basic of C language programming throughly.
[Plans and Contents] First half for spread sheet software, latter half for C language.
1. Guidance
2. Spreadsheet software (1)
3. Spreadsheet software (2)
4. Spreadsheet software (3)
5. Spreadsheet software (4)
6. Spreadsheet software (5)
7. Spreadsheet software (6)
8. Programming
9. Editor and programming environment
10. Basics of C Language
11. Variables, model
12. Control structure (1)
13. Control structure (2)
14. Array
15. The end of term exam
[Keywords] Spreadsheet software, C Language, Programming
[Textbooks and Reference Books] Textbook: 「Meikai C Language」、Softbank Publishing, Bouyou SHIBATA, 2,200 Yen, ISBN4-7973-2792-8
[Evaluation] Evaluation is given by assignment of the seminar in the Lecture、Homeworks, and the end of term exam.
[Course requirements] Students must have taken courses of Information Processing.

情報画像リテラシ-　Computer Literacy for Information and Image Sciences
[Instructor]Takashi Imaizumi
[Credits] 2
[Semester] 1st year-Fall Tue 4
[Course code] T1T003002
[Room] Bldg.GEN. A-4F Information Processing Seminar Room 2
[Course enrollment] 50
[Course description] Learn about spreadsheet software to use and have good command of computer as a tool. Prepare for programming and learn about C language programming
[Course objectives]Your computer does not automatically performs necessary calculation for you, the user must designate how to calculate. As a software for this purpose, we will learn about spreadsheet software, how to designate to calculate complicated process. Also learn C language structure sentences for basic programmingability. Third semester course ”Program Design and Realization” along with this course enables you to understand　basic of C language programming throughly.
[Plans and Contents] First half for spread sheet software, latter half for C language.
1. Guidance
2. Spreadsheet software (1)
3. Spreadsheet software (2)
4. Spreadsheet software (3)
5. Spreadsheet software (4)
6. Spreadsheet software (5)
7. Spreadsheet software (6)
8. Programming
9. Editor and programming environment
10. Basics of C Language
11. Variables, model
12. Control structure (1)
13. Control structure (2)
14. Array
15. The end of term exam

[Keywords] Spreadsheet software, C Language, Programming
[Textbooks and Reference Books] Textbook: 「Meikai C Language」、Softbank Publishing, Bouyou SHIBATA, 2,200 Yen, ISBN4-7973-2792-8
[Evaluation] Evaluation is given by assignment of the seminar in the Lecture、Homeworks, and the end of term exam.
[Course requirements] Students must have taken courses of Information Processing.

計算機システム入門 Introduction to Computer Systems
[Instructor] Yoshitsugu Manabe
[Credits]2
[Semester] 2nd year-Spring-Thu 1
[Course code] T1T 006001
[Room] Bldg.Eng. 2-103
(Bldg. ENG-2 cannot be used during 2014 fall semester.)
[Course enrollment] 100
[Candidate] Students of faculty of Engineering, other Faculties, and Specially Registered Non-Degree Student.; Department of Informatics and Imaging Systems 2nd year Compulsory
[Course description] To understand computing system's basic structure and operation, this lecture explains expression principles of numbers and signs, computer's basic structure, commands and assembly language, assembler operation and basical calculation circuit. Students are encouraged to learn on their own and expected to prepare for class using textbook and material on website. Through answering questions in class and doing exercises help to learn and deeper understand the subject.
[Course objectives] The purpose of this lecture is to understand electronic computing system's basic principle, structure and operation. Today electronic computing systems have been built in internet, home appliances, mobile device, automobile, industrial machinery, airplane and so on. Engineers for all electronic computing system must understand basic principle, structure and operation. Basic items are lectured in this class.
[Plans and Contents] Scheduled as in below, exercises will be conducted in class.
1. Structure and operations of computer systems, logical structure of computers, history of computers
2. Representation of integers Representation theory of numbers and symbols,
3. Representation of numbers including decimal point, floating decimal point representation.
4. Basic operations of computers, overview of COMET, overview of COMET commands
5. Assembly language CASL, type and format of command and Operation overview of assembler
6. Classification of computer circuits, Boolean algebra, basic operations and logic functions
7. Representation method of logic functions
8. Overall summary of 1st – 7th lecture contents
9. Simplification of logic functions
10. Combinational circuit
11. Operational circuits
12. Memory circuit, semi-conductor memory, Flip-Flop circuit
13. Concept of sequencial circuit
14. Composition of sequencial circuit
15. Overall summary of 9th – 14th lectures

[Keywords] Computer system, Number, Character, Sign, Commands, Assmbler, Operational circuit, Memory circuit, Sequencial circuit
[Textbooks and Reference Books] Hideo Ito and Tadashi Kurata: Introduction to Computer Systems, Asakura Publishing Co.Ltd.
[Evaluation]
Evaluation to be based on mini-tests conducted during each lesson (30%), interim exam conducted during the 8th lecture (35%), end-of-term exam conducted during the 15th lecture (35%), making a total of 100%.
[Related courses] This lecture is basis for learning computer structure or operation and digital processing (logical circuit) such as computer hardware, computerarchitecture, program language structure, digital signal processing, and operating system.
[Remarks] Over 11times of attendance will be precondition to archive a credit.

プログラムの設計と実現 I　Design and Implementation of Computer Programs I
[Instructor] Yasuo Horiuchi
[Credits]2
[Semester] 2nd year-Spring-Thu 2
[Course code]T1T007001
[Room] Bldg.Eng.2-103
(Bldg. ENG-2 cannot be used during 2014 fall semester.)
[Course enrollment] 120
[Course description] Learn basics of computer programming with C language and algorithm design. This class is a requirement for Information Image Science major students, and this class will be necessary for the future studies using programming. For Image Science students this is not a requirement, still this class helps learn basics of programming and C language programming.
[Course objectives] That student may write a simple program in C language. It is essential to learn the basics of programming when using computers in future studies. Procedural language is ideal for learning basics of algorithm design. First for basic programming knowledge, there will be (1) variable (2) conditional brunch (3) loop (4) array (5) function to learn the basics of algorithm design, which is followed by, requirement for practical C language programming (6) strings (7) pointer (8) recursive programming (9) structure (10) file input and output and (11) modularization for large-scale programming (12) List structure by self-referential structure using pointer
[Plans and Contents] Prior "Computer Literacy for Information and Image Sciences" has an introduction to C language; this class reviews the basic programming, and then learns basic programming method of C language and advanced method. In this class, students will acquire necessary programming for future study, along with "Computer Programming Practice" also in this semester with advanced exercises. Exercise material will be on WWW.

1. Variable, operator, type, conditional branch and loop
2. Array
3. Function
4. Basic type and recursion
5. Character and string
6. Pointer
7. Pointer and string
8. Command-line argument
9. Structure
10. File input and output
11. Module programming
12. Self-referential structure and list
13. Array of pointers
14. Review
15. Summary and end-of-term exam

[Keywords] Programming,C Language,Algorithm,Data Structure
[Textbooks and Reference Books]
"Meikai C Gengo Introcuctory Edition", Softbank. Use other reference books depending on your own skills and preferences since there are many books on the C language that are in publication. For those who would like to gain an in-depth understanding of the C language, they may also refer to the book "The C Programming Language 2nd Edition", Brian W. Kernighan and Dennis M. Ritchie
[Evaluation] Evaluation will be given based on Attendance, Seminar assignment Homework、The end-of term exam
[Related courses] "Computer Literacy for Information and Image Sciences" has introduction to C language, "Computer Programming Practice" has actual exercises on computer, after which there will be experiment with C language programming
[Course requirements] Students must have taken courses of Computer Literacy for Information and Image Sciences.
[Remarks] Questions and opinions may be raised during the lectures and questions are also welcome anytime after lectures and during office hours.

画像科学実験 I　Laboratory Work I in Image Science
[Instructor] Mitsuhiro Tateda, Shigeru Takahara
[Credits] 1
[Semester] 2nd year-Spring Thu 3, 4, 5 (last half of the semester)
[Course code]T1T007001,　T1T007002, T1T007003
[Room] Bldg. Eng.9-106 and Bldg.GEN-E-Basic Chemistry Lab.
[Course enrollment] 48
[Course description] Learn image chemistry through basic items in analytical chemistry experiment.
[Course objectives] Learn necessary basic knowledge for Image chemistry by themselves through analytical chemistry experiment on their own.
[Plans and Contents]　Analytical chemistry experiment for 6 weeks, knowledge of safety and basic experiment for 1 week and discussion about the results for 1 week are lectured.
1. Safety training, fundamental knowledge of experiments
2. Analytical chemistry experiment (I): Introduction
3. Analytical chemistry experiment (II): Thin layer chromatography
4. Analytical chemistry experiment (III): Partition
5. Analytical chemistry experiment (IV): Analysis of chloride
6. Analytical chemistry experiment (V): Chemical oxygen demand (COD)
7. Analytical chemistry experiment (VI): Qualitative analysis
8. Discussion

[Keywords]　Thin layer chromatography, Partition, COD, Qualitative analysis
[Textbooks and Reference Books] Text on the experiments will be distributed.
[Evaluation] In other to gain Credits, conducting every experiment and submitting every report on the experiment are mandatory. Overall evaluation will be based on the usual score, experiment notes, reports, etc.
[Remarks] Extra information will be updated on Moodle

フーリエ変換と画像 Fourier Transform for Information and Image Sciences
[Instructor] Takahiko Horiuchi
[Credits] 2
[Semester] 2nd year-Spring-Tue 2
[Course code] T1T 008001
[Room] Bldg.Eng.17-113
[Course enrollment] No Limited
[Candidate] Students of faculty of Engineering, other Faculties, and Specially Registered Non-Degree Student..
[Course description] After the explanation on basic mathematics and signal processing model, there will be lecture of Fourier series expansion, Fourier transform, discrete Fourier transform, FFT, two-dimensional Fourier transform or filtering in relation to images, with exercises for every class. There will be answers and explanation of exercises the next week, so students are encouraged to study unsolved exercises before the next class.
[Course objectives] That students will understand Fourier transform's basic disposition, necessary in information image engineering like digital image processing or optics in image science, and will learn its relationship to images; such as (1) Understand principles of Fourier series expansion and solve basic numerical calculation problem (2) Understand principles of Fourier transform and discrete Fourier transform and solve basic numerical calculation problem (3) understand relationship to FFT, AD/DA conversion, Shannon's sampling theorem necessary when applying to engineering (4) Extend understanding of Fourier transform to two-dimensional signals, explain the significance in Image Engineering or Image Science. Students are encouraged to review each Practical Training in previous classes to do self-evaluation of achievements before examination.
[Plans and Contents]
General remarks
1. Fourier series
2. Fourier expansion
3. Vector form of Fourier series and expansion
4. Complex form of Fourier series and expansion
5. 1D Fourier transform (1)
6. 1D Fourier transform (2)
7. Discrete Fourier transform (1)
8. Discrete Fourier transform (2)
9. Fast Fourier transform
10. AD, DA conversion and sampling theorem
11. 2D Fourier transform
12. Fourier transform for information and image sciences (1)
13. Fourier transform for information and image sciences (2)
14. Summary and The end of term exam

[Textbooks and Reference Books] Textbook is not specified. Handout will be given with the process of class on appropriate time. Select your own reference books depending on your own personal level of understanding since there are many books on Fourier transformation at different levels that are in publication.
[Evaluation] Exercises in every class(50％)and examination at the end of the term(50％). If average point for the exercises exceeds 80％, then examination at the end of the term may be exempted in some cases.
[Related courses] This study is important for many studies, especially the following; "micro-magnetic waves and light" "information theory" "digital signal processing" "digital image processing" "visual information processing" "circuit theory II" "oscillation and waves"
[Remarks] The lecture will be given for the student who has student ID number with even number

フーリエ変換と画像 Fourier Transform for Information and Image Sciences
[Instructor] Takahiko Horiuchi
[Credits] 2
[Semester] 2nd year-Spring-Tue 3
[Course code] T1T 008002
[Room] Bldg.Eng. 17-113
[Course enrollment] No Limited
[Candidate] Students of faculty of Engineering, other Faculties, and Specially Registered Non-Degree Student..
[Course description] After the explanation on basic mathematics and signal processing model, there will be lecture of Fourier series expansion Fourier transform, discrete Fourier transform, FFT, two-dimensional Fourier transform or filtering in relation to images, with exercises for every class. There will be answers and explanation of exercises the next week, so students are encouraged to study unsolved exercises before the next class.
[Course objectives] That students will understand Fourier transform's basic disposition, necessary in information image engineering like digital image processing or optics in image science, and will learn its relationship to images; such as (1) Understand principles of Fourier series expansion and solve basic numerical calculation problem (2) Understand principles of Fourier transform and discrete Fourier transform and solve basic numerical calculation problem (3) understand relationship to FFT, AD/DA conversion, Shannon's sampling theorem necessary when applying to engineering (4) Extend understanding of Fourier transform to two-dimensional signals, explain the significance in Image Engineering or Image Science. Students are encouraged to review each Practical Training in previous classes to do self-evaluation of achievements before examination.
[Plans and Contents]
1. Fourier series
2. Fourier expansion
3. Vector form of Fourier series and expansion
4. Complex form of Fourier series and expansion
5. 1D Fourier transform (1)
6. 1D Fourier transform (2)
7. Discrete Fourier transform (1)
8. Discrete Fourier transform (2)
9. Fast Fourier transform
10. AD, DA conversion and sampling theorem
11. 2D Fourier transform
12. Fourier transform for information and image sciences (1)
13. Fourier transform for information and image sciences (2)
14. Summary and The end of term exam

[Textbooks and Reference Books] Textbook is not specified. Handout will be given with the process of class on appropriate time. Select your own reference books depending on your own personal level of understanding since there are many books on Fourier transformation at different levels that are in publication.
[Evaluation] Exercises in every class(50％)and examination at the end of the term (50%). If average point for the exercises exceeds 80%, then examination at the end of the term may be exempted in some cases.
[Related courses] This study is important for many studies, especially the following; "micro-magnetic waves and light" "information theory" "digital signal processing" "digital image processing" "visual information processing" "circuit theory II" "oscillation and waves"
[Remarks] The lecture will be given for the student who has student ID number with uneven number

画像作り実習 Practice of Image Making
[Instructor] Mitsuhiro Tateda, Shigeru Takahara
[Credits]1
[Semester] 2nd year-Spring Thu 3, 4, 5 alternate weeks 1, 3
[Course code]T1T011001, T1T011002, T1T011003
[Course enrollment] 50
[Course description] Students are encouraged to various images on their own. Experiencing as well as observation is essential. Students are also encouraged to drill down their own interest.
[Course objectives] Students will find out how they lead in their study in Image Science, will experience the depth of technology by creating images and using image technology on their own. Through such experience, understand about image creation as a part of fabrication industry and have a notion of what a good image might be.
[Plans and Contents]　Details for the first half of the class will be announced at the guidance in the first class.

1. Guidance
2. Digital image processing
3. Color printing
4. Pinhole photograph
5. Electrochromism
6. Photosensitive resin letterpress
7. Rewritable thermal recording material

[Keywords] Manufacturing, Image creation, Photograph, Printing, Color, Display
[Textbooks and Reference Books] None in particular
[Evaluation] Evaluation will be based on attendance, participation, and attitude during classes and reports.

プログラムの設計と実現 II　Design and Implementation of Computer Programs II
[Instructor] Yasuo Horiuchi
[Credits] 2
[Semester] 2nd year-Fall Tue 3
[Course code] T1T 016001
[Room] Bldg Eng.2-103, Bldg.GNE -H45
[Course enrollment] 96
[Course description] Students will learn basic programming with object-oriented language. Java programming will enable students to find out the way of thinking in object-oriented programming fundamental for large scale system design. In this lecture, students will learn about basic object-oriented programming and Java programming.
[Course objectives] that students may write a simple program in Java language. It is essential to learn the basics of programming when using computers in future studies and to have understanding of object-oriented programming. First for basic Java programming knowledge, there will be (1) variable (2) conditional brunch (3) loop (4) array to write basic program in Java, then (5) concept of "class", this concept and object-oriented programming is essential for all students, which is followed by and proceeding to, requirement for Java programming in actual engineering, (6) file input and output and (7) GUI to be able to write applicable and useful program.
[Plans and Contents]　This class learns basic of Java language referencing C language and the basis of object-oriented programming understanding the concept of "class", then learns the techniques for practical programming. In this class, students will take the lecture and then write the Java program using the computer. Exercise material will be on WWW.

1. Guidance
2. Introduction to Java
3. Variable
4. Conditional branch
5. Loop
6. Array
7. Object-orientated and class
8. Encapsulation
9. Constructor
10. Class inheritance
11. Overload and override
12. Exception handling (1)
13. Exception handling (2)
14. Text files input and output
15. Window, keyboard input

[Keywords] Object Oriented Programming, Java Language, Class
[Textbooks and Reference Books]
No textbooks are specified in particular. Students may prepare their own reference books depending on their own capabilities and preferences since there are many books on the Java language that are in publication.
For example, “Easy-to-Understand Java” by Takashi Kawaba, Hidekazu System (Introductory Guide / Introduction to Object-Oriented Programming / self-study and revision of 3 sub-volumes on object-oriented programming).
[Evaluation] Evaluation to be based on the programing execises of each lecture and reports of challenging programs.
[Related courses] Students must know basic C language and programming through courses like “Computer Literacy for Information and Image Sciences”, “Design and Implementation of Computer Programs I”, ” Computer Programming Practice”, JAVA language and object-oriented programming which are all essential for experiment and graduate research.
[Course requirements] Students must have taken courses of Design and Implementation of Computer Programs I.
[Remarks] Questions and opinions are welcome anytime during and after the lectures and during office hours. The seminars will be conducted in Building 1, 5F, Computer Room 501.

画像科学実験 II　Laboratory Work II in Image Science
[Instructor] Mitsuhiro Tateda, Shigeru Takahara
[Credits] 2
[Semester] 2nd year-Fall Fri 3, 4, 5
[Course code] T1T018001,T1T018002, T1T018003
[Room] Bldg.Eng. 9- 107
[Candidate] 2nd year of Department of Image Sciences
[Course enrollment] 60
[Course description] Learn necessary basic knowledge for Image Science through chemistry and physics experiment.
[Course objectives] Learn necessary basic knowledge for Image Science by themselves through chemistry and physics experiment on their own.
[Plans and Contents] For 4 week-through experiment unit and three units, students are arranged in 3 groups (16-18 people in each group). The three experiment units (optics and electromagnetism, organic synthesis of dye compounds, optical absorption) are lectured all at once in parallel experiments for 12 weeks total, simulation experiments for 2 weeks and a guidance week. Classes and details are announced at the guidance. The followings are examples of each week.

1. Guidance, safety training, mathematics for physics tutorials
2. Simulation experiment (I)
3. Simulation experiment (II)
4. Optics and electromagnetism (I): Optics – Reflection and refraction
5. Optics and electromagnetism (II): Optics – Polarized light
6. Optics and electromagnetism (III): Electromagnetism – Electric field and electric potential
7. Optics and electromagnetism (IV): Electromagnetism – Magnetic field and electric current
8. Organic synthesis of dye compounds (I)
9. Organic synthesis of dye compounds (II)
10. Organic synthesis of dye compounds (III)
11. Organic synthesis of dye compounds (IV)
12. Optical absorption (I): Monochromatic light, and optical absorption of colors
13. Optical absorption (II): Quantitative analysis of Fe2+ ions using coloring reagents
14. Optical absorption (III): Stoichiometry of complex formations
15. Optical absorption (IV): Measurement of the fading reaction speed of colors

[Keywords] Simulation calculation, Optics, Electromagnetism, Dye, Organic synthesis, Optical absorption
[Textbooks and Reference Books] Text will be distributed
[Evaluation] In other to gain Credits, conducting every experiment and submitting every report on the experiment are mandatory. Overall evaluation will be based on the usual score, experiment notes, reports, etc.

画像有機化学 Organic Chemistry for Imaging
[Instructor] Nobukazu Miyagawa
[Credits] 2
[Semester] 2nd year-Spring Mon 2
[Course code] T1T019001
[Room] Bldg.Eng. 4-204
[Candidate]Students of faculty of Engineering, other Faculties, and Specially Registered Non-Degree Student; 2nd year of Department of Image Sciences (compulsory)
[Course description] Many imaging materials, e.g. dyes, are mostly organic compounds. To understand these, we will discuss organic chemistry in its principles and reaction mechanisms necessary for imaging. Especially, we will discuss the reaction mechanisms in organic chemistry that are very important for design of organic function materials and synthesis of them. We will also study reaction of compounds that are used and applied for actual image formation.
[Course objectives] ［General Target］understanding about the mechanisms of organic functional materials, especially chemical reactions of molecules. In addition, it is theoretical understanding about stability and reactivity of chemical species, and fundamental chemical reactions for design and preparation of functional materials. ［Attainment Target］(knowledge・understanding) Understand fundamental organic reactions in organic chemistry by each functional groups. Understand the reaction of compounds in photo-functional materials and imaging materials (evaluated by tests between classes and finals). (logical thinking) Speculate the methodology of synthesis and/or reactivity of compounds, even if the first seeing (evaluated by exams). (interest and motivation for class) Have more interest toward chemical compounds, notably imaging materials (evaluated indirectly through attendance sheets). (participation) Do research and examination in above field of interest on their own (evaluated by reports). (expression and skills) explain the reaction mechanism and elementary reaction related to imaging material on their own words (evaluated by reports). Practicing ideas and knowledge's for other classes like dye synthesize in "Laboratory Work in Image Science II" and molecule modeling in "Laboratory Work in Image Science IV" (the latter will not be directly evaluated).
[Plans and Contents]
1. Guidance on the lecture plan. Explanation on the relationship between imaging and chemistry, especially imaging and organic chemistry will be held. A pop-quiz will be conducted to assess the level of understanding of the class of "Fundamental Chemistry B" and review session will also be conducted for "Fundamental Chemistry B".
2. Stereo chemistry of organic compounds and isomers
3. The relationship electron orbitals and molecular structures
4. Chemical bonds and reactions
5. Bond formation and dissociation, and reaction intermediate
6. Aromaticity, and resonance
7. Properties and reactions of aromatic compounds
8. Dyes and Sesitizers in image formation
9. Molecular structure and optical absorption
10. Properties and reactions of carbonyl compounds(1)
11. properties and reactions of carbonyl compounds (2)
12. properties and reactions of carbonyl compounds (3)
13. Properties and reactions of amine
14. Imaging and polymers (1)
15. Imaging and polymers (2)
16. The end -of term exam–

[Keywords] Organic Chemistry, Reaction Mechanisms for Organic Chemistry, Imaging, Materials Chemistry for Imaging
[Textbooks and Reference Books] Not specified, with hand out materials for review and home task. For reference, "Hajimete Manabu Daigaku-no Yuki Kagaku (beginner's guide to organic chemistry in college)", Kagaku Dojin for preparation. For more understanding, and review, "Morrison and Boyd Organic Chemistry, Prentice Hall (Japanese translated edition is published by Tokyo Kagaku Dojin) and "Organic Chemistry Problems and Solution (Japanese translated edition is "Yuki Kagaku Mondai-no Toki Kata —Morisson and Boyd no Kyokasho ni Sotte") for self evaluation
[Evaluation] Overall evaluation will be based on the results of several pop quiz (40%), reports (10%) and results on final exams (50%).
[Related courses] Fundamental Chemistry B, Laboratory Work in Image Science II, Laboratory Work in Image Science IV
[Course requirements] As a general rule, students should preferably be taking "Fundamental Chemistry B" (Department of Image Science) or a similar subject (others).
[Remarks] Attendance necessary and recorded by attendance sheet original for this class. Credits will not be given to those who lacked required attendance, students must report if they will be absent on account of sickness or other grounds. Small

test will be announced before the class in which the test will be conducted (must be attended), more than 4 times and not fixed according to the progress in class.
Report themes will be also announced only in class. Students must use Moodle for handouts and review material or web exercises and test through Moodle.

写真創作実習　Photo creation practice
[Instructor] (Tateo Suzuki)
[Credits] 2
[Semester] 3rd year-Spring Fri 4
[Course code]　T1T020001
[Room] Bldg.Eng.5-105
[Course enrollment] Department of Image Sciences・Department of Informatics and Imaging Systems each 15 people
[Candidate] Department of Image Sciences, Department of Informatics and Imaging Systems、
[Course description] Learn about framing out and how to see lights in image expression through making works using both analog film and digital camera.
[Course objectives] Students learn image expression by bringing their photographs to completion from a view point of sensibility using an image processing software.
[Plans and Contents]　Through creating some image works using analog film and digital camera, students will learn how to express their sensibility. There will be an exhibition for the works of participating students. This course is about creation and expression, which examines and considers image and sensibility. We are looking forward to your splendid works with a great sensibility

1. Orientation
2. B&W film Self-portrait “My Own Existence 2014”
3. Development of analog film
4. Digital image expression 1: “Natural colors and forms”; Imaging of colors and forms in nature
5. Works appreciation
6. Digital image expression 2: “Paper and nails”; Imaging for expression of difference in texture
7. Works appreciation
8. Digital image expression3: “Momentary forms”; Imaging of movement of water.
9. Works appreciation
10. Work creation using Adobe Photoshop 1
11. Work creation using Adobe Photoshop 2
12. Black and white print production (dark room operation)
13. Preparing presentation (work publication)
14. Exhibition of works
15. General lessons

[Evaluation] Attitude towards image and work evaluation
[Course requirements] Limited to 15 students and only for students majoring in Information Image Sciences or Image Sciences. For those who wish to take this class, all candidates are asked to submit a short essay or report of around A4 sheet - 1 page - on their own thoughts on images by 15:00 P.m. 10th April (Tuesday). Reports may be submitted to: Technology and Engineering Department 8th building 4th floor KOBAYASHI&AOKI Laboratory. Admitted students will be announced on 12th April (Thursday) on bulletin board on the 2nd floor of the laboratory building.
[Remarks]　Students are to provide their own USB memory sticks for storing the photos (2G or more is preferred).

画像科学実験 III　Laboratory Work in Image Science III
[Instructor] Norihisa Kobayashi, Yusuke Okawa, and all staffs
[Credits] 2
[Semester] 3rd year-Spring Wed 3, 4, 5
[Course code] T1T021001,T1T021002,T1T021003
[Room] Bldg. Eng.9-106
[Course description] Laboratory works on image analysis, and chemistry and physics for imaging. This class is for preparing for graduation study in the senior year.
[Course objectives] This experiment class gives basis for graduation study in senior course. Find and solve your own problems besides only doing the given tasks. In this class, read carefully the text and other reference materials to deeper understand Image Sciences.
[Plans and Contents]　Around 15 people in one group.　All subjects below are required.　The schedule depends on each group.

1. Guidance
2. Image analysis 1
3. Image analysis 2
4. Image analysis 3
5. Chemistry3, Physical and inorganic chemistry 1
6. Chemistry3, Physical and inorganic chemistry 2
7. Chemistry3, Physical and inorganic chemistry 3
8. Physics2 1: Optics, mathematics for physics
9. Physics2 2: Optical refraction, interference
10. Physics 2 3: Applied wave optics
11. Physics 2 4: Mathematics for physics (fundamental electrical quantities)
12. Photoreactive materials 1 (reaction to convert light energy to chemical energy)
13. Photoreactive materials 2 (sensitization of polyvinyl cinnamate and its action spectrum)
14. Photoreactive materials 3 (photoreaction using polarized light and orientation control of liquid crystal)
15. Photoreactive materials 4 (evaluation of photopolymer)

[Keywords] Image Expression and Analysis, Imaging Chemistry, Imaging Physcs
[Evaluation] Evaluation will be given based on attendance and submitted reports.
[Remarks] We use Moodle for supplementary information and submission of reports.

数値計算の理論と実際 Numerical Computation Theory and Applications
[Instructor] (Tetsuya Kawamura)
[Credits] 2
[Semester] 3rd year-Spring Intensive
[Course code] T1T023001
[Room] Bldg.Eng 2-201
(Bldg. ENG-2 cannot be used during 2014 fall semester.)
[Course description] Lecture and exercise in basic and simple numerical computation method.
[Course objectives] Lecture on basic numerical computation essential to technologies, designing program for actual use as well as theoretical view. Emphasis added on solution of linear differential equations, which is important in engineering
[Plans and Contents]

1. Preface to numerical calculation computation methods
2. Solution to non-linear equations 1
3. Solution to non-linear equations 2
4. Solution to simultaneous linear algebraic equations 1
5. Solution to simultaneous linear algebraic equations 2
6. Discrete interpolation of functions 1
7. Discrete interpolation of functions 2
8. Numerical differentiation and integration
9. Solution of ordinary differential equations 1
10. Solution of ordinary differential equations2
11. Solution of partial differential equations using difference method
12. Solution of partial differential equations using difference method 2
13. Finite element method
14. Boundary element method
15. Exam

[Evaluation] Evaluation will be given by The end -of term exam and report writing
[Related courses] Linear algebra and calculus in Year 1 and 2
[Remarks] The schedule is announced at the beginning of semester.

情報通信ネットワーク　Information and Communication Network
[Instructor] Hiroo Sekiya
[Credits] 2
[Semester] 3rd year-Spring Fri 5
[Course code]T1T24001
[Room] -Bldg Eng.2-103
(Bldg. ENG-2 cannot be used during 2014 fall semester.)
[Course enrollment] 120
[Candidate] Students of Faculty of Engineering, Specially Registered Non-Degree Student . 3rd year and 4th year students.
[Course description]
Learn about various communication networks, basic technologies such as distributed processing, the Internet, protocol technologies, and applications of such networks. In addition, understand involvements of information and communication networks in the society.
[Course objectives]
The objective of this lecture is to learn about the Internet-based information and communications, the IT core technologies, and the future ubiquitous system technologies.
[Plans and Contents]
Learn about the basic concept of communication, involves Laboratory Work in Informatics and Imaging Systems II, in the first couple of lectures. Next, learn about the meaning of information and communications. After that, IT core technologies and the future ubiquitous system technologies.

1. TCP/IP (1): Communication protocol and its hierarchy, OSI hierarchy model, various routing algorithms (RIP/Bellman-Ford, OSPF/Dijkstra), multicast control algorithms (PIM-SM, SSM) and protocols (mobile IP/NEMO, IPv6)
2. TCP/IP (2): Working principle of TCP (Connection cotnrol, flow control, congestion control, error control, and retransmission control), multimedia communication using UDP, TCP variation
3. TCP/IP (3): ARP, ICMP, DHCP, and NAT
4. PHY (1): Basic principle of communication (Sampling theory and quantization), basic modulation schemes, frequency and communication property
5. PHY (2): Multiple access schemes (FDMA and TDMA)
6. PHY (3): Multiple access schemes (CDMA and OFDM), and optical communication
7. Outline of information and communication network: Changes and situation in information and communication networks (circuit switching and packet switching, telephone network and the Internet, wired network and ubiquitous network, intensive processing and distributed processing)
8. Distributed processing architecture: Features of centralized processing (Client-server system) and distributed processing (pure P2P and hybrid P2P), network virtualization and cloud computing
9. Distributed algorithm: Synchronization, deadlock, leader selection problem, distributed transactions via database, update and control of duplicate data, ACID (atomicity, consistency, independence, and sustainability)
10. Multimedia communication on the Internet: Video and audio encoding methods, communication and multimedia, QoS control (Intserv/RSVP, Diffserv, RTP/RTCP, RTSP, SIP, MPLS), traffic control (basics of queueing theory)
11. Network security: Coding, authentication algorithms (DES/AES, RSA), firewall, illegal access detection, control (IDS/IPS), anti-virus measures, network security protocol (IPsec, SSL/TLS, S/MIME)
12. Network application system : P2P content distribution network, content caching, Web service, cloud computing
13. Types and working principles of ubiquitous networks: Ubiquitous system architecture, standardization trends, short distance wireless (RFID, DSRC, NFC etc.), wireless PA (Bluetooth, UWB, ZigBee, milli-wave communications), wireless LAN (IEEE802.11/b/a/g/n), wireless MAN (IEEE802.16/16e）
14. Applications of ubiquitous networks and future developments: Mobile ad-hoc networks, sensor network and energy-saving communications (smart grid), home and consumer electric network, NGN (next generation network), combined communication broadcast with IPTV

[Keywords] Internet, Network architecture， ubiquitous systems, distributed processing,multimedia communication, protocol,Computer network
[Textbooks and Reference Books]The lecture text will be updated on the web.
[Evaluation] Evaluation will be given by examination, attendance, reports
[Related courses] Applied mathematics, operating system, database, multimedia data processing, digital signal processing

パターン認識基礎 Pattern Recognition
[Instructor]Norimichi Tsumura
[Credits] 2
[Semester] 3rd year-Spring Fri 2
[Course code] T1U025001
[Room] Bldg.Eng. 2-103
(Bldg. ENG-2 cannot be used during 2014 fall semester.)
[Course description] Lecture on basic theory on pattern recognition necessary in varied field of information engineering.
[Course objectives] Recognize the importance of pattern recognition process and feature extraction. Learn basic (including mathematical) method of pattern recognition. Understand statistical pattern recognition and method. Learn concept of learning algorithm. Learn how to handle feature space, feature analysis, feature transform.
[Plans and Contents]
1. What is pattern recognition?
2. Characteristic spectral and characteristic space
3. Characteristic spectral and characteristic space (2)
4. Learning and identification functions (1)
5. Learning and identification functions (2)
6. Learning and identification functions (3)
7. Relationship with neural networks
8. Design of identification part (1)
9. Design of identification part(2)
10. Evaluation of characteristics and Bayes error probability (1)
11. Evaluation of characteristics and Bayes error probability (2)
12. Evaluation of characteristics and Bayes error probability (3)
13. Transformation of characteristic space
14. Subspace method
15. Summary and future developments, the end-of term exam

[Keywords] Feature vector, Perceptron, Learning
[Textbooks and Reference Books] To be purchased： WAKARISASUI PATTERN NINSHIKI, ISBN4-274-1349-1
[Evaluation] Evaluation will be given comprehensively by attendance and all report writing and the result of end-of term exam and so on.

パターン認識基礎 Pattern Recognition
[Instructor]Norimichi Tsumura
[Credits] 2
[Semester] 3rd year-Spring Fri 2
[Course code] T1U025001
[Room] Bldg.Eng. 2-103
(Bldg. ENG-2 cannot be used during 2014 fall semester.)
[Course description] Lecture on basic theory on pattern recognition necessary in varied field of information engineering.
[Course objectives] Recognize the importance of pattern recognition process and feature extraction. Learn basic (including mathematical) method of pattern recognition. Understand statistical pattern recognition and method. Learn concept of learning algorithm. Learn how to handle feature space, feature analysis, feature transform.
[Plans and Contents]
1. What is pattern recognition?
2. Characteristic spectral and characteristic space
3. Characteristic spectral and characteristic space (2)
4. Learning and identification functions (1)
5. Learning and identification functions (2)
6. Learning and identification functions (3)
7. Relationship with neural networks
8. Design of identification part (1)
9. Design of identification part（2）
10. Evaluation of characteristics and Bayes error probability (1)
11. Evaluation of characteristics and Bayes error probability (2)
12. Evaluation of characteristics and Bayes error probability (3)
13. Transformation of characteristic space
14. Subspace method
15. Summary and future developments, the end-of term exam

[Keywords] Feature vector, Perceptron, Learning
[Textbooks and Reference Books] To be purchased： WAKARISASUI PATTERN NINSHIKI, ISBN4-274-1349-1
[Evaluation] Evaluation will be given comprehensively by attendance and all report writing and the result of end-of term exam and so on.

ヒューマンインタフェース Human Interface
[Instructor] Shingo Kuroiwa
[Credits] 2
[Semester] 3rd year-Spring Tue 2
[Course code]T1U026001
[Room] Bldg.Eng.2-202
(Bldg. ENG-2 cannot be used during 2014 fall semester.)
[Course enrollment] assuming around 40 students
[Course description]
In addition to lectures, students will be required to conduct presentations and participate in open discussions. At the beginning, a lecture on the basic concept of human interface will be given. Based on the concept, students will look for examples of things that they find “easy to use / hard to use” from their surroundings, write a report and conduct a presentation on these things. The lecturer and fellow students will then conduct a discussion and mutual evaluation. Based on this, students will acquire a sense of what human interface means and learn the basics of presentation. Subsequently, in order to learn basic techniques and practical techniques regarding human interface, lectures on 4 themes shown in “Purposes and Objectives” below will be given. At the end, students will compile a report on proposals to improve the usability for those examples nearby that they identified at the beginning and conduct a presentation based on the design principles that they learned in the lectures. Besides conducting a mutual appraisal of one another’s presentation, students will also discuss specifically the 4 themes shown in “Purposes and Objectives” below through individual examples in each presentation.
[Course objectives] Ability to design high-usability man-machine interface, to have (1) presentation skill, (2) human interface design principle, (3) human interface design method as user-oriented design (4) user research and usability evaluation skills.
[Plans and Contents]
1. What is human interface?
2. Presentation technique 1: Basic concept of presentations
3. Presentation technique 2: Presentation techniques
4. First report presentation “Things I find easy / difficult – From my surroundings” (1)
5. First report presentation “Things I find easy / difficult – From my surroundings” (2)
6. First report presentation “Things I find easy / difficult – From my surroundings” (3)
7. Design principle of human interface
8. Human interface design: Visualization of interaction and affordance
9. Human interface design: Human errors and countermeasures (1)
10. Human interface design: Human errors and countermeasures (2)
11. Human interface design: Design principle and trade-offs in design
12. User survey methods, usability evaluation methods
13. Summary of human interface theory（The end-of-term exam）
14. 2nd report presentation “Proposal to improve usability” (1)
15. 2nd report presentation “Proposal to improve usability” (2)
16. 2nd report presentation “Proposal to improve usability” (3)

[Keywords] presentation skill, usability
[Textbooks and Reference Books] Textbook is not specified. Reference Books：Donald A. Norman, The Psychology of Everyday Things, 1988.　Donald A. Norman, The Design of Future Things, 1988. Jakob Nielsen, Usability Engineering, 1994.
[Evaluation] Overall evaluation to be based on ordinary points such as reports and mini-tests during lessons (mini-test will be conducted at the end of each lesson to measure the level of understanding), as well as presentations (including reports) and results of end-of-term exam. The weightage of the ordinary points, presentations and end-of-term exam shall be 1:4.5:4.5 as a guide.
[Remarks] Students will be required to conduct presentations using presentation software such as PowerPoint. The number of attendances must be 11 or more for credits to be awarded.

コンピュータグラフィックス Computer Graphics
[Instructor] Norimichi Tsumura
[Credits] 2
[Semester] 3rd year-Spring Thu
[Course code]T1U027001
[Room] Bldg.Eng. 2-103
(Bldg. ENG-2 cannot be used during 2014 fall semester.)
[Course description]Lecture of computer graphics from basic to practice with text. OpenGL exercises also conducted.
[Course objectives] Computer graphics can take the real world into the machine, it is growing rapidly, involving mathematics, physics or other science and engineering fields. Students are encouraged to make a new challenge and learn its dynamism in class, and to be a self-motivated person, learn the importance of basic science through applied computer graphics.
[Plans and Contents]
1. Lecture overview, latest CG information
2. Digital camera model
3. Coordinate conversion
4. OpenGL Seminar
5. OpenGL Seminar
6. Modelling (1)
7. Modelling（2）
8. Modelling (3)
9. Rendering (1)
10. Rendering (2)
11. Rendering (3)
12. Computational photography and image processing
13. Image-based rendering
14. Animation
15. CG system, graphics processing unit (GPU), Final summary and future developments, The end-of term exam

[Textbooks and Reference Books] Get ready the following textbooks from the second lesson onwards if you are taking this course. Computer Graphics, ISBN 4-906665-48-9 B5
[Evaluation] Overall evaluation to be based on the reports submitted during lessons, reports submitted outside of lessons, result of end-of term exam etc.

ディジタル信号処理 Digital Signal Processing
[Instructor] Kazuhiko Kawamoto
[Credits] 2
[Semester] 3rd year-Spring Mon 2
[Course code] T1U035001
[Room] Bldg.Eng.2-202
(Bldg. ENG-2 cannot be used during 2014 fall semester.)
[Course description] With mobile phones or digital cameras, sensor signals are everywhere and indispensable for our lives. Digital signal processing is base technology for these devices and its fundamental articles are lectures in class.
[Course objectives] understand its algorithm to analyses Sensor signals with computers, purposes of this class are as follows(1)Understand differences between analogue signals and digital signals，able to explain strong and practical points of digital signal processing(2)Understand the significance of expressing signals by frequency domain，able to explain algorithm（such as Fast Fourier transform）used there, (3)Analyse disposition of digital filter, (4)Conduct making of easy digital filter
[Plans and Contents]
1. signals and Systems
2. signals and Systems Factorization of signals
3. 3. infinitesimal calculus of digital　From Fourier series to Fourier transformation
4. 4. An autocorrelation function and cross-correlation function　Sampling model and discrete Fourier transformation
5. High-speed Fourier transformation and convolution integral theory
6. Laplace transformation
7. Interim summary
8. z-transformation
9. Finite impulse response (FIR) system (1)
10. Finite impulse response (FIR) system（2）
11. Infinite impulse response (IIR) system
12. Transfer function and frequency characteristics of linear time invariant systems (1)
13. Transfer function and frequency characteristics of linear time invariant systems（2）
14. Design of digital filters
15. Overall summary

[Keywords] Fourier series,Fourier transform, discrete Fourier transform, fast Fourier transform, Laplace transform, Z conversion, disintegration time system, system unchangeable at linear time, digital film
[Textbooks and Reference Books] Textbook is not specified. Handout will be provided on appropriate time.
Reference books: Reference books for the lectures include “Digital Signal Processing and Basic Theory” by Takashi Yahagi, Corona Publishing and “Digital Signal Processing” by Shigeo Tsujii et al. and others.
For more detailed information, refer to “Digital Signal Processing” by A.V.Oppenheim, Prentice Hall (translated version: “Digital Signal Process I & II” by Gen Date, Corona Publishing) and “Digital Processing of Signals and Images” by Taku Arimoto, Sangyo Tosho etc. A.V.Oppenheim 「Digital Signal Processing」Prentice Hall（For the signal representation in the first half, “the explanation in the book “Applied Mathematics for Beginners ” by Kenichi Kanaya,Kyoritsu Publishing, is easy to understand.
[Evaluation] Mid-term will be in 7 th class and examination at the end of the term will be in 15th class. 50 for each exam and total of 100, students weigh total score over 60 will be accredited.
[Related courses] Linear algebra, differential calculus integral calculus，Fourier Transform for Information and Image Sciences, Electric Circuit Theory I/II，Digital image processing. Linear algebra, calculus
[Course requirements] Students are presumed to be taking linear algebra and calculus as well.

インターンシップ Practical Training in Factory
[Instructor] Yusuke Okawa
[Credits] 2
[Semester] 3rd year-Spring-Fall
[Course code] T1T036001
[Room]
[Course enrollment] No limitted
[Course description] Exercise on technology in actual industry related to the faculty courses.
[Course objectives] Learn actual works, procedures, and method, and ethics, through exercise in actual industry. This is the first step to the society and helps you think about your future career.
[Plans and Contents] Exercise on technology in actual industry related to Image Science. More than 5 days and 30 hours are required.
[Evaluation] Student report (form-1) and enterprise report (form-2) according to the above purpose and objective.
[Course requirements] The schedule should not affect other classes. Confirm to the enterprise or to the corresponding instructor whether the training course is suitable for the above objective and requirements. All forms (form 2 and letter from the faculty staff (form-3) will be handed to the responsible personnel by the student before the training term begins.
[Remarks] Find your own enterprise on web, administration office, or bulletin board. If you cannot find any suitable enterprise and still want to take this class, confer with the faculty staff. No registration is necessary. After the completion of the training and the evaluation, the faculty staff will assign the class and the Credits.

視覚情報処理　Visual Information Processing
[Instructor] Hirohisa Yaguchi
[Credits] 2
[Semester]3rd year-Fall　Tue 1
[Course code] T1U038001
[Room] Bldg. GEN-F41, Bldg. ENG-2-103
(Bldg. ENG-2 cannot be used during 2014 fall semester.)
[Course enrollment] 145
[Candidate] Students of Faculty of Engineering, Specially Registered Non, and Specially Registered Non-Degree Student may take this course.
[Course description] Information process of humans related to vision and visual recognition，in its psychological and physical experiment, learning about information process model, in retina and each part of visual cortex, space characteristics, time characteristics，movement vision，binocular vision，function of color recognition
[Course objectives] Understand basic characteristics of information　image engineering，evaluation and investigation method of human sight characteristics，to have ability to make out the hidden fact behind complex phenomena.
[Plans and Contents] Students are encouraged to take interest in how humans see the world. Lecture on how the mechanism of vision is efficient and adoptive，in relation to information image engineering

1. What is the sense of vision? Essense of visual understanding
2. What is the sense of vision?　Means of visual understanding
3. Eyeball structure? Eyeball optics system and retina
4. Eyeball structure? Eyesight and image formation
5. Photoreceptor and sampling
6. Dark adaptation, light adaptation and photoreceptor response
7. Spatial property and retina cells
8. Peripheral vision and retina non-uniformity
9. Spatial frequency characteristics of visual systems
10. Form perception and frequency characteristics
11. Cerebral visual cortex and spatial frequency characteristics
12. Time frequency characteristics
13. Sense of color
14. Movement vision
15. Stereoscopic vision

[Keywords] Sight information processing, retina, cerebrum visual cortex
[Evaluation] Attendance (25%), reports (25%) reports and the results of exams will be given a total of 60 points and above being considered a pass.
[Remarks] Note that students enrolled before 2003 will not be able to obtain graduation credits even if they were to take this course.

生体情報システム論 Biological Information System
[Instructor] Ikuo Matsuba
[Credits] 2
[Semester] 3rd year-Fall Mon 4
[Course code] T1U039001
[Room] Bldg.Eng.17-211
[Course description] Lecture of information process and neural network in organ
[Course objectives] Organic bodies are ideal information processing computer. Visual sensor system, brain neural system and their information process, practice to engineering and neural network deriving from brain neural circuit model.
[Plans and Contents] Brain and computer, basic information process in organ system, sensing system and visual system, retina, visual cortex, characteristics like lateral inhibition, of sight system information process, Mach effect, information content of discharging and brain content, neural structure of internal neural system, system theory and brain theory, information theory, neural circuit network statistics, excitatory circuit network, prohibiting circuit network, logic neuron and circuit, characteristics of information process in neural network, association, statistic calculation of content, learning machine and perceptron, neural circuit network in aspect of optimization search, organ information system in engineering.

1. Overview of the brain
2. Functions of nerve cells
3. Visual information processing 1
4. Visual information processing2
5. Memory and memory capacity
6. Statistics of biological neural networks
7. Logical neurons
8. Associative memory and memory capacity 1
9. Associative memory and memory capacity 2
10. Associative memory and memory capacity 3
11. Learning machine and perceptron 1
12. Learning machine and perceptron 2
13. Unsupervised learning
14. Neural network applications 1
15. Neural network applications2

[Keywords] Neural Networks, Biological Systems, Visual System, Associative Memory, Learning Machine
[Textbooks and Reference Books] ！！IMPORTANT！！Material will be uploaded on web and must print out to bring to class. Reference Books：Matsuba, Neural System Information Process, Shokodo
[Evaluation] Evaluation will be given by examination,attendance and report writing.
[Course requirements] must be taken the courses probability and statistics
[Remarks] Must download the material and bring the copy to the class(material,2)from
http://www.geocities.jp/complex lab2005

ディジタル画像処理 Digital image processing
[Instructor] Takahiko Horiuchi
[Credits] 2
[Semester] 3rd year-Fall Wed 4
[Course code] T1U040001
[Room] Bldg.Eng2-102, Bldg.Eng17-113
(Bldg. ENG-2 cannot be used during 2014 fall semester.)
[Course description] This course presents the fundamentals of digital signal processing which is necessary for information and imaging system design, computer vision, and computer graphics by mainly focusing on the color image processing.
[Course objectives]
Introduce the students to the fundamentals of digital image processing and provide them with the essential knowledge about the main themes, so that, the students will be able to create programs.
The specific objectives are as follows:
(1) Understanding input and output methods of digital images.
(2) Understanding differences between binary, color, and multi-spectral images.
(3) Understanding simple image processing in the image and the frequency spaces, and implementing it.
(4) Applying their knowledge to a three-dimensional image processing and video image processing.
Review what we studied for the exam and confirm the achievement of the target.
[Plans and Contents]
1. Overview
2. 2 Input and output of images
3. Image space and frequency space
4. Spectral image and color image
5. Digital halftoning
6. Image coding
7. Image quality improvement (1)
8. Image quality improvement (2)
9. Binary image processing
10. Feature extraction
11. Three-dimensional image processing
12. Video processing
13. Image recognition
14. Image processing practice
15. Summary and The end-term exam

[Textbooks and Reference Books] Hideyuki Tamura, “Computer Image Processing”, Ohmusha.
[Evaluation] Evaluation given by Report writing (50%) and End term exam (50%)
[Related courses] Visual Information Processing. Processing and Analysis of Color Image. Theory of Image Analysis System. Images and Human Sensitivity. Image Electronics. Digital Imaging System. Fourier Transform for Image. Pattern Recognition. Digital Signal Processing. Computer Graphics. Information Theory.
[Course requirements]
Students should preferably be taking courses like “Visual Information Processing” and “Processing and Analysis of Color Image”.

画像産業汎論 Introduction to Imaging Industry
[Instructor] Each teacher
[Credits] 2
[Semester] 3rd year-Fall Fri 5
[Course code] T1T041001
[Room] Bldg.Eng17-113
[Course enrollment] 100
[Course description] Specially invited speakers will give lectures advanced topic related to imaging industry. All the speakers are active researchers/engineers in the enterprises related to image and information industries.
[Course objectives] Understanding recent trends in image and related technology and industry. Lectures by top researchers/engineers in image-related industries will deepen and fix your knowledge about image science.
[Plans and Contents] Researchers and engineers who all work actively in imaging and the related industries will introduce advanced topics in their fields weekly in a lecture style.
1. Guidance (Attn: corresponding teacher)
2 - 15. Lectures by specially invited speakers.
[Keywords] Image Science, Image Industries
[Evaluation] Write a report on the lecture in last 10 min of every lecture. Attendance and the reports will be evaluated
[Remarks] Candidates should pay attention to the latest information about this class. The information will be given through e-mail and the bulletin board.

データベース　Data　Base
[Instructor]Kouji Kajiwara
[Credits] 2
[Semester] 3rd year-Fall Mon 5
[Course code] T1U048001
[Room] Bldg.Eng. 2-102
(Bldg. ENG-2 cannot be used during 2014 fall semester.)
[Course objectives]　Lecture has two themes, “data representation” and “Data operation” of Data processing function of computers and for each theme, there will be systematic description from ”data representation” to ”record representation” then to ”representation between records”。
[Plans and Contents]　Development of data processing function, data representation method, record representation method, representation between records, record and file, sequential file, direct file, indexed sequential file, overview of database, data model in general, internal representation of data, independence of data and How to use data base system.
[Evaluation]Evaluation will be given by report writing and examination

心理物理学　Psychophysics
[Instructor] Naokazu Aoki
[Credits] 2
[Semester] 2nd year-Fall, Wed 3
[Course code] T1T049001
[Room]Bldg. GEN A-4F: Data processing room 2
[Course description] Psychophysics is the scientific study of the relation between physical stimuli and their subjective correlates, or percepts, to study the effect on a subject's experience or behavior of systematically varying the properties of a stimulus. Psychophysical function, or brain function.　Signal detection theory and psychophysical scaling, perception, learning, and behavior problems are solved. It has been able to applicable to many variety of field of science and technology. Lecture on application and utilization of psychophysics methods in the some image fields. And task with related problems, measurement and experiment.
[Course objectives] Understand relations of image and visual information, organ information, perception, recognition. Conduct some psychophysical experiments and statistical data processing and analyses in quantitative point of view.
[Plans and Contents] To explain about a psychological concepts and psychophysics.

1. The summary
2. The statistics basics
3. Regression analysis
4. Analysis of variance・ Experimental design
5. Classical Psychophysical methods・The measurement of the sensitivity
6. Detection & Discrimination
7. Signal detection & ROC curves
8. Comparison judgment
9. Magnitude estimation・Psychometric function
10. Scaling
11. Ratio scaling
12. Two-alternative forced choice method・Standardized rank method
13. Factor analysis
14. Semantic Differential
15. Application of psychophysics
16. Examination（Bring scientific calculator ）

[Keywords] Psychophysics, Perception, Semantic Differential
[Textbooks and Reference Books] “Psychophysics”: F.A.A. Kingdom & N. Prins, Academic Press (2010)
[Evaluation] Evaluated by data analysis of the psychophysics, a problem about the item about the

画像技術史 Development of Imaging Technology
[Instructor] (Tetsuro Kuwayama)
[Credits] 2
[Semester] 4th year-Spring Wed 4,5
[Course code] T1T050001
[Room] Bldg. Eng. 2-202
※Basically, the lecture will be held 4 and 5 period on Wednesday every other week.
[Course enrollment] No limit
[Candidate] Students of faculty of Engineering, other Faculties, and Specially Registered Non-Degree Student.
[Course description] At this lecture, it aims deep understanding from various angles on the theme of "What is a picture." Questions are welcome within and after lectures.
[Course objectives] Digital imaging technology is rapidly progressing, and various imaging devices have appeared. It is useful to go back to foundations and to think the principle question “What is image” in history of technology. At this lecture, an understanding of to the whole imaging technology is deepened using the viewpoint of the history of technical.
[Plans and Contents] (1) Introduction of information image technology history and significance / What is image ? / Integrated understanding of “recording” and “communication”, (2) Problem of “size” and “shape” in images part 1 / perspective and its history, (3) Problem of “size” and “shape” in images part 2 : Anamorphosis, (4-6) Depth component : Stereo photography and stereo image, holography, various 3-dementional imaging technology, (7-9) Movement component : thaumatrope, phenakistoscope, invention of cinema, and the history of television, (10-11) Capture and reproduction of brightness in photography and printing, black area on television image, (12-14) Capture and reproduction of color component : The history of color theory history, color photograph, color printing, color television, (15) The conclusion of all the lectures : ”What is image ? :
[Textbooks and Reference Books] Handouts provided in lecture
[Evaluation] A simple report shall be submitted for every lesson. Evaluation is based on attendance and the contents of reports.
[Course requirements] None in particular
[Remarks] In 2014, lecture is held on every other Wednesday 4th and 5th period, from April 17. There may be changes in the schedule and please check the web site or ask by mail.
[Keywords]
Color television Anamorphosis Thaumatrope Phenakistoscope Praxinoscope Stereoscope Invention of moving picture

広報媒体論 Study on Mass Media
[Instructor] (Masashi Wada)
[Credits] 2
[Semester] 4th year-Spring Fri 3
[Course code]T1T051001
[Room] Bldg. Eng- 9-106
[Candidate] The person who are interested in social communication and media business by the advertising revenue models and the latest information technology (IT), and who attempt to study about the marketing communication theories and media sociologies. Students in the other departments in this faculty and the Specially Registered　Non-Degree Student are also very welcome.
[Course description] Marketing communications including the advertising and PR (Public Relations) activities are very old media business. “Publicity” started as ”cryouts” in Babylonian oral information, handmade posters, then came the mass media age, which includes the printed media (papers and magazines) , the electric-communication （telephone, telegrams）, and the broadcasting（radio, TV）. The mobile and internet media are rapidly emerging today. In this class, we will discuss the media technologies and business development, the changes of contents and commercial messages, and the today’s digital media business or media environment in our social life.
[Course objectives]　[general]：After attending this class, you will able to : Be familiar with the history of advertising and PR media technology’s changes, have a good understanding of media technologies and business, know the difference between advertising and PR. [specific] ：Overview of the printing to electronic papers, the publicity media changes, the largest media “TV advertising” business, the theories on audio-visual communication analysis, and the advertising effect theories. The discussion will include such the latest technologies like mobile, net movie, SNS, Buz/ WOM communications, and the so-called content marketing.
[Plans and Contents]　The schedule and content are subject to alteration.

1. Guidance: Current situation of the information media industry and advertising business
2. 4,000 years of history in advertising, public relations and journalism – In tandem with the development of media technologies
3. From Gutenberg printing (15th century) to the advent of electronic books (2010)
4. Media as a “telephone” and “radio” – Communication business and advertising broadcast model (free model)
5. Post-war expansion of Japanese broadcast media and advertising market – Commercial broadcasting and commercial TV and terrestrial digital broadcasting
6. Short history of TV CM (1) 1953-1974 – Expression trend towards rapid growth from the beginning
7. Advertising strategy of images and videos and measurement of effects – Ratings survey system and DAGMAR theory
8. Low involvement theory” of TV CM and buying behavior model
9. Short history of TV CM (2) 1975- 1995 – After TV advertising surpassed print advertising
10. Single source concept and “Big Data” age – Integration of POS system (buying) and ratings (contact)
11. Short history of TV CM (3) 1995-2010 – Imaging environment after the commercialization of the Internet
12. TV media theory based on IMC (Integrated Marketing Communications) and brand theory
13. Media theory of OOH (Out Of Home), mobile and digital signage
14. Internet & Web2.0 – Media theory of CGM (Consumer Generated Media)
15. Contact point and cross media – Considering a new media, eco-system

[Keywords] communication, media, technology, technology and society, advertising and public relations
[Textbooks and Reference Books] Not specified in particular. Lesson materials shall be distributed for each lesson and required reference books and publications will be introduced on each occasion.
[Evaluation] Submission of final report (70%) and minute paper during lessons (about 6 times: 30%)
Statistical analysis and the psychophysics experiment problem and the term-end examination about the required item.
[Related courses] Visual Information Processing (T1T038001),　Multivariate Analysis (T1U023001)
[Course requirements] Nothing in particular

画像科学演習 I　Seminar on Image sciences I
[Instructor] Each teacher
[Credits] 1
[Semester] 4th year-Spring Intensive
[Course code] T1T052001
[Room]
[Candidate] 4th year of Department of Image Sciences
[Course description]Conducted through seminars and tutorials in the assigned research laboratory
[Course objectives] Aim to acquire basic knowledge and problem solving skills that are crucial for undertaking graduation research and improve research presentation skills etc.
[Plans and Contents] Solve basic engineering problems related to image science in the assigned research laboratory during graduate research. Reading and comprehension of mainly English reference books and papers on image science.
[Evaluation] Evaluation to be based on presentations and reports.
[Related courses] Seminar on Image sciences II, Graduate Research
[Course requirements] Satisfy requirements for registration under graduation research.

メディアアート Media Art
[Instructor] (Shigeru Sato)
[Credits] 2
[Semester] 4th year-Spring Intensive
[Course code] T1T054001
[Room] Bldg.Eng.9-206
[Course description] This course is designed to provide a basic understanding of expression techniques in visual media like Film, TV and Video, such as photographing, editing and color grading. Additionally practical training is given to learn basic knowledge and skills for movie making.
[Course objectives] The purpose of this course is giving students knowledge about how to read creator's intention from the visual contents. This may inspire students to use visual media as a means of self-expression.
[Plans and Contents] Lecture and Practical training. In the lecture, expression techniques such as photographing (angle, frame size, camera position), POV shot, visual guidance, light, editing (continuity editing, montage, etc.), texture of the film (color grading), compositing and sound will be discussed. In practical training, theme-based exercise with computer will be conducted to learn basic skills for movie making.
[Keywords] visual media expression, movie making, film grammar
[Textbooks and Reference Books] None in particular
[Evaluation]Overall evaluation to be based on topics and tests conducted during the lessons and attendance.
[Remarks] Expected start date: September 1st-5th 2014

画像解析 Design and Evaluation of Image Quality
[Instructor] (Satoh Nobuo)
[Credits] 2
[Semester] 4th year Fall Fri 5
[Course code] T1T055001
[Room] Bldg.Eng 15-109
[Course description] Learning essential technology of "measure" for Image science (or engineering), from the basics of electrical and electronic circuits, and processing signal detection by the sensor. It also treats as a subject of study a microscope to obtain the imaging of micro and nano-scale.
[Course objectives]
Measurement engineering has contributed greatly to the development of science and technology. In other words, the support of the theory and techniques, it must prove the measurement result by the experimental demonstration with reproducibility.
[Plans and Contents]
The success or failure of the measurement is determined by the accumulation of result, you need correctly using the instruments, you are obtained properly validate data. For the appropriate science and engineering in the future, we have to develop and achieve the method of evaluation for the physics theory and the instrument for measurement while also affected by progress in other fields. Especially, it will be also continued development of measurement tools.
Electrical and electronic measurement is a useful knowledge to students who are learning the design and evaluation of image quality. This means that in the measurement engineering, and emphasis for first is located in the basic format is electrical and electronic measurement, voltage and current measurement and physical quantity conversion by the sensor is closely related. In order to understand the operation of measuring instrument by right man in the right place as the measurement technique, we apply to interest the field as you can learn the case of the microscope.
1. Guidance
2. Basis of electrical circuit
3. Impedance
4. Principle of electrical measuring instrument
5. Laplace transformation
6. Fourier transformation
7. Sensor
8. Noise and signal
9. Operational amplifier
10. Lock-in amplifier
11. Optical microscope
12. Scanning electron microscope
13. Scanning probe microscope
14. Application of scanning probe microscope
15. Test

[Keywords]Electric circuit, Sensor, Semiconductor, Filter, Microscopy.
[Textbooks and Reference Books] Not specified. (Material that has been created by the instructor will be distributed.)
[Evaluation] Evaluation to be based on Attendance, exam
(Remarks) The instructor has been changed from 2014.If you have further question, please contact the following e-mail (satoh.nobuo + @ + it-chiba.ac.jp). Post address, 2-17-1 Tsudanuma, Narashino, Chiba 275-0026.

ディジタル映像システム Digital Imaging System
[Instructor] (Toshiharu Kurosawa)
[Credits] 2
[Semester] 4th year-Fall Intensive
[Course code] T1T056001
[Room] Bldg.Eng. 9-206
[Course description] Overview on digital technology and development of Audio Visual image system, with changes in society, characteristics in recent digital AV system structure and characteristics of images・AV process technology and high-end including recent topic
[Course objectives] Looking at the evolving digital AV system from basic to high-end, interactive course to deeper understand way of thinking and research ability necessary for engineering.
[Plans and Contents] digital technology has various element of　technology and evolving fast with AV system changing from analogue to digital. TV changes from terrestrial to digital, in its beginning of 2006, started pursuit of more beautiful expression of AV, TV and PC media mix and networking. AV material recorded digital, edited on digital, more convenient, compiled and transported, they are everywhere and always new.　Looking over development of digital AV system, looking at the most familiar AV device, TV, from analogue technology to digital technology, change in AV device with the society of digital, AV system structure, digital AV format, digital AV encoding, technology, input/output AV device, its basic and characteristics, digital AV process technology and hi-end technology, patent rights from basic to applied to hi-end technology will be discussed, Will the organic EL make the history of TV? Will the 3rd wave of 3dtv come to our daily lives? What comes next to world war for standardization? How far can TV go?
[Keywords] Digital video equipment, digital imaging, image coding, image evaluation technology, image device, TV display, standard norm
[Evaluation] Evaluation to be based on attendance record, participation record, report score.
[Remarks]
Toshiharu Kurozawa (Part-time, ex-Matsushita Electric Industries, Coordinator: Tokumichi Tsumura) The schedule for 2014 will be informed.

画像科学演習 II　Seminar on Image sciences II
[Instructor]Each teacher
[Credits] 1
[Semester] 4th year-Fall Intensive
[Course code] T1T057001
[Room]
[Candidate] 4th year of Department of Image Sciences
[Course description] Seminars and exercise in laboratories
[Course objectives] Students will have the skill for basic knowledge and problem solving ability for their graduation study. To improve presentation ability in investigation
[Plans and Contents]　Students will belong to laboratories and investigate on a problem related to Image Science. Read reference and papers in Image Science in English.
[Evaluation] Evaluation to be based on presentations and reports.
[Related courses] Seminar on Image sciences I, Graduate Research
[Course requirements]
Satisfy the requirements for registration under graduation research.

卒業研究 Graduate Research
[Instructor]Each teacher
[Credits] 8
[Semester] 4th year-Spring-Fall
[Course code]T1T058001
[Room]
[Course objectives] Most important in Department of Image Sciences aim to build application skill, investigation skill.
[Plans and Contents] Students will belong to laboratories and investigate on a theme. In research, each teaching staff will instruct students. Final presentation to be evaluated.
[Evaluation] Research, paper, presentation
[Course requirements] Vary by the entrance year, confirmation required when registering in this course.

画像物理化学 I Physical Chemistry for Image ScienceI
[Instructor] Fumiyuki Shiba
[Credits] 2
[Semester] 2nd year-Spring Fri 2
[Course code] T1T060001
[Room] Bldg.Eng.5- 104
[Course enrollment] 60
[Course description] chemical kinetics and chemical equilibrium
[Course objectives] This course aims understanding the concepts of chemical kinetics and reaction rate by mathematically describing chemical processes from a phenomenological standpoint.
[Plans and Contents] The class uses the following textbook (chapters 7 - 11.). Schedule is

1. Guidance for the class; physical quantities and units
2. Chemical kinetics: Fundamentals of chemical kinetics
3. Chemical kinetics: Rate equations, Part I
4. Chemical kinetics: Rate equations, Part II
5. Chemical kinetics: Temperature dependence of reaction rate
6. Chemical kinetics: Explanations for Arrhenius equation
7. Chemical kinetics: Insights for rate equations
8. Chemical kinetics: Reaction mechanisms and rate equations
9. Chemical kinetics: Derivation of rate equations
10. Chemical equilibrium: Fundamentals of chemical equilibrium
11. Chemical equilibrium: Expression of chemical equilibrium
12. Chemical equilibrium: Application of chemical equilibrium, Part I (acid-base equilibrium)
13. Chemical equilibrium: Application of chemical equilibrium, Part II (solid-liquid equilibrium and solubility)
14. Chemical equilibrium: Application of chemical equilibrium, Part III (complex equilibrium)
15. Conclusion
16. End term exam

[Keywords] Reaction rate, Rate constant, Reaction order, Arrhenius equation, Activation energy, equilibrium constant, chemical potentioal
[Textbooks and Reference Books] P. W. Atokins and J. de Paula, Elements of Physical Chemistry, 5th ed. (Japanese ed. trans. by H. Chihara and A. Inaba), Tokyo Kagaku Dojin (2012).
[Evaluation] Evaluation is based on both the end term exam (70%) and homework (30%).
[Related courses] Fundamental Chemistry A
[Course requirements] Review the curriculum in Fundamental Chemistry A.
[Remarks] This course serves as a replacement for Physical Chemistry for Image Science（target for 08T～12T ）

画像解析学 I　Image Analysis I（旧　人間と画像）
[Instructor]Hiroyuki Kobayashi
[Credits] 2
[Semester] 2nd year-Spring Mon 3
[Course code] T1T061001
[Room] Bldg.Eng.9-106
[Course enrollment] Compulsory
[Course description] Explain brightness and color in recording of information, image output and observing process in photographs or digital photograph information
[Course objectives] Along with “Image Analysis II” class for 3rd year, from image input to output and observation process, students are encouraged to improve ability to examine photo system in its whole. This class helps understand about color and brightness.
[Plans and Contents]
1. Image system: From input to recognition
2. Basic knowledge for learning about colors: Spectrum energy distribution, spectral reflectivity, spectral permeability, visible light, white light, monochromatic light, three primary colors theory
3. Light source: Black-body radiation spectral, normal light
4. Practical light source: Incandescent lamp, fluorescent lamp
5. Digitization of brightness 1: Radiation volume (radiant flux, radiation power, radiance, irradiance)
6. Measured luminous quantity (luminous flux, intensity, brightness, illuminance, exposure)
7. Color coding: Munsell color system, three elements of color
8. Digitization of color 1: RGB color system, isochromatic experiment, isochromatic function
9. XYZ color system, xy chromaticity diagram, linearity
10. McAdams’ ellipse, uniform chromaticity diagram, uniform color space
11. Color reproduction: Conditional is chromaticity, colorimetric color reproduction, spectroscopic color reproduction, color mixing
12. Color reproduction using additive mixture of colors (spectral sensitivity of required image input system)Color reproduction of monitor, gamma correction, linear RGB, monitor RGB
13. 3-color decomposition, realization of negative spectral sensitivity
14. Color appearance: Constancy, adaptive unique color, clashing color, sense of color model

[Keywords] Brightness, color
[Evaluation] Mini-test will be carried out for each lesson (together with attendance taking). For those who satisfy the stipulated attendance ratio, evaluation shall be carried out based on the mini-test results and attendance ratio on a 75:25 weightage.
[Course requirements] Compulsory

工学国際英語 IA　Technical English for Engineering IA
[Instructor] Naokazu Aoki
[Credits] 1
[Semester] 1st, 2nd year-Spring
[Course code] T1T063001
[Room]
[Course description] Acquire basic skills in engineering English through e-learning courses. Learning is carried out by accessing the university server from a personal or university PC.
[Course objectives] Acquire Engineering English Skill, to read English books with terms of engineering, to write papers in English, to achieve “Industrial English Certificate of 3rd Level”. Extensive e-learning course available for students to cover their weak points.
[Plans and Contents]
1. e-Larning course based on the text of Technical English for Engineering
[Evaluation] e-Larning and examination at the end of the term.
[Remarks] This class is for Department of Image Sciences only, make confirmation as to if you will accredited for graduation at guidance by taking this course.

工学国際英語 IB　Technical English for Engineering IB
[Instructor] Naokazu Aoki
[Credits] 1
[Semester] 3,4th year Spring-Fall
[Course code] T1T064001
[Room]
[Course description] Acquire basic skills in engineering English through e-learning course. Learning is carried out by accessing the university server from a personal or university PC.
[Course objectives] Acquire standard English Skill, to read English books with terms of engineering, to write papers in English, to achieve “Industrial English Certificate 2nd level. Extensive e-learning course; Technical English for Engineering IIA-D available for students to cover their weak points.
[Plans and Contents]
1. e-Larning course based on the text of Technical English for Engineering
[Evaluation] e-Larning and examination at the end of the term.
[Related courses] Technical English for Engineering IA
[Course requirements] It must be taken Technical English for Engineering IA in enrolled student for 2013
[Remarks] This class is for Department of Image Sciences only, make confirmation as to if you will accredited for graduation at guidance by taking this course.

工学国際英語 IIA　Basic English for Engineering IIA
[Instructor] Yusuke Okawa
[Credits] 1
[Semester] 1.2.3.4year-Spring, Fall Intensive
[Course code]T1T065001
[Room]
[Course description] Acquire basic skills in engineering English through e-learning course by Alc. Learning is carried out by accessing the university server from a personal or university PC.
[Course objectives] Acquire standard English skill, to read English books with terms of engineering, to write papers in English.　Extensive e-learning course is available for students to cover their weak points.
[Plans and Contents] e-Larning course based on Alc for English for technology and engineering.
[Evaluation] e-Learning and examination at the end of the term.
[Remarks] This class is for Department of Image Sciences only.　Make confirmation as to if you will accredited for graduation at guidance by taking this course.

工学国際英語 IIB　Basic English for Engineering IIB
[Instructor] Naokazu Aoki
[Credits] 1
[Semester] 1.2.3.4year-Spring, Fall Intensive
[Course code] T1T066001
[Room]
[Course description] Acquire basic skills in engineering English through e-learning course by Alc. Learning is carried out by accessing the university server from a personal or university PC.
[Course objectives] Acquire standard English skill, to read English books with terms of engineering, to write papers in English. Extensive e-learning course is available for students to cover their weak points.
[Plans and Contents] e-Larning course based on Alc for English for technology and engineering.
[Evaluation] e-Learning and examination at the end of the term.
[Remarks] This class is for Department of Image Sciences only.　Make confirmation as to if you will accredited for graduation at guidance by taking this course.

工学国際英語 IIC　Basic English for Engineering IIC
[Instructor] Yusuke Okawa
[Credits] 1
[Semester] 1.2.3.4year-Spring, Fall Intensive
[Course code] T1T067001
[Room]
[Course description] Acquire basic skills in engineering English through e-learning course by Alc. Learning is carried out by accessing the university server from a personal or university PC.
[Course objectives] Acquire standard English skill, to read English books with terms of engineering, to write papers in English.　Extensive e-learning course is available for students to cover their weak points.
[Plans and Contents] e-Larning course based on Alc for English for technology and engineering.
[Evaluation] e-Learning and examination at the end of the term.
[Remarks] This class is for Department of Image Sciences only.　Make confirmation as to if you will accredited for graduation at guidance by taking this course.

工学国際英語 IID　Basic English for Engineering IID
[Instructor] Yusuke Okawa
[Credits] 1
[Semester] 1.2.3.4year-Spring, Fall Intensive
[Course code]T1T068001
[Room]
[Course description] Acquire basic skills in engineering English through e-learning course by Alc. Learning is carried out by accessing the university server from a personal or university PC.
[Course objectives] Acquire standard English skill, to read English books with terms of engineering, to write papers in English.　Extensive e-learning course is available for students to cover their weak points.
[Plans and Contents] e-Larning course based on Alc for English for technology and engineering.
[Evaluation] e-Learning and examination at the end of the term.
[Remarks] This class is for Department of Image Sciences only. Make confirmation as to if you will accredited for graduation at guidance by taking this course.

国際実習　International Practical Training
[Instructor] Shigeru Takahara
[Credits] 2
[Semester] Spring-Fall
[Course code] T1T069001
[Candidate] 4th year of Department of Image Sciences
[Course description] This is a course to acknowledge international activities such as international conferences related to Image Sciences that are held overseas, practical training in overseas research institutions such as universities and research centers etc.
[Course objectives] The course aims to cultivate the students' skills in advancing international activities and widen the students' perspective through practical Image Sciences training overseas such as international conferences, practical activities and workshops in overseas research institutions like universities and research centers, short-term overseas studies and so on.
[Plans and Contents] International activities such as international conferences, practical activities and workshops in overseas research institutions like universities and research centers, short-term overseas studies, overseas oral presentations, practical work and report writing upon return and so on will be the subject of evaluation for the certification.
[Evaluation] Evaluation shall be carried out by the supervising faculty member or program teaching staff and credits shall be awarded based on submitted documents.
[Remarks] Those who wish to register for the International Practical Training should not register for this course. Those who passed the evaluation criteria after the practical training will be registered for the course subsequently by the faculty member in-charge. International practical training can be taken even if the upper limit of the number of registered credits has been reached. (These credits will not be counted in the registered credit limit)

フーリエ解析　Introduction to Fourier analysis
[Instructor]Katsuhiko Miyamoto
[Credits] 2
[Semester]3rd year-Spring Fri 4
[Course code]T1T070001
[Room] Bldg. Eng9-206
[Course enrollment] 70
[Course description]
The Fourier analysis is one of the mathematical tools in the applied-analysis. This lecture introducing basic principle of a Fourier analysis using a mathematic, it has broader theoretical underpinning and includes the analysis of a physical phenomenon.
[Course objectives]
The main purposes and objectives of this lecture are:
(1)Fundamental mathematics (calculus, differential equation, function of a complex variable)
(2)The time-frequency analysis using a Fourier transform
(3)Solution of a differential equation in the physical phenomenon
[Plans and Contents]
1. Introduction
2. Periodic function
3. Fourier series expansion
4. Convergence of Fourier series expansion
5. Calculus of Fourier series expansion
6. Complex Fourier series expansion
7. Linear system analysis
8. Dirac delta function
9. Fourier transform
10. Complex Fourier Transform
11. Parseval's identity
12. Fourier transform of a super function
13. Partial differential equation
14. Wave equation
15. Thermal diffusion equation
16. End-term Exam

[Keywords]
Fourier transforms Partial differential equation
[Textbooks and Reference Books]
Reference Books, Fourier analysis, S. Ohishi, (IWANAMI-SHOTEN), Fourier analysis, R. Fukuda, (IWANAMI-SHOTEN)
[Evaluation]Practical Training, The mid-term Exam, the End-term Exam,
[Remarks] contact:　k-miyamoto@faculty.chiba-u.jp

画像物理化学 II Physical Chemistry for Image Science II
[Instructor] Yusuke Okawa
[Credits] 2
[Semester] 3rd year-Spring Tue 3
[Course code]T1U038001
[Room] Bldg.Eng. 5-104
[Candidates] Students of faculty of Engineering, other Faculties, and Specially Registered Non-Degree Student..
[Course description]
In the first half, we reexamine the equilibrium theory that you learned as a phenomenology in "Physical Chemistry for Image Science I", based on thermodynamic quantities introduced in "Introduction to Thermodynamics and Statistical Mechanics." In the latter half, we apply quantum mechanics to molecules and discuss the fundamental behavior of electrons in molecules.
[Course objectives] Understanding chemical equilibria based on thermodynamic functions. Understanding behavior of electrons in molecules from quantum theory.
1. Chemical thermodynamics: Gibbs energy and direction of the changes
2. Chemical thermodynamics: The phase equilibrium of the pure substances
3. Chemical thermodynamics: Mixtures and chemical potential
4. Chemical thermodynamics: Colligative properties of solutions
5. Chemical thermodynamics: Thermodynamics of chemical equilibria
6. Electrochemistry 1: Electrolyte solutions
7. Electrochemistry 2: Equilibrium electrochemistry, Oxidation-reduction equilibria and batteries
8. Mid-term exam
9. Quantum theory of molecules 1: Review of quantum theory, electron in a box, and a hydrogen atom
10. Quantum theory of molecules 2: Valence bond theory and hybridized orbitals
11. Quantum theory of molecules 3: Molecular orbital method (1) LCAO and hydrogen molecules
12. Quantum theory of molecules 4: Molecular orbital method (2) Homonuclear diatomic molecules
13. Quantum theory of molecules 5: Molecular orbital method (3) Heteronuclear molecules, Hückel approximation
14. Quantum theory of molecules 6: Molecular orbital method (4) Free electron model
15. Spectroscopy basics: Electron transition, ultraviolet-visible absorption, and fluorescence
16. End term exam

[Keywords] Chemical thermodynamics, Chemical equilibria, Electrochemistry, Quantum chemistry, Spectroscopy
[Textbooks and Reference Books] P. Atkins, J. de Paula, "Elements of Physical Chemistry" (Japanese translation available)
[Evaluation] Examinations are essential. Submission of reports for quizzes will be added to evaluation up to 20%.
[Related courses] Fundamental Chemistry A, Physical Chemistry for Image Science I, Introduction to Thermodynamics and Statistic Mechanics, Introduction to Quantum Mechanics, Chemistry of Photochemical Reactions

画像解析 Design and Evaluation of Image Quality
[Instructor] Nobuo Satoh
[Credits] 2
[Semester] 4th year Fall Fri 5
[Course code] T1T055001
[Room] Bldg.Eng - 15-109
[Course description] Learning essential technology of "measure" for Image science (or engineering), from the basics of electrical and electronic circuits, and processing signal detection by the sensor. It also treats as a subject of study a microscope to obtain the imaging of micro and nano-scale.
[Course objectives]
Measurement engineering has contributed greatly to the development of science and technology. In other words, the support of the theory and techniques, it must prove the measurement result by the experimental demonstration with reproducibility.
[Plans and Contents]
The success or failure of the measurement is determined by the accumulation of result, you need correctly using the instruments, you are obtained properly validate data. For the appropriate science and engineering in the future, we have to develop and achieve the method of evaluation for the physics theory and the instrument for measurement while also affected by progress in other fields. Especially, it will be also continued development of measurement tools.
Electrical and electronic measurement is a useful knowledge to students who are learning the design and evaluation of image quality. This means that in the measurement engineering, and emphasis for first is located in the basic format is electrical and electronic measurement, voltage and current measurement and physical quantity conversion by the sensor is closely related. In order to understand the operation of measuring instrument by right man in the right place as the measurement technique, we apply to interest the field as you can learn the case of the microscope.
1. Guidance
2. Basis of electrical circuit
3. Impedance
4. Principle of electrical measuring instrument
5. Laplace transformation
6. Fourier transformation
7. Sensor
8. Noise and signal
9. Operational amplifier
10. Lock-in amplifier
11. Optical microscope
12. Scanning electron microscope
13. Scanning probe microscope
14. Application of scanning probe microscope
15. Test

[Keywords] Electric circuit, Sensor, Semiconductor, Filter, Microscopy.
[Textbooks and Reference Books] Not specified. (Material that has been created by the instructor will be distributed.)
[Evaluation] Evaluation to be based on Attendance, exam
(Remarks) The instructor has been changed from 2014.If you have further question, please contact the following e-mail (satoh.nobuo + @ + it-chiba.ac.jp). Post address, 2-17-1 Tsudanuma, Narashino, Chiba 275-0026.

応用光学 Applied Optics（レーザ工学　Laser Engineering）
[Instructor] Mitsuhiro Tateda
[Credits] 2
[Semester] 3rd year-Spring Tue 4
[Course code] T1T073001
[Room]Bldg.Eng.9-107
[Candidate]Students of faculty of Engineering, other Faculties, and Specially Registered Non-Degree Student
[Course description] Explain the behavior of light from both sides of the geometrical optics called beam approximation and the wave optics based on the electromagnetic theory, and introduce the various applications of optics.
[Course objectives] (Purpose)
To understand the properties of the optical system such as reflection, refraction and lens action of light by geometrical optics which treats light as a straight line. In addition, have a better understanding of the properties of light such as diffraction, interference using the wave optics which handles light as a wave.
(Subject) Explain the fundamental characteristics of light from the view point of the geometrical optics and explain other various behavior of light from the view point of the wave optics.
[Plans and Contents]
1. Law of reflection and refraction of light rays, Thin lens
2. Lateral magnifications of lens, Telescope, Microscope
3. Aberration
4. Light as a wave, Fermat's principle
5. Fresnel formulae on transmission and reflection (1)
6. Fresnel formulae on transmission and reflection (2)
7. Interference of light
8. Diffraction of light
9. Resolution
10. Holography and optical fiber communication
11. Polarization and birefringence
12. Optical activity
13. Maxwell's equations
14. Dielectric constant and polarization
15. Summary and testing

[Keywords] ray, reflection, refraction, lens, aberration, wave, interference, diffraction, polarized light, birefringence
[Textbooks and Reference Books] 1) Kozo Ishiguro, “Optics”, Shokabo, Selected books on fundamental physics, No. 25.
2) Hiroshi Kubota, “Optics”, Iwanami.
3) Hiroshi Kubota, “Optics”, Iwanami.
4) Max Born and Emil Wolf, “Principles of optics”, translated by Toru Kusakawa and Hideshi Yokota, Tokai University Press
[Evaluation Methods and Criteria] Overall evaluation based on attendance and test results. An understanding of 60% or more of the basic items in applied optics shall be a requirement for a pass.
[Related courses] Electromagnetics
[Course requirements] None in particular

光反応化学　Chemistry of photochemical reaction
[Instructor] Shigeru Takahara
[Credits] 2
[Semester] 3rd year-Spring Mon 4
[Course code] T1T074001
[Room] Bldg.Eng.9-106
[Candidate] 3rd year of Department of Image Sciences, and Students of Faculty of Engineering, and, Other department's students, and specially registered non-degree students
[Course description] Energy or information of light from photo excited material can be used in various ways. Its electron or energy transfer, the concept of photoreactive material, photoresist, photorecording material, display material, and the material design will be lectured.
[Course objectives] Basic photochemisty concepts will be lectured, and explained of the relation to application such as the information material and imaging materials.
[Plans and Contents]
1. Introduction - Outline of photochemical reactions and applications
2. Absorption of photon and excited state
3. Emission from the excited state of organic molecules, and spin state
4. Photochemical reaction and spin - Photocleavage reaction
5. Photochemical reaction of carbonyl compounds - Photocleavage and hydrogen abstraction
6. Mechanism of photochemical reaction - Reactive intermediate (I)
7. Mechanism of photochemical reaction - Reactive intermediate (II)
8. Photochemical reaction of alkene and alkyne – Photodimerization reaction
9. Review classes for 1st-7th week. Examination at the middle of the term takes place.
10. Photosensitiztion – Energy transfer
11. Photochemical reaction of oxygen molecule
12. Photosensitization – Electron transfer
13. Photoinduced electron transfer and proton transfer
14. Photopolymerization
15. Photocrosslinking and photoinduced deprotection reaction
16. Photochemical reaction in a living body

Review classes for 8th-15th week. Examination at the end of the term takes place.
[Keywords] Photochemistry, Absorption, Photodegradation, Photocuring, Emission, Exciplex, Display, Printing, Lithography
[Textbooks and Reference Books]
Photochemistry, C. E. Wayne, R. P. Wayne, Oxford University Press, 1996, ISBN0-19-855886-4; Modern Molecular Photochemistry, N. J. Turro, University Science Books, 1991, ISBN0-935702-71-7; Reactive Intermediate Chemistry, Edited by R. A. Moss, M. S. Platz, M. Jones Jr., John Wiley & Sons, 2004, ISBN 0-471-23324-2; Introduction to Liquid Crystal, P. J. Collings, M. Hird,Taylor & Francis, 1997, ISBN 0-7484-0483-X; Photoinitiators for Free Radical, Cationic and Anionic Photopolymerization, 2nd Edition, J. V. Crivello and K. Dietliker, G. Bradley Ed., Jhon Wiley and Sons, NewYork (1988), ISBN 0-471-97892-2; Photoreactive Polymers: The Science and Technology of Resist, Arnost Reiser, Jhon Wiley and Sons, New York (1989), ISBN 0-471-85550-2;　Handbook of Photochemistry, Second Edition, Revised and Expanded, S. L. Murov, I. Carmichael, G. L. Hug, Marcel Dekker, 1993, ISBN 0-8247-7911-8.
[Evaluation] Attendance required more than 11/15. Report for specific task：mid-term examination for the first half of the class：examination at the end of the term for the latter half＝10：45：45, 100 in total, of which 60 points are in accordance with the target achievement and difficulty.
[Related courses] Laboratory Work II in Image Science
[Course requirements] As a general rule, students should have taken Basic Chemistry A & B, imaging chemistry tutorials, imaging physical chemistry and imaging organic chemistry.
[Remarks] All students should register themselves in the Moodle system in Chiba University. The small test and some lecture reports may be carried out using the system. Questions and opinions etc. are also accepted via email.

画像システム工学(Imageing System Engineering)
[Instructor] Katsuyoshi Hoshino, Ken-ichi Kuge, Shigeru Takahara
[Credits] 2
[Semester] 3rd year-Spring Thur　3
[Course code]T1T075001
[Room] Bldg.Eng- 5-105
[Course description] Lecture on Image recording process and its material design
[Course objectives] To understand image recording process along with necessary material design.
[Plans and Contents] lecture on image recording process and material design.

1. History of image-recording technology (1) – Capturing of image = camera, Formation of images using chemical reactions (a)
2. History of image-recording technology (2) – Formation of images using chemical reactions (b), Formation of images using electronics
3. Interaction between light and material for recording images (1) – Wave-particle duality of light, Absorption of light with materials
4. Interaction between light and material for recording images (2) – Color and energy of light, Change in materials absorbing light (a)
5. Interaction between light and material for recording images (3) – Change in materials absorbing light (b)
6. Energy structure of solids 1 – Insulators, semiconductors, conductors
7. Energy structure of solids 2 – Energy band structures
8. Energy structure of solids 3 – pn junctions
9. Electrophotography 1 – Electrophotographic processes
10. Electrophotography 2 – Energetics of Electrophotography
11. Photographic systems – Principles of film photography and digital photography
12. Chemical reaction of Organic molecule and Image recording system I – Principle and classification of image recording systems by using light and thermal energy: Chemical reactions used in image recording with color change
13. Chemical reaction of Organic molecule and Image recording system II – Physical and chemical property of polymer and their functions in image recording systems: Photopolymerization and photocrosslinking in photocuring materials, photosensitive CTP, 3D modeling and color printing
14. Chemical reaction of Organic molecule and Image recording system III – Organic photochemical reactions and their subsequent reactions to form negative and positive photosensitive pictures: Thermosensitive recording systems of thermal printer, thermal mode CTP
15. Chemical reaction of Organic molecule and Image recording system IV – Thermal reactions by photothermal conversion: Recording system of digital printing plate, CTP
16. Term examination

[Keywords] Image recording techniques、Photographic systems、Band structures、Electrophotography、 Chemical reactions of organic molecules and image recording
[Textbooks and Reference Books] Original handouts will be distributed for each lecture and students are required to take key notes.
[Evaluation] Overall evaluation will be based on attendance, pop quiz and the results on the final exam conducted at the end of the term. Since many questions will be posed, students are recommended to review each lesson.

画像解析学Ⅱ Image Analysis II
[Instructor] Kobayashi, Hiroyuki
[Credits] 2
[Semester] 3rd year-Spring Fri3
[Course code] T1T076001
[Room] Bldg.Eng- 5-105
[Course description] It is explained first that difference between analogue and digital images, both from engineering and sensibility viewpoint, then that quantification of image quality, its level required for human visual system, its impression effect, and cognition and visual arts.
[Course objectives] This class learns image not only from engineering view point but also from point of view of psychology and cognitive science, that is, how we see images, which impressions we receive from them, what factors are required for preference. Knowing enables to see things more in the same picture. New side of images will be revealed to students.
[Plans and Contents]
1. Analog and digital images
2. Film and image sensor 1
3. Film and image sensor 2
4. image quality 1: Tone reproduction, half-toning (concentration modulation, area modulation), required number of gradation
5. Image quality 2: Sharpness, required resolving power
6. Image quality 3: Granularity, noise
7. Image quality 4: Impression effect of image quality
8. Preferred images: Subjective evaluation, presentation method of samples, memory color
9. Impression evaluation: SD(semantic differential) method, factor analysis
10. Visual cognition 1: Visual and cognitive recognition, perception of form, figure and ground
11. Visual cognition 2: Rules on good forms, Pregnant Principle
12. Vision and image expression: Central vision, peripheral vision, color mixing, spatial properties of color vision, contrast effect, juxtaposed color mixing, equiluminant colors, optical illusion
13. Perspective: Conversion from 3D to 2D images
14. Context and recognition: Top-down processing, surrealism
15. Context in photographs: What have the photographers conveyed?

[Keywords] Image quality, Impression effect of image quality, preferred images, visual cognition, image impression learned from paintings
[Textbooks and Reference Books] R. L. Solso: Cognition and the Visual Arts, MIT, 1994; M. Livingstone: Vision and Art, ABRAMS, 2002
[Evaluation] Pop quiz will be conducted in each class (together with attendance). For those who meet the stipulated attendance ratio, evaluation shall be carried out on a 75:25 ratio for pop quiz) :(attendance).

画像物理科学Ⅲ（旧固体物性論）　Physical Chemistry for Image Science III - Electrochemistry
[Instructor] Katsuyoshi Hoshino
[Credits] 2
[Semester] 3rd year-Fall Tue 4
[Course code] T1T078001
[Room] Bldg.Eng. 9-106
[Course description] Lecture on the fundamentals of electrochemistry.
[Course objectives] This class is aimed to promote the understanding of the basic properties of electrochemical events that play a significant role in the field of image science and their application examples. Its goal is to understand the fundamentals of electrochemistry and their applications to the image science devices.
[Plans and Contents]　An introduction and explanation of various electrochemical principles and events necessary to master image science will be given.

1. Guidance – Outline of the 2nd to the 15th lectures to be conducted, understand the overall outline.
2. Electrochemical systems
3. Energy of materials and equillibrium
4. Standard electrode potential (1)
5. Standard electrode potential (2)
6. Electrode reactions (1)
7. Electrode reactions (2)
8. Electrode reactions (3)
9. Voltammetry
10. Electrochemical events
11. Electrolyte solution
12. Solid electrolyte
13. Battery
14. Photoelectrochemistry
15. Applications of electrochemistry
16. Term examination

[Keywords] Electrochemistry、Voltammetry、Electrolyte、Battery、Photoelectrochemistry
[Textbooks and Reference Books] Electrochemistry, by Tadashi Watanabe, Kiyoshi Kanamura, Hideki Masuda, Masayoshi Watanabe, Maruzen, Tokyo, 2014 (in Japanese) will be used. Original handouts will be distributed for each lecture and students are required to take key notes.
[Evaluation]　Overall evaluation will be based on attendance, pop quiz and the results on the final exam conducted at the end of the term. Since many questions will be posed, students are recommended to review each lesson.
[Course requirements] None in particular。

機器分析科学 Instrumental Analysis for Materials Science
[Instructor] Fumiyuki Shiba
[Credits] 2
[Semester] 3rd year-Fall Wed 2
[Course code]T1T045001
[Room] Bldg Eng-9-106
[Candidate] 3rd or 4th year students
[Course description] This course will introduce principles and applications of analytical instruments that can be used to evaluate image materials.
[Course objectives] This course aims to understand principles of analytical instruments on the basis of its related physical phenomena. Instruments that will be introduced may be ones that use some sorts of radiation including light, X-ray, electron beam, etc. That uses other kinds of ways, such as force, will also be introduced.
[Plans and Contents]
1. Introduction
2. Microscopy: Outline of microscopes
3. Microscopy: Optical microscopy
4. Microscopy: Electron microscopy
5. Microscopy: Scanning probe microscopy
6. Spectromertry: Atomic absorption / emission spectroscopy
7. Spectromertry: UV-visible spectroscopy, Fluorescence spectroscopy
8. Spectromertry: Infrared spectroscopy
9. Spectromertry: Raman spectroscopy
10. Spectromertry: Nuclear magnetic resonance
11. Composition analysis: Fluorescent X-ray spectroscopy, X-ray photoelectron spectroscopy
12. Composition analysis: Electron beam microanalyzer
13. Crystal structure: Diffraction by Crystal
14. Crystal structure: X-ray diffraction, electron diffraction
15. Separation of mass: Mass spectroscopy

[Keywords] molecular structure, crystal structure, surface structure, fine structure, elemental composition, radiation
[Textbooks and Reference Books] None in particular
[Evaluation]
Evaluation to be based on the results of final exam (70%) and homework (30%)
[Remarks]The curriculum substitutes the " Sensing of Information on Properties of Materials " held until 2013.

プログラム演習　Computer Programming Using C
[Instructor] Yasukuni Mori
[Credits] 2
[Semester] 2nd year-Spring Fri 3
[Course code] T1T081001
[Room] Bldg.Eng. 1- 501 information engineering Seminar room(1)
[Course description] This course covers fundamentals of C programming language. Students are expected to learn about how to program and construct algorithms through some exercises.
[Course objectives] Students are expected to be able to understand, implement and debug practical computer programs using C language. Through this course, students should be able to:
Read and understand C programs.Gain sufficient understanding of algorithms and data structures that are necessary for more complex programs.Become familiar with computers with UNIX environment.Learn programming skills to be needed in more advanced computer science.Excercise logical thinking and problem solving skills.
[Plans and Contents]
The following is a list of keywords to be covered throughout the semester.
1. Guidance, programming fundamentals
2. Variables
3. Control statements
4. Looping
5. Arrays
6. Functions
7. Character arrays
8. Pointers
9. Pointers and arrays
10. Character arrays and pointers
11. Basic of structures
12. Self-referential structures (1)
13. Self-referential structures (2)
14. File I/O
15. Algorithms and data structures

[Keywords] C Programming, Algorithms, Data Structures
[Textbooks and Reference Books] Meikai C-Gengo Nyumon-Hen, BohYoh Shibata, Softbank
[Evaluation]
Evaluation is made based on attendance, exercises related to the material covered in each lecture.
[Related courses] Information Processing, Computer Literacy for Information and Image Sciences, Design and Implementation of Computer Programs I.
Students must have mastered the basic operations of computers with UNIX environment.

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
[Requirement for registration] 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] Yosuke Yoshioka
[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.
12. Assignment 4: Seminar.
13. Assignment 4: Criticism.
14. 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
[Requirement for registration] 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)
8. 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)
9. 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.
[Requirement for registration]
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.

工業技術概論 Introduction to Industrial Technologies
[Instructor] Yun Lu
[Credits] 2
[Semester] Spring-Mon 5
[Course code] T1Z05400
[Room] Bldg.Eng. 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.
[Requirement for registration] 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] Bldg.Eng. 7-213
[Course enrollment] about40
[Candidate] Students of faculty of Engineering, other Faculties, and Specially Registered Non-Degree Students.
[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 Refrence 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.
[Requirement for registration] Not particularly
[Remarks] Foreign students only, subject of choice（F30 or F36）and no credit for Japanese students（Z99）