

School Year 2026

**Guide of the Registration
in the Master's Program
~International Program~**



Graduate School of Engineering

University of Miyazaki

◇ *International Program* ◇

A multidisciplinary international program will be offered for the three integrated courses in the Department of Engineering, with all lessons conducted in English.

Registration for study is stated on the “Notes for Graduate Students”.

◇ *Educational Goal of Master’s Course*

1) Educational Philosophy of Master’s Course, Graduate School of Engineering

The basic philosophy of the program is to perpetuate and advance the intellectual heritage related to science and technology, while contributing to the development of society and human welfare by nurturing talented human resources who can play a leading role in the development and welfare of society.

2) Educational Purpose of Master’s Course, Graduate School of Engineering

In addition to possessing specialized knowledge, engineers in the 21st century are required to have high ethical standards and to consider things on a global scale. Furthermore, issues that cannot be resolved only by conventional technologies, such as environmental and energy issues and various challenges presented by an advanced information society, continue to arise.

Under these circumstances, the purpose of the Graduate School of Engineering is to nurture global engineers who can acquire and apply highly specialized knowledge in the field of engineering, can identify challenges and use their knowledge to find a solution to these challenges, can communicate in Japanese and English as needed for research and development, and can make a great contribution to the industrial world with practical skills.

3) Educational Goal of Master’s Course, Graduate School of Engineering

In order to nurture highly specialized engineers who can make a great contribution to the industrial world with practical skills, it is necessary to develop several capabilities including a broader point of view, specialized practical skills, communication skills, and a global perspective. The Graduate School of Engineering will establish and implement an integrated education program with the goal of developing these capabilities.

◇ *Diploma Policy*

The Graduate School of Engineering, University of Miyazaki certifies completion, and confers the Master degree of Engineering on those who have acquired abilities listed below, attended at school for the specified period, acquired the necessary credits, and passed the review of Master's thesis and final examination.

1. Ability to acquire and apply highly specialized knowledge in the field of Engineering and other related fields.
2. Ability to search for problems, to make and implement the plan to solve the problems under the suitable supervision, to solve the problems, and to send out the result of research.
3. Ability to solve the problems with high ethical standard and responsibility as highly specialized engineer.
4. Ability to solve the problems of international and domestic societies and regions, and to contribute to the development of the region and global society.

◇ *Curriculum Policy*

The Graduate School of Engineering, University of Miyazaki organizes and implements the curriculum on the basis of policies mentioned below. Its purpose is to develop human resources who possess abilities listed on the diploma policy.

Organization of Curriculum

1. Establish common subjects and elective subjects for the purpose of acquiring the abilities listed on the diploma policy.
2. Establish subjects for the purpose of developing the abilities to acquire and apply highly specialized knowledge in the field of Engineering and other related fields.
3. Establish subjects for the purpose of developing the abilities to search for problems, to make and implement the plan to solve the problems under the suitable supervision, to solve the problems, and to send out the result of research.
4. Establish subjects for the purpose of developing the abilities to solve the problems with high ethical standard and responsibility as highly specialized engineer.
5. Establish subjects for the purpose of developing the abilities to solve the problems of international and domestic societies and regions, and to contribute to the development of the region and global society.

6. Establish “Advanced Research” for the purpose of integrating the acquired knowledge and skills, seeking the solution of problems and the creation of new values, and writing Master’s thesis.

Contents and Methods of Curriculum

1. Write clearly and make well known each subject’s goal of achievement, lesson plan, standard and method of grade evaluation, instructions of preparation and review, its relation with diploma policy.
2. Make the research and study plan through the collaboration of supervisor, vice-supervisors, and student.

Evaluation of the Study Results

1. Decide on and announce the standard and method of grade evaluation in order to clarify the achievement level of study purpose.
2. Rigorously implement the quantitative and qualitative evaluation on each subject on the basis of standard and method of grade evaluation.
3. Suitably collect and analyze the information about educational activities, study history, and student’s real feeling of growth and degree of satisfaction.
4. Attach the greatest importance to student’s study process on the basis of diploma policy, and evaluate whole study result during the period of attendance at school. Visualize the study result so that student can explain the achievement level of study purpose by showing evidence.

◇ *Overview of Master's Course* ◇

The Department of Engineering offers courses that integrate adjacent fields of study, by bringing them under a single department to bridge specialized fields. The department offers integrated studies that exceed those of the Bachelor's course, by developing educational programs that bridge different fields and provide knowledge on a wide range of relevant topics, specialized skills, communication skills, and a global perspective. The department nurtures global engineers who can acquire and apply highly specialized knowledge in the field of engineering, can identify challenges and use their highly specialized knowledge to find a solution to these challenges, can communicate in Japanese and English as needed for research and development, and can make a great contribution to the industrial world with practical skills.

Department of Engineering

○ **Advanced Information Course**

The course does not only provide the diverse curriculum based on the sophistication of specialized fields and the fusion of different fields, but also focuses on cutting-edge technologies in the information and communication field with a view to social implementation. The course aims to develop highly specialized engineers in the information field in order to make our life more abundant and better in the sustainable society.

The course will nurture creative advanced information technology human resources who can contribute to the improvement of productivity through the creation of added value and the enhancement of efficiency. It will thus satisfy the social needs of new businesses that respond to the fourth industrial revolution, such as artificial intelligence, big data, and internet of things.

○ **Environmental Science Course**

The course integrates chemical and social environmental studies, with the aim of nurturing highly specialized engineers who are able to create functional materials and manufacturing processes that are compatible with nature and are environmentally friendly, and who can contribute to the development of sustainable technology, using chemical technologies to solve environmental problems related to the reduction of pollution, restoration of the environment, and effective use of energy and resources.

The course will nurture highly creative human resources who can contribute to the sustainable development of science and technology, based on social needs. These needs include the development of chemical technology to assist with environmental issues, such as the reduction of pollution, restoration of the environment, and effective use of energy and

resources, in addition to the development of technologies and policies for resolving problems facing local communities, such as social infrastructure, regional disasters and environmental preservation.

○ **Electrical System and Semiconductor Science Course**

The course integrates the study of electricity and electronics, electronic materials, applied physics, and applied mathematics, with the aim of developing highly creative and specialized engineers who can contribute to sustainable social growth through electrical system and semiconductor-related science and technology from an international perspective.

Electrical system and semiconductor science technologies are essential for supporting the infrastructure of an advanced information society. The course will nurture human resources who can contribute to diverse industries and sectors, including industries related to electrical equipment, automobiles, and semiconductors, and information and communication technologies, as engineers or researchers. This is based on social needs, such as the development of advanced technologies including low-carbon energy and smart energy systems.

○ **Mechanical System Course**

The course aims to nurture highly specialized engineers in the fields of mechanical engineering, utilizing the expertise to support technology for making products that improve human quality of life and use resources in an environmentally friendly way to support a sustainable society. The course will nurture highly creative human resources who can contribute to the sustainable development of science and technology, based on social needs, such as multifunctional and intelligent products, and the development of advanced technologies for human society and environmental control.

◇ Notes for Graduate Students ◇

1. Subject Selection

A multidisciplinary international program will be offered for the three integrated courses in the Department of Engineering, with all lessons conducted in English.

Lesson subjects are listed in the table of offered subjects. Students must acquire at least 30 credits in total, consisting of 10 compulsory credits for Advanced Research I and II (10 credits), and at least 20 credits for the elective subjects.

Students will receive instructions from their supervisors, lesson instructors, and members of the academic affairs committee regarding their study plan and research plan.

Students will be informed separately of the registration period and the procedures for choosing subjects. Please ensure that you complete the procedures by the deadline. Registration for the first semester, second semester, and full year must be completed together in the first semester. Please ensure that you register for the subjects you need. Subjects cannot be added later.

2. Syllabus

The study guide contains basic descriptions of each subject. To read the detailed syllabus, please use official portal for academic information, Wakaba.

Wakaba > Syllabus > Syllabus search

<https://wakaba.of.miyazaki-u.ac.jp/campusweb/top.do>

3. Grading

Evaluation of each lesson is based on examinations, reports, and other assessments. The standard grading criteria by grade and percentage are outlined below. More than 75% attendance rate of the lectures is required.

Excellent: 100~90% (excellent standard of achievement regarding learning objectives)

Very Good: 89~80% (very good standard of achievement regarding learning objectives)

Good: 79~70% (good achievement regarding learning objectives)

Acceptable: 69~60% (minimum necessary achievement regarding learning objectives)

Unacceptable: Below 60% (fails to meet minimum necessary achievement regarding learning objectives)

4. Graduation Requirements

The graduation requirement for the Master's Course is to be enrolled for at least two years and get 30 credits including compulsory subjects. Additionally, after receiving research supervision, students must pass their Master's thesis and final examinations. However, students who have achieved outstanding academic performance may be allowed to enroll for only one year. Graduation requirements are set forth in the Article 76 of the University of Miyazaki Educational Affairs Regulations and the Article 10 of the Graduate School of Engineering Regulations. Please read the curriculum information carefully, and follow the instructions.

5. Applying for Master's Degree

Students who wish to apply for a Master's Degree after studying for the prescribed period in the Department of Engineering must obtain the approval of their supervisor. Students must assemble and submit the following documents to the Academic Affairs and Student Services Section by the deadline set by the Committee of the Graduate School of Engineering. Please refer to the "Guideline for the examination of the Master's thesis and final examination in the Graduate School of Engineering, University of Miyazaki," which can be found at the end of this booklet.

- Application for Master's thesis examination (1 copy)
- Master's thesis (1 copy)

6. Criteria for Master's Thesis Examination

The criteria for awarding a passing or failing grade for a Master's thesis in the Master's Course, Department of Engineering, are as follows:

[1] General Criteria

1. Research background and positioning is clearly shown.
2. Research purpose is clearly outlined.
3. Research method is adequately mentioned.
4. Interpretation of the research result and process of drawing the result are clearly made.
5. Format and style of Master's thesis are well- balanced, and literatures are adequately quoted.

7. Personal Accident Insurance for Students Pursuing Education and Research (PAS)

This insurance provides mutual aid and compensation to provide relief for students, in

case a student suffers an accident during regular studies at the university, while traveling to or from the university, or during extracurricular activities on campus. All graduate students engage in research activities, and must therefore enroll in the insurance plan. Students who are doing an internship must also separately enroll in the Liability Insurance coupled with the PAS. To enroll in the insurance plan, please contact the Student and Educational Affairs Office at the 330 Hall.

- Personal Accident Insurance for Students pursuing education and research (PAS):
¥1,750 (premium covering two years)
- Liability insurance coupled with PAS: ¥680 (premium covering two years)

8. Notification Procedures

- 1) Notify the Academic Affairs and Student Services Section if there is a change in your address, phone number, name or guarantor that you registered with the university at the time of admission or after admission.
- 2) If you are taking a break from studies, leaving the university or resuming studies, obtain the prescribed forms from the Academic Affairs and Student Services Section and submit them to your supervisor.
- 3) If you wish to obtain a student discount card, student identification, certificate of expected graduation or official academic transcript, please use the automated issuing machine at the 330 Hall.

◇ *List of Subjects* ◇

【Required Subjects】

Course Title	Credit	1 st semester (from April)	2 nd semester (from October)	Instructor
Advanced Research I	4	○	○	Supervisors
Advanced Research II	6	○	○	Supervisors

Advanced Research I Required Subject (4 credits)

Students will learn how to clarify the background and objectives of their research, select and apply appropriate research methods, summarize their findings, and develop the skills needed to create effective presentation materials and communicate their research clearly.

Advanced Research II Required Subject (6 credits)

This course develops the ability to effectively organize research progress, analyze data, apply appropriate writing techniques for academic papers, and create presentation materials. Students will acquire the fundamental skills needed to structure their research outcomes into a master's thesis and cultivate the ability to communicate their findings through oral presentations and other formats.

【Elective Subjects】

(General)

Course Title	Credit	1 st semester (from April)	2 nd semester (from October)	Instructor
Research Skills and Ethics	2		○	Associate Professor A. Nagaoka and Other Related Staffs
MOT and Venture Business	2		○	All Related Staffs

Research Skills and Ethics Elective Subject (2 credits)

This course provides the skills for logical thinking, conducting literature searches and reviews, describing research frameworks, academic writing and presentation. The course also provides the basic understanding of engineering ethics and research one.

MOT and Venture Business Elective Subject (2 credits)

This course explores the basis of Management of Technology (MOT) and Venture business. It introduces conceptual frameworks based on cutting-edge studies in corporate strategy and organization. The students will gain an in-depth understanding of how to develop strategies for managing technologies in their firms and how to apply managerial skills such as portfolio investment and quality control through case studies and group discussion.

(Special)

Course Title	Credit	1 st semester (from April)	2 nd semester (from October)	Instructor
Advanced Materials Chemistry	2	○		Professor G. Sakai
Advanced Organic Chemistry	2	○		Professor K. Sugamoto
Advanced Theoretical and Computational Chemistry	2		○	Associate Professor T. Uto
Advanced Membrane Separation Engineering	2		○	Associate Professor A. Inada
Advanced Material Recycle and Waste Management	2	○		Associate Professor T. Sekito
Water Environmental Engineering	2		○	Professor Y. Suzuki
Advanced Coastal Engineering	2	○		Professor K. Murakami
Advanced Structural Analysis	2		○	Professor C. Morita
Environmental and Disaster Management Hydraulics	2		○	Professor M. Irie
Durability of Concrete	2	○		Associate Professor C. Li
Transportation Geotechnics	2	○		Associate Professor Y. Fukubayashi
Advanced Geotechnical Engineering	2		○	Professor D. Suetsugu
Watershed Ecological Engineering	2	○		Associate Professor K. Nukazawa
Advanced Course of Nuclear Physics	2		○	Associate Professor Y. Maeda

Course Title	Credit	1 st semester (from April)	2 nd semester (from October)	Instructor
Solid State Physics and its Applications	2		○	Professors A. Fukuyama and K. Nishioka
Advanced Course on High-Energy Astrophysics	2		○	Professors M. Yamauchi and K. Mori
Atomic Physics and its Applications	2		○	Professor A. Igarashi
Advanced Course on Applied Mathematics	2		○	Professors M. Iida, R. Kon, and H. Izuhara Associate Professors M. Umehara and S. Kobayashi
Nano Structure Photovoltaic Device	2	○		Professor K. Yoshino
Infrared Optical Sensing and Photonic Devices	2	○		Professor M. Arai
Thin Film Growth Engineering	2	○		Associate Professor H. Suzuki
Quantum Imaging Technology	2		○	Associate Professor A. Takeda
Advanced Radiation Physics	2		○	Assistant Professor H. Suzuki
Numerical Simulation of Semiconductor Devices	2		○	Associate Professor M. Asami
Advanced Thermal Energy Engineering	2		○	Associate Professor A. Nagaoka
Advanced Analog Integrated Circuits	2		○	Professor K. Tanno
Advanced Lecture on Image Processing	2		○	Professor Thi Thi Zin and Assistant Professor Cho Nilar Phyo
Ionized Gas Engineering	2	○		Professor T. Sakoda and Program-Specific Assistant Professor May Thin Khaing
Numerical Electromagnetic Field Analysis and Applications	2		○	Professor A. Takei

Course Title	Credit	1 st semester (from April)	2 nd semester (from October)	Instructor
Advanced Energy Management	2		○	Associate Professor Y. Ota
Advanced Opt-Thermal Engineering	2		○	Associate Professor D. Sato
Advanced Photo- and Electrocatalysis	2		○	Associate Professor T. Higashi
Fuzzy System and Neural Networks	2		○	Professor H. Tamura
Introduction to Control Theory	2	○		Professor I. Hodaka and Assistant Professor T. Hirata
Advanced Lecture on Measurement and Control	2		○	Professor K. Kawasue and Professor G. Lee
Intelligent Mobile Systems	2		○	Associate Professor M. Yokomichi
Machining Processes	2	○		Associate Professor O. Ohnishi
Advanced Mechanical Vibrations	2	○		Associate Professor Y. Bonkobara
Advanced Mechanics of Materials	2		○	Professor R. Kawamura
Advanced Biomechanical Engineering	2		○	Professor G. Yamako
Advanced Biofluid Dynamics	2		○	Associate Professor S. Miyauchi
Advanced Robot Mechatronics	2		○	Associate Professor K Masuya
Advanced Course of Fluid Dynamics	2	○		Associate Professor T. Fujikawa
Advanced Lecture on Parallel Processing and Machine Learning	2		○	Professor K. Yamamori

Course Title	Credit	1 st semester (from April)	2 nd semester (from October)	Instructor
Advanced Lecture on Software Engineering	2	○		Professor T. Katayama
Advanced Lecture on Information Network	2		○	Professor N. Okazaki and Program-Specific Assistant Professor S. Usuzaki
Advanced Lecture on Computer Vision	2		○	Professor M. Mukunoki
Advanced Lecture on Operations Research	2	○		Associate Professor S. Ikeda
Advanced Lecture on Information Processing for Intelligent Systems	2	○		Associate Professor H. Yamaba
Mathematical Neuroscience	2	○		Associate Professor A. Date
Advanced Lecture on Digital Communication Engineering	2	○		Professor K. Aburada

Advanced Materials Chemistry Elective Subject (2 credits)

This class gives the basis of solid surface structure, electronic theory referring to the fundamental inorganic chemistry and analytical chemistry. Students learn how differences in surface structure and electronic state impact to activity and selectivity in catalytic reactions. In addition, the class introduces the examples of attempts to design new environmentally friendly catalyst. The development and the use of new inorganic materials in terms of harmony with the environment and nature are lectured.

Advanced Organic Chemistry Elective Subject (2 credits)

To be able to understand the transformation reaction of organic materials, this class reviews and organizes the various chemical reactions, basing on the basic knowledge of applied chemistry, in particular organic chemistry and biological sciences. Moreover, this class introduces environmentally friendly science and technologies for chemical synthesis and new material design.

Advanced Theoretical and Computational Chemistry Elective Subject (2 credits)

Theoretical and computational chemistry, which deals with various problems in materials science by using computer simulations, is a fast growing area of modern chemistry. This course addresses the methodology and theoretical background of molecular simulation. This course is designed to deepen the microscopic understanding of materials based on three-dimensional structure, intermolecular interaction, and statistical ensemble through various analysis cases. In addition, recent trends and technical problems related to predictions by cooperating molecular modelling and machine learning will be explained.

Advanced Membrane Separation Engineering Elective Subject (2 credits)

Membrane separation engineering is an extremely important field of study with applications in a very wide range of fields, from everyday life to industrial production processes. This course aims to provide an understanding of the fundamentals of membrane separation, starting with “What is a membrane?” and outlining the types and manufacturing methods of separation membranes, the characteristics of membrane separation methods, and the membrane separation process through familiar examples.

Advanced Material Recycle and Waste Management Elective Subject (2 credits)

The purpose of this course is to introduce students to the environmental, technical and legal aspects of solid waste management and material recycling. This course will cover all aspects of municipal solid waste management and material recycling including refuse generation, source reduction, collection, transportation, recycling and resource recovery, burial in landfills, composting and combustion.

Water Environment Engineering Elective Subject (2 credits)

Understanding water environment system and water quality analysis for preservation of water environment and improvement of water treatment technology.

Advanced Coastal Engineering Elective Subject (2 credits)

This lecture covers the mechanism of water surface waves to understand coastal disasters associated with high waves, storm surges, and tsunamis. This also includes the understanding of sediment transport under wave actions.

Advanced Structural Analysis Elective Subject (2 credits)

Understanding the structural elements, basic theory and analysis technology of structural mechanics in the civil engineering field.

Environmental and Disaster Management Hydraulics Elective Subject (2 credits)

The flow of water, transporting solid soil particle, wood, nutrients, and hazardous matter etc. can be the causes of disaster and environmental problem. In this lecture, basic analysis method of material transportation in hydraulics and the applications to the issues of disaster management and environmental conservation are discussed.

Durability of Concrete Elective Subject (2 credits)

Understanding the weathering action, chemical attack, abrasion, or any process of deterioration of concrete.

Transportation Geotechnics Elective Subject (2 credits)

Fundamental on design of transportation geotechnical infrastructure subjected to traffic load, such as road, railway and airfield, is lectured. With recognition of the roles and characteristics of transportation infrastructure, their construction, maintenance, disaster prevention/mitigation technologies are also covered. Through case studies of transportation infrastructure projects in Japan or overseas, it is aimed that students practically understand transportation infrastructure design, construction and maintenance with application of geotechnical engineering.

Advanced Geotechnical Engineering Elective Subject (2 credits)

This class explains the characteristics of the soil necessary for ground design based on the critical state of the soil, focusing on the shear strength and failure. This class introduces earth reinforcement and ground improvement techniques and discusses their application issues.

Watershed Ecological Engineering Elective Subject (2 credits)

The lecture aims to understand the characteristics and functions of watershed ecosystems, as well as to acquire the conceptual and pragmatic knowledges towards realizing sustainable and environment-friendly society based on ecological engineering approaches.

Advanced Course of and Nuclear Physics Elective Subject (2 credits)

This course covers the basics of nuclear physics followed by an introduction to recent research developments and applications.

Solid State Physics and its Applications Elective Subject (2 credits)

The aim of this class is to present the concepts for solid state physics and its applications to several optoelectronic devices such as photo detector, light emitting diodes, and solar cells. The content of applications includes also some methods for the deposition and investigation of thin solid films.

Advanced Course on High-Energy Astrophysics Elective Subject (2 credits)

This series of special lectures reviews important recent topics in high-energy astrophysics, mainly based on X-ray and Gamma-ray observational results. Astrophysical phenomena originated from the death of massive stars are especially focused.

Atomic Physics and its Applications Elective Subject (2 credits)

The aim of this class is to present the concepts for atomic structure and for the interactions of atoms with photons/charged particles. The content includes approximation methods in quantum mechanics, hydrogenic atoms, two-electron atoms, many electron atoms, interaction of atoms with radiation, and electron scatterings by atoms.

Advanced Course on Applied Mathematics Elective Subject (2 credits)

This course deals with some of the following topics:

1. Mathematical theory on diffusion in developmental biology
2. Mathematical biology
3. Nonlinear partial differential equations in flow phenomena
4. Nonlinear science and applied mathematics

Most of the nonequilibrium phenomena in the fields of biology, chemistry and physics are described by partial differential equations, ordinary differential equations, and difference equations. This course gives an introduction to the derivation of mathematical models and the analysis from a viewpoint of continuous and discrete dynamical systems.

Nano Structure Photovoltaic Device Elective Subject (2 credits)

Material science and characterization of Nano structure of photovoltaic device such as solar cell is learned. Advanced technology of solar cell is also learned.

Infrared Optical Sensing and Photonic Devices Elective Subject (2 credits)

This course lectures on infrared optical sensing using photonic devices. It also introduces several applications of optical sensing.

Thin Film Growth Engineering Elective Subject (2 credits)

The purpose of this lecture is to understand basic physics and actual systems of crystal growth, especially epitaxial growth of semiconductor thin films. In addition, analysis techniques for thin films will be introduced.

Quantum Imaging Technology Elective Subject (2 credits)

The purpose of this lecture is to understand the imaging technologies to visualize various quantum beams, e.g., visible light, X-rays, electron beams, charged particles, etc. The interaction between quantum and material, and data processing technologies using data acquisition systems are explained.

Advanced Radiation Physics Elective Subject (2 credits)

We begin by exploring the history of observations of radiation that is always present in our surroundings, then move on to understanding its physical properties and safety considerations, as well as the characteristics and origins of environmental radiation. Finally, we learn the nature of radiation traveling through outer space (cosmic rays) and examine the latest human knowledge about their origins.

Numerical Simulation of Semiconductor Devices Elective Subject (2 credits)

This course provides a comprehensive introduction to numerical modeling of semiconductor devices based on the Poisson, continuity, and drift–diffusion equations. Students will learn both the physical foundations and computational techniques required to solve these equations numerically.

Using Python or the device simulation software PC1D, participants will build one-dimensional models of semiconductor structures (such as p-n junctions and solar cells) to analyze current–voltage characteristics and carrier dynamics under illumination, thereby deepening their understanding of semiconductor device physics through practical simulation exercises.

Advanced Thermal Energy Engineering Elective Subject (2 credits)

The purpose of this course is to understand the conversion of thermal energy to electrical energy. This course teaches the fundamentals of thermoelectric effect (Seebeck effect and Peltier effect) and thermodynamics (Laws of thermodynamics), thermoelectric material engineering (Phase diagram and Crystal growth), and thermal energy perspectives for the 21st Century.

Advanced Analog Integrated Circuits Elective Subject (2 credits)

This course teaches on the design of analog integrated circuits with an emphasis on CMOS technology. After a brief review of electric and electronic circuits, this course lectures on MOS transistor-based building blocks including current mirrors, differential amplifiers, frequency response, feedback circuits, bandgap reference circuits, etc. Student will learn how to use SPICE (Simulation Program with Integrated Circuit Emphasis) for circuit design.

Advanced Lecture on Image Processing Elective Subject (2 credits)

The purpose of this lecture is to provide the theoretical and practical basic principles of image processing techniques. This course intends to design and develop the applications which play important roles in many aspects of our life.

Ionized Gas Engineering Elective Subject (2 credits)

The goal of this course is to understand characteristics of ionized gases, plasma formation techniques, and their industrial applications. The students will be able to characterize plasma parameters which control operation of plasma sources and optimize the plasma sources.

Numerical Electromagnetic Field Analysis and Applications Elective Subject (2 credits)

Understanding Maxwell's equations as the governing equation of the numerical analysis technique and the simulation systems.

Advanced Energy Management Elective Subject (2 credits)

This lecture aims to understand the application of energy in an environment-friendly way based on the generation and transportation of electrical energy, focusing on new technologies (i.e., power-to-gas (P2G) systems, solar electric vehicles, and photovoltaics).

Advanced Opt-Thermal Engineering Elective Subject (2 credits)

This course covers the fundamentals of optical and thermal energy and their applications, including topics related to energy and environmental problems. The aim of this course is to understand the basics and utilization technologies related to combustion, thermal radiation, and solar photoelectric generation, etc.

Advanced Photo- and Electrocatalysis Elective Subject (2 credits)

This course introduces the fundamentals of photocatalysis and electrocatalysis, exploring their core principles, design techniques, and recent advancements. Students will gain deep insights into the interplay between light, electrons, and molecules in catalytic processes, especially at solid/liquid and solid/gaseous interfaces. Additionally, the course highlights how these technologies drive progress in energy conversion, environmental remediation, and chemical synthesis.

Fuzzy System and Neural Networks Elective Subject (2 credits)

This course lectures on fuzzy logic control and neural networks, including the fuzzy inference method and back propagation method. In addition, the seminar of this course that uses program language (C, Visual C++ or Visual Basic) is executed for the ability of applications.

Introduction to Control Theory Elective Subject (2 credits)

This lecture is designed to serve as a course in control engineering especially for electrical and electronic engineering. This lecture reviews the fundamental control theory and its practice. It is our intention to minimize to learn the theory but maximize to understand the implication of theory through an electronic circuit simulator called SPICE. Each student will operate the SPICE simulator to realize various control systems into electronic circuits. This will lead students to obtain a practical way of thinking in control engineering.

Advanced Lecture on Measurement and Control Elective Subject (2 credits)

This course lectures on theories and practical methods to control the mechanical systems using a computer vision. We provide some topics such as measurement, control, robotics etc. Student will select some options with considering his pre-knowledge and interests.

Intelligent Mobile Systems Elective Subject (2 credits)

The application areas for mobile robots have been spreading widely, for example, from home entertainment robots to planetary rovers. In order to achieve the safe navigation for autonomous mobile robots, they should be able to perceive the state of environment and to decide safe movement by themselves. In this course, some fundamental technologies such as path planning, Bayes filtering, and obstacle avoidance are introduced.

Machining Processes Elective Subject (2 credits)

This class focuses on the machine tools and various machining methods. The class contents are as follows: basics of machine tools, various machine tools and machining methods, etc.

Advanced Mechanical Vibrations Elective Subject (2 credits)

The subjects of this lecture are vibration analyses of a multi-degree of freedom system, vibration control methods, nonlinear vibration problems and self-excited vibration problems. By studying them, students will acquire the ability to analyze various mechanical vibration phenomena dynamically and logically.

Advanced Mechanics of Materials Elective Subject (2 credits)

This class is designed to give the graduate students the basis of mechanics of materials in addition to the theory of elasticity which are needed to elucidate mechanical behavior of strength and deformation in machinery and structure. The class also lectures methods for structural analysis based on numerical simulation.

Advanced Biomechanical Engineering Elective Subject (2 credits)

The objective of this lecture is to understand principles on biocompatibility by learning biomechanics of cells, hard and soft tissues, and organs, and fundamentals of biomaterials.

Advanced Biofluid Dynamics Elective Subject (2 credits)

Lectures will be given on flow phenomena and mathematical modeling of the blood circulatory system from the viewpoints of fluid mechanics and physiology. In addition, programming and numerical analysis of flow phenomena will be studied through exercises.

Advanced Robot Mechatronics Elective Subject (2 credits)

The aim of this lecture is to understand robot mechatronics, such as the technology of actuators, sensors, and mechanisms, including those developed recently.

Advanced Course of Fluid Dynamics Elective Subject (2 credits)

A viscous fluid is defined as a fluid that resists flow, exhibiting differing velocities among its layers due to shear forces. It is important in so many facets of everyday life that everyone has some intuition about the diverse flow phenomena that occur in practice. This course principally deals with an introduction to the viscous flow by giving first definitions of pressure and viscous stress and derivation of Navier-Stokes equations. Secondly, based on the equations, Reynolds number, inviscid and viscous flows, incompressible and compressible flows, and laminar and turbulent flows are discussed. Thirdly, typical examples of the viscous flow, such as Hagen-Poiseuille flow and boundary-layer flow, are explained. In the end, an analysis based on computational fluid dynamics (CFD) is introduced and applied to the Hagen-Poiseuille flow for students' future use of CFD.

Advanced Lecture on Parallel Processing and Machine Learning

Elective Subject (2 credits)

This course gives lectures on the fundamentals of machine learning algorithms such as deep learning. This course also addresses the parallel implementation of these algorithms using the Message Passing Interface and OpenMP framework.

Advanced Lecture on Software Engineering Elective Subject (2 credits)

This course will describe some problems which possibly occur in software development and issues which the present software engineering holds. Mainly topics are software process, design, testing, and improvement of quality or reliability of software.

Advanced Lecture on Information Network Elective Subject (2 credits)

This course will give lectures on computer network and some related advanced technologies including mobile ad-hoc network, sensor network and network security.

Advanced Lecture on Computer Vision Elective Subject (2 credits)

We introduce several methods, such as stereo vision, structure from motion and shape from shading, which recover the 3D shape of an object from plural images. Students will get a better understanding on principle and strengths-and-weaknesses of the methods through the exercises to implement them on computers. Students must have basic programming skills in C language.

Advanced Lecture on Operations Research Elective Subject (2 credits)

This course will be the introduction to Operations Research concerning efficient techniques and algorithms for probabilistic optimizations.

Advanced Lecture on Information Processing for Intelligent Systems

Elective Subject (2 credits)

This course provides the information processing techniques to represent and manipulate knowledge on computers. Several search algorithms in state space search and mathematical logic are lectured together with programming exercises on the subjects using Lisp and Prolog Language.

Mathematical Neuroscience Elective Subject (2 credits)

This course will provide an introduction to a variety of mathematical models of learning and recognition. Topics covered include models of associative memory, self-organization, and dynamics of population of neurons. Each topic will be introduced with several lectures, and concluded with a computer project, carried out by each student.

Advanced Lecture on Digital Communication Engineering Elective Subject (2 credits)

The purpose of this course is to understand the communication engineering, especially digital modulation and multiplexing. In addition, this course lectures the mobile communication such as cellular communication system.

**Rules of Inquiry regarding Grades of Special Subjects
in the Faculty of Engineering and the Graduate School of Engineering**

- I. These rules shall provide for necessary matters concerning the inquiry regarding grades of special subjects in the Faculty of Engineering and the Graduate School of Engineering, based on Article 5 of the Regulations for the Course Registration of Special Subjects in the Faculty of Engineering and on Article 14 of the Regulations of the Graduate School of Engineering.
- II. The inquiry regarding the grades must, in principle, be made to the Vice Dean (Academic Affairs) via the Academic Affairs and Student Services Division within the semester in which these grades are given.
- III. Upon receiving an inquiry, the Vice Dean (Academic Affairs) asks the Department to which the student belong to take necessary actions. Then, the Department appropriately questions the student and the teacher in charge, and reports the result to the Vice Dean (Academic Affairs).
- IV. Upon receiving the report, the Vice Dean (Academic Affairs) announces the result to the student.