

[Degree Programs' Common Courses]Engineering Mechanics and Energy Associated Courses (Foundation Subjects for Major)

Course Number	Course Name	Instru- ctional Type	Credit s	stand- ard regist- ration year	Term	Meeting Days, Per- iod etc.	Classro- om	Instructor	Course Overview	Remarks
OAL0600	Energy System Engineering	1	2.0	1, 2	SprAB	Tue1, 2	3B303	Okajima Keiichi, Ishida Masayoshi	This course focuses on a systematic overview of energy supply, power infrastructure, and gas infrastructure for energy problems and technologies that have a wide range of aspects. It also explains how the supply and demand adjustment of the power system, frequency control, voltage control, and supply reliability are ensured.	Core subject face-to-face
OAL0601	Advanced Solid Mechanics	1	2.0	1, 2	SprAB	Fri5, 6	3A410	Kameda Toshihiro, Matsuda Akihiro	This course describes the solid mechanics for elastic and plastic materials with fundamental framework of tensor analysis. Application to engineering issues are provided as some exercises.	Core subject face-to-face (partially online)
OAL0602	Advanced Structural Mechanics	1	2.0	1, 2	SprAB	Wed1, 2	3B302	Isobe Daigoro, Yamamoto Kyosuke	This course focuses on behaviors of beams and plates with geometrical and material nonlinearities, which are popularly used as structural components in civil, architectural and mechanical fields.	Core subject Lectures are conducted in English if requested. face-to-face (partially online)
OAL0603	Advanced Vibration Analysis	1	2.0	1, 2	SprAB	Fri1, 2	3B405	Asai Takehiko, Morita Naoki	The course provides the foundations and advanced topics on dynamics in structures and mechanical systems, focusing onto the study of vibration theory associated with modal analysis, numerical method, and random vibration.	Core subject Lectures are conducted in English if requested. face-to-face
OAL0605	Disaster Information	1	2.0	1, 2	SprAB	Thu5, 6	3B304	Shoji Gaku, Kawamura Youhei	This course provides students with a practical understanding of the application of disaster control informatics based on fundamental theories from the perspective of risk assessment, information gathering (handling) and various core technologies such as Geographic Information System (GIS).	Class days from the 6th week to the 8th week will be treated as an intensive lecture in late-May. Identical to O2RB238. Lecture is conducted in English. face-to-face (partially online)
OAL0612	Advanced Space Exploration Engineering Workshop 2024	2	2.0	1, 2	SprAB, FallAB	Fri7	3B402	Kameda Toshihiro	It is a workshop style project based class, handling space exploration engineering mission proposal and realization. During the class, students are expected to propose their own space mission and provide some prototype equipment for the mission, including space environment test. Collaboration with foreign space engineering teams such as cubesat development project is strongly encouraged.	Lecture is conducted in English. face-to-face Students can register this course even if they took previous Advanced Space Exploration Engineering courses, however, up to two credit hours can be provided in total for graduation requirement.
OAL0620	Advanced Civil Engineering Workshop	2	2.0	1, 2	SprAB, FallAB	Wed7	3B406	Yamamoto Kyosuke	This is a PBL-style course, in which students participate group workshops on the theme of new civil engineering systems that contribute to solving global issues.	Lectures are conducted in English if requested. face-to-face (partially online)
OAL0621	Advanced Exercises for Planning and Designing	2	1.0	1, 2	SprC Sum Vac	Mon2 Intensive	3B406, 3B407	Kanakubo Toshiyuki, Yasoji ma Akira	The exercises of planning, designing, and drafting for the definite topics in designing of buildings and housing are conducted. The field works are also conducted for actual structures and introducing presentations for them are assigned.	face-to-face
OAL0622	Advanced Electromagnetics	1	1.0	1, 2	SprA	Fri5, 6	3B303	Fujino Takayasu	In this course, we study the characteristics of static and dynamic electromagnetic fields on the basis of Maxwell's equations.	Cannot be taken by students who have already taken Engineering of Electromagnetic Energy. Core subject. face-to-face
OAL0623	Smart Grid	1	1.0	1, 2	FallB	Fri1, 2	3B302	Kodaira Daisuke	This lecture will explain the basic principles of the main components of the electricity supply system as well as the future development of the system.	Cannot be taken by students who have already taken Engineering of Electromagnetic Energy. Core subject. face-to-face

OAL0624	Advanced Fluid Mechanics	1	3.0	1, 2	SprABC	Thu1, 2	3B303	Takewaka Satoshi, Shirakawa Naoki, Kyotoh Harumichi	Potential theory in fluid mechanics, derivation of Navier-Stokes equations, and effects of viscosity, turbulence, and others will be explained. (Potential Theory) Velocity potential, Bernoulli's theorem, flow function, complex potential, isometric mapping, eddy motion, wing theory, and others will be explained. (Navier-Stokes equation) Derivations of laminar boundary layer problems and their solutions, momentum integral equations and their solutions, and viscosity effects will be discussed. (Turbulence) The Reynolds equation and the logarithmic law will be derived for turbulent duct flow and planar boundary layer flow. The mean velocity distribution and drag law are obtained. The course also introduces methods for predicting the occurrence of turbulence in the boundary layer, Kolmogorov theory of uniformly isotropic turbulence, and the structure of anisotropic turbulence.	Cannot be taken by students who have already taken Advanced Fluid Mechanics 1 or Advanced Fluid Mechanics 2. Core subject. face-to-face
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[Degree Programs' Common Courses] Engineering Mechanics and Energy Associated Courses (Major Subjects)

Course Number	Course Name	Instruc-tional Type	Credit s	standa rd registration year	Term	Meeting Days, Period etc.	Classro om	Instructor	Course Overview	Remarks
OAL5600	Micromechanics	1	2.0	1, 2	SprAB	Thu5, 6	3A409	Matsuda Tetsuya	The course aims to give the theoretical knowledge of the mechanics of a class of heterogeneous solids with an emphasis on the micro-macro transition in mechanical properties. This includes the crystal plasticity for metals and the analytical and numerical homogenizations for composite materials of different kinds. A generalized continuum mechanics for higher-order materials is also explained.	face-to-face (partially online)
OAL5601	Advanced Dynamics of Compressible Flow	1	2.0	1, 2	Fall AB	Wed5, 6	3B303	Yokota Shigeru	We cover several unique concepts and applications of compressible flow, including: speed of sound and Mach number, isentropic 1-D flow in variable area ducts, converging nozzles, choking, converging-diverging nozzles, moving shocks, shock tubes, normal and oblique shock waves, expansion fans, and small perturbation theory.	Sub-core subject Online (Asynchronous)
OAL5602	Advanced Space-Development Technology	1	1.0	1, 2	Fall C	Intensive		Matsumoto Satoshi, Mizutani Tadahito	This course provides lectures on spacecraft thermal control technology, structure and material technology, space environment utilization technology, and lunar and planetary exploration technology.	Coordinator: Prof. Fujino Online (Asynchronous)
OAL5604	Advanced Computational Mechanics	1	2.0	1, 2	Fall AB	Tue3, 4	3B302	Matsushima Takashi, Shintaku Yuichi	This course provides the theoretical basis, formulation, and implementation of Finite Element Method (FEM). Theoretical basis includes variational method, weighted-residual method and virtual work principle. Also, the FE formulation and implementation of 2-dimensional Poisson equation and elastic continuum are described in details.	Sub-core subject face-to-face (partially online)
OAL5605	Structure Design of Nuclear Plant	1	2.0	1, 2	SprAB	Tue5, 6	3B406	Matsuda Akihiro	This course describes the high temperature structural design for nuclear power plants and thermal power plants. Assessment methods for high temperature materials in some design topics of the power plants are provided.	face-to-face (partially online)
OAL5606	Structural Design Methodology	4	2.0	1, 2	Fall AB	Wed4, 5	3B401	Yasojima Akira	The procedures of the seismic design method for reinforced concrete structures are explained. Furthermore, the exercises on structural design of buildings are conducted based on allowable stress concept and lateral load-carrying capacity calculation.	face-to-face
OAL5607	Multiphase Flow Engineering	1	2.0	1, 2	Fall AB	Fri5, 6	3A304	Monji Hideaki, Kaneko Akiko, Kanagawa Tetsuya	Focusing on the features and dynamics of multiphase flows as important role in thermo-fluid machinery, environmental field, and so on, basic property and concept, flow behavior, wave propagation, measurement technique, and recent progress and topic are introduced.	face-to-face
OAL5608	Strength and Fracture of Solids	1	2.0	1, 2	Fall AB	Fri1, 2	3B406	Kawai Masamichi	The course aims to give students the theoretical and practical knowledges of the strength of solids. This includes the phenomena and mechanisms of elasticity, plasticity and fracture for a class of metallic materials, and the mechanics for these behaviors, respectively, emphasizing the interdiscipline of the practical approach to the strength of solid materials.	Coordinator: Prof. T. Matsuda face-to-face

OAL5609	Advanced Reliability Engineering	4	2.0	1, 2	SprAB	Wed3, 4	3B203	Nishio Mayuko	In this course, the basics of structural reliability theory and reliability design are first explained, including the associated probability theory. In addition, exercises using Matlab programming will be taken to understand numerical methods for analyzing structural reliability and safety.	Sub-core subject Lectures are conducted in English if requested. Online (partially face-to-face)
OAL5610	Computational Fluid Dynamics	1	2.0	1, 2	FallAB	Fri3, 4	3A403	Mitsume Naoto	This course focuses on computer simulation of fluid dynamics, and introduces fundamental and applied mathematical models and numerical methods related to the computational fluid dynamics (CFD). Recent research trends on CFD is also introduced in this course.	Sub-core subject face-to-face (partially online)
OAL5611	Advanced Earthquake Engineering	1	2.0	1, 2	SprBC	Tue1, 2	3B203	Shoji Gaku, Asai Takehiko	In this course, you will study the fundamental and advanced topics on earthquake engineering. The first part describes the mechanism of fault ruptures, wave propagation process, and strong ground motion occurrence, and the evaluation method of seismic hazards. The latter part describes the relationship between ground motion intensity and structural damage, nonlinear seismic response analysis of structures, and seismic design of structures.	face-to-face
OAL5612	Advanced Geotechnical Engineering	1	2.0	1, 2	SprAB	Tue3, 4	3A207	Matsushima Takashi	This course describes complicated mechanical response of geomaterials as a mixture of solid grain, pore water and air, basic framework of the governing equation including typical constitutive models, and various numerical methods for engineering design.	Lectures are conducted in English if requested. face-to-face (partially online)
OAL5613	Transport Phenomena	1	2.0	1, 2	SprAB	Fri1, 2	3B302	Nishioka Makihito	Transport phenomena of mass and heat will be explained theoretically from a macroscopic viewpoint. Examples of actual phenomena related to mass diffusion and/or heat conduction, and their practical applications will also be introduced.	Sub-core subject Online (Asynchronous)
OAL5614	Thermo-Fluids Measurement Techniques	1	2.0	1, 2	SprA SprB	Wed5, 6 Fri5, 6	3B303	Monji Hideaki, Kaneko Akiko, Fujino Takayasu, Yokota Shigeru, SHEN Biao	Hot-wire anemometer, laser anemometer, image processing anemometer, spectroscopy, probe method, schlieren method, laser-induced fluorescence method, etc. are introduced as the, laser-induced fluorescence method, etc. can be obtained as the latest measurement methods for the speed, temperature, concentration, pressure, etc. of thermal fluid. Discussed with data processing methods.	Sub-core subject face-to-face
OAL5615	Advanced Composite Structural Engineering	1	2.0	1, 2	SprAB	Mon1, 2	3B401	Kanakubo Toshiyuki	Outline, construction method, and design method of reinforced concrete structures are introduced. Structural behavior of beams, columns, walls, beam-column joints, and so on, of reinforced concrete is explained based on the limit stress design method and ultimate state design method.	face-to-face
OAL5616	Topics in Engineering Mechanics and Energy I	1	1.0	1, 2	SprC	Intensive		OHSUMI Michio, AWATA Teruhisa, 穂積 良和, 牛島 栄, Shinozaki Yui	This course will be taught by visiting lecturers who are specialized in infrastructure systems, civil construction, disaster prevention and management, energy systems and related fields. In the classes, followings will be discussed: technology development, project management, maintenance of infrastructures, overseas projects etc.	Coordinator: Profs. S. Takewaka and G. Shoji face-to-face
OAL5617	Topics in Engineering Mechanics and Energy II	1	1.0	1, 2	SprC, Sum Vac	Intensive		Sakakita Hajime	In this course, technologies on plasma processing are described. For human being, "Plasma" is very important, since it is related on many natural phenomena (Stellar such as sun, ionosphere, aurora, and lightning). Moreover, the plasma is utilized in fluorescent light, semiconductor processing, space propulsion and so on. Academic background and technologies are studied, and many of novel development trends such as a medical application are introduced.	Coordinator: Prof. Toshihiro Kameda Online (partially face-to-face)

OAL5618	Topics in Engineering Mechanics and Energy III	1	1.0	1, 2	Fall IAB	Intensive		Ichikawa Kazuyoshi	Japan relies on fossil-fueled thermal power generation for about 80% of its electricity generation and the reduction of greenhouse gases which is a major factor in climate change is an urgent issue. This lecture will focus on the latest thermal power technologies for low carbon, and will cover the latest energy situation, basics of thermal power generation, innovative power generation technologies, biomass energy utilization technologies, and zero-emission technologies (e.g., CO2 capture, utilization, storage, and hydrogen utilization technologies). In addition, based on the above, we will discuss the future of Japan's energy system.	Coordinator: Prof. Akiko Kaneko face-to-face
OAL5619	Topics in Engineering Mechanics and Energy IV	1	1.0	1, 2	Fall IC	Intensive		Sato Hiroyuki	In this course, students can learn High Temperature Gas-cooled Reactor (HTGR) technologies, a Generation IV nuclear system with superior safety and capability of high temperature heat supply of 1,000 deg C. Topics also includes the HTGR heat application technologies such as high efficiency helium gas turbine power generation and CO2-free massive hydrogen production. The course also deals with energy situation in Japan and trends of development in nuclear and hydrogen energies.	Coordinator: Prof. Akiko Kaneko Online (Asynchronous)
OAL5620	Topics in Engineering Mechanics and Energy V	1	1.0	1, 2	Fall IC	Intensive		Yoshida Hiroyuki	This course provides, at first, an outline of a light water reactor (boiling water reactor and pressurized water reactor) that is used as electricity generation systems, focusing on the light water reactor design procedures related to thermal-hydraulics phenomena. In the second part of this topic, numerical simulation related to thermal-hydraulics will be introduced. In this part, a multi-phase computational fluid dynamics simulation methodology will be explained briefly. Finally, this course provides issues in the application of CFD to design works of the nuclear reactor.	Coordinator: Prof. Akiko Kaneko face-to-face
OAL5621	Learning from Disasters: Extreme events and their impact on infrastructure, engineering and society	2	2.0	1, 2	Fall IC, Spr Vac	by appointment		Matsushima Takashi, Shoji Gaku	Extreme events such as hurricanes Maria, Irma and Harvey in 2017, Katrina in 2005, or the 2011 Tohoku earthquake and Tsunami in Japan, have resulted in high death tolls, and devastating damage to housing units, urban infrastructure, and lifelines (water, power ...). Emergency response to extreme events is difficult due to their large impacts, and recovery often very slow. In developing countries, where resources tend to be limited, extreme events such as earthquakes and typhoons often result in medical threats from infectious diseases due to the limited availability of clean water and emergency medical services. Since many global warming models predict a sharp increase in the number, as well as severity, of extreme events it is important to learn from past disaster, in order to reduce their potential for destruction. In this course, we will examine several major disasters, including local case histories, and discuss engineering design methods/concepts, as well as, their effects in terms of preparedness, vulnerability, robustness, flexibility, and resilience.	The course is designed as PBL (Project-Based Learning) style online course open both in University of Tsukuba and Ohio State University. Participants are supposed to belong to a small group, work together, and make a presentation as the group. The schedule will be informed in the latest Syllabus. Lecture is conducted in English. Online (Synchronous)
OAL5623	Advanced Exercise for Structure and Solid Mechanics	2	2.0	1, 2	Fall IAB	Tue5, 6		Matsuda Akihiro, Shoji Gaku, Shintaku Yuichi, Morita Naoki	This course provide workshop-style projects for issues related to structural mechanics and solid mechanics in the nuclear engineering fields. MS students select equipment for nuclear power plants and nuclear-related facilities, and conduct performance and safety evaluations related to structural mechanics and solid mechanics using advanced numerical simulation software.	Online (Synchronous)
OAL5624	Environmental Fluid Engineering	1	1.0	1, 2	Spr C	Thu3, 4	3B302	Shirakawa Naoki, Denda Masatoshi, Takewaka Satoshi, Dairaku Koji	The engineering approaches to various environmental problems in the hydrosphere will be discussed, ranging from local riverine environment to global-scale environment.	Lectures are conducted in English if requested. face-to-face
OAL5625	Advanced Exercise for Thermo-fluid Engineering	2	3.0	1, 2	Fall ABC	Thu1, 2	3L206	Kaneko Akiko, SHEN Biao	This PBL course will introduce you to advanced measurement techniques in the field of thermo-fluid engineering, with a focus on nuclear safety applications. You will learn practical knowledge about and gain hands-on experience in hydrodynamic and heat transfer measurements in a workshop environment.	face-to-face

[Program's Courses(Master's Programs)]Engineering Mechanics and Energy Associated Courses (Foundation Subjects for Major)

Course Number	Course Name	Instru- ctional Type	Credit s	stand- ard regist- ration year	Term	Meeting Days, Per- iod etc.	Classro- om	Instructor	Course Overview	Remarks
OALF000	Internship	3	1.0	1, 2	Annual	by request		構造エネルギー工 学学位プログラム 専任教員	The purpose of this course is to provide opportunities for students to work in private companies, public institutions, NGOs, etc. for weeks and help them to develop fundamental business skills and knowledge through practical experience. The students must apply both to the host organization and to the department (graduate program) of EME by themselves in advance, and submit the final report after the internship.	

[Program's Courses(Master's Programs)]Engineering Mechanics and Energy Associated Courses (Major Subjects)

Course Number	Course Name	Instru- ctional Type	Credit s	stand- ard regist- ration year	Term	Meeting Days, Per- iod etc.	Classro- om	Instructor	Course Overview	Remarks
OALF500	Seminar in Engineering Mechanics and Energy I	2	2.0	1	Annual	by appoint- ment		構造エネルギー工 学学位プログラム 専任教員	This course provides an overview of any research field of Engineering Mechanics and Energy for first-year MS students. Presentation of the individual research project is required.	
OALF501	Seminar in Engineering Mechanics and Energy II	2	2.0	2	Annual	by appoint- ment		構造エネルギー工 学学位プログラム 専任教員	This course provides an overview of any research field of Engineering Mechanics and Energy and evaluates the individual research project for second-year MS students. Presentation of the individual research project is required.	
OALF502	Research in Engineering Mechanics and Energy I	3	4.0	1	Annual	by request		構造エネルギー工 学学位プログラム 専任教員	This course is for individual research projects in Engineering Mechanics and Energy emphasizing fundamental knowledge for first-year MS students. This course is approved by advisors.	
OALF503	Research in Engineering Mechanics and Energy II	3	4.0	2	Annual	by request		構造エネルギー工 学学位プログラム 専任教員	This course is for individual research projects in Engineering Mechanics and Energy emphasizing advanced knowledge for second-year MS students. This course is approved by advisors, aiming to complete MS theses.	
OALF504	Seminar in Engineering Mechanics and Energy Ia	2	1.0	1	SprABC	by appoint- ment		構造エネルギー工 学学位プログラム 専任教員	This course provides an overview of any research field of Engineering Mechanics and Energy for first-year MS students. Presentation of the individual research project is required.	Only students enrolled in the fall and those approved by the program leader can take this course.
OALF505	Seminar in Engineering Mechanics and Energy Ib	2	1.0	1	FallABC	by appoint- ment		構造エネルギー工 学学位プログラム 専任教員	This course provides an overview of any research field of Engineering Mechanics and Energy for first-year MS students. Presentation of the individual research project is required.	Only students enrolled in the fall and those approved by the program leader can take this course.
OALF506	Seminar in Engineering Mechanics and Energy IIa	2	1.0	2	SprABC	by appoint- ment		構造エネルギー工 学学位プログラム 専任教員	This course provides an overview of any research field of Engineering Mechanics and Energy and evaluates the individual research project for second-year MS students. Presentation of the individual research project is required.	Only students enrolled in the fall and those approved by the program leader can take this course.
OALF507	Seminar in Engineering Mechanics and Energy IIb	2	1.0	2	FallABC	by appoint- ment		構造エネルギー工 学学位プログラム 専任教員	This course provides an overview of any research field of Engineering Mechanics and Energy and evaluates the individual research project for second-year MS students. Presentation of the individual research project is required.	Only students enrolled in the fall and those approved by the program leader can take this course.
OALF508	Research in Engineering Mechanics and Energy Ia	3	2.0	1	SprABC	by request		構造エネルギー工 学学位プログラム 専任教員	This course is for individual research projects in Engineering Mechanics and Energy emphasizing fundamental knowledge for first-year MS students. This course is approved by advisors.	Only students enrolled in the fall and those approved by the program leader can take this course.
OALF509	Research in Engineering Mechanics and Energy Ib	3	2.0	1	FallABC	by request		構造エネルギー工 学学位プログラム 専任教員	This course is for individual research projects in Engineering Mechanics and Energy emphasizing fundamental knowledge for first-year MS students. This course is approved by advisors.	Only students enrolled in the fall and those approved by the program leader can take this course.
OALF510	Research in Engineering Mechanics and Energy IIa	3	2.0	2	SprABC	by request		構造エネルギー工 学学位プログラム 専任教員	This course is for individual research projects in Engineering Mechanics and Energy emphasizing advanced knowledge for second-year MS students. This course is approved by advisors, aiming to complete MS theses.	Only students enrolled in the fall and those approved by the program leader can take this course.
OALF511	Research in Engineering Mechanics and Energy IIb	3	2.0	2	FallABC	by request		構造エネルギー工 学学位プログラム 専任教員	This course is for individual research projects in Engineering Mechanics and Energy emphasizing advanced knowledge for second-year MS students. This course is approved by advisors, aiming to complete MS theses.	Only students enrolled in the fall and those approved by the program leader can take this course.

[Program's Courses (Doctoral Programs)] Engineering Mechanics and Energy Associated Courses (Major Subjects)

Course Number	Course Name	Instru- ctional Type	Credit s	stand- ard regist- ration year	Term	Meeting Days, Per- iod etc.	Classro- om	Instructor	Course Overview	Remarks
OBLF500	Seminar in Engineering Mechanics and Energy	2	2.0	1	Annual	by appointment		構造エネルギー工学学位プログラム専任教員	This course provides an overview of any research field of Engineering Mechanics and Energy for Ph.D. students. Presentation of the individual research project is required.	Identical to O2CM102.
OBLF501	Research in Engineering Mechanics and Energy	3	6.0	1	Annual	by request		構造エネルギー工学学位プログラム専任教員	This course is for individual research projects in Engineering Mechanics and Energy for Ph.D. students. This course is approved by advisors, aiming to complete Ph.D. dissertations.	Identical to O2CM101.
OBLF502	Seminar in Engineering Mechanics and Energy A	2	1.0	1	SprABC	by appointment		構造エネルギー工学学位プログラム専任教員	This course provides an overview of any research field of Engineering Mechanics and Energy for Ph.D. students. Presentation of the individual research project is required.	Only students enrolled in the fall and those approved by the program leader can take this course.
OBLF503	Seminar in Engineering Mechanics and Energy B	2	1.0	1	FallABC	by appointment		構造エネルギー工学学位プログラム専任教員	This course provides an overview of any research field of Engineering Mechanics and Energy for Ph.D. students. Presentation of the individual research project is required.	Only students enrolled in the fall and those approved by the program leader can take this course.
OBLF504	Research in Engineering Mechanics and Energy A	3	3.0	1	SprABC	by request		構造エネルギー工学学位プログラム専任教員	This course is for individual research projects in Engineering Mechanics and Energy for Ph.D. students. This course is approved by advisors, aiming to complete Ph.D. dissertations.	Only students enrolled in the fall and those approved by the program leader can take this course.
OBLF505	Research in Engineering Mechanics and Energy B	3	3.0	1	FallABC	by request		構造エネルギー工学学位プログラム専任教員	This course is for individual research projects in Engineering Mechanics and Energy for Ph.D. students. This course is approved by advisors, aiming to complete Ph.D. dissertations.	Only students enrolled in the fall and those approved by the program leader can take this course.

[Degree Programs' Common Courses]Common (Foundation Subjects for Major)

Course Number	Course Name	Instru- ctional Type	Credit s	stand- ard regist- ration year	Term	Meeting Days, Per- iod etc.	Classro- om	Instructor	Course Overview	Remarks
OAL0000	Introductory Technical Writing	1	2.0	1, 2	SprAB	Tue5, 6	3Z112- 1	Millar Neil	In this course students will develop skills for effective academic writing. Topics will include (1) writing in an appropriate academic style, (2) sentence and paragraph structure, (3) making a text 'flow' (cohesion), (4) writing definitions, and (5) describing processes. Students will learn how to produce a number of key text types including extended definitions and problem-solution texts. There will be a strong focus on vocabulary development using the Academic Word List. Outside class, each week, students will complete self-study vocabulary, grammar exercises and short writing tasks. Students will receive personalized feedback on assessed writing tasks.	* Class size is limited to 60 students. This class is the same contents as OAL0001, OAL0012, O2CA102 and O2CA117. For exchange students, only those enrolled in the SIE program are eligible to take this course. Identical to O2CA101. Lecture is conducted in English. face-to-face * To enroll, please sign up on TWINS and come to the first class. During the first two weeks, priority will be given to students from Systems and Information Engineering. During this time, students from other graduate schools can register and attend. However, this does not guarantee enrollment. After week 2, if there is space, students from other graduate schools can enroll.
OAL0001	Introductory Technical Writing	1	2.0	1, 2	FallAB	Tue5, 6	3Z112- 1	Millar Neil	In this course students will develop skills for effective academic writing. Topics will include (1) writing in an appropriate academic style, (2) sentence and paragraph structure, (3) making a text 'flow' (cohesion), (4) writing definitions, and (5) describing processes. Students will learn how to produce a number of key text types including extended definitions and problem-solution texts. There will be a strong focus on vocabulary development using the Academic Word List. Outside class, each week, students will complete self-study vocabulary, grammar exercises and short writing tasks. Students will receive personalized feedback on assessed writing tasks.	* Class size is limited to 60 students. This class is the same contents as OAL0000 and OAL0012. For exchange students, only those enrolled in the SIE program are eligible to take this course. Lecture is conducted in English. face-to-face * To enroll, please sign up on TWINS and come to the first class. During the first two weeks, priority will be given to students from Systems and Information Engineering. During this time, students from other graduate schools can register and attend. However, this does not guarantee enrollment. After week 2, if there is space, students from other graduate schools can enroll.

OAL0002	Advanced Technical Writing	1	2.0	1, 2	SprAB	Thu5, 6	3Z108	Millar Neil	<p>In this course students will apply skills and knowledge developed in Introductory Technical Writing to construct a short research paper based an aspect of their own research. In the first class students will develop a plan for their research paper. In following classes students will learn how to construct the sections that typically make up a research article (Introduction, Methods, Results, Discussion). There will be a strong focus on analysing texts in order to understand the type of information contained in each of the sections, how it is organised, and the typical language features (e.g. vocabulary, grammar structures and phrases). In addition to simple generic texts, students will select and analyse a number of research articles from their own discipline. Students will also learn how to use text analysis tools to help them employ appropriate phraseology in their writing. Students will submit and receive detailed feedback drafts of each section of their paper before submitting a final version for assessment.</p>	<p>* Students wishing to take this course should have already completed Introductory Technical Writing. Class size is limited to 12 students. This class is the same contents as OAL0003 and O2CA104. For exchange students, only those enrolled in the SIE program are eligible to take this course. Identical to O2CA103. Lecture is conducted in English, face-to-face  * To enroll, please sign up on TWINS and come to the first class. During the first two weeks, priority will be given to students from Systems and Information Engineering. During this time, students from other graduate schools can register and attend. However, this does not guarantee enrollment. After week 2, if there is space, students from other graduate schools can enroll.</p>
OAL0003	Advanced Technical Writing	1	2.0	1, 2	FallAB	Thu5, 6	3Z108	Millar Neil	<p>In this course students will apply skills and knowledge developed in Introductory Technical Writing to construct a short research paper based an aspect of their own research. In the first class students will develop a plan for their research paper. In following classes students will learn how to construct the sections that typically make up a research article (Introduction, Methods, Results, Discussion). There will be a strong focus on analysing texts in order to understand the type of information contained in each of the sections, how it is organised, and the typical language features (e.g. vocabulary, grammar structures and phrases). In addition to simple generic texts, students will select and analyse a number of research articles from their own discipline. Students will also learn how to use text analysis tools to help them employ appropriate phraseology in their writing. Students will submit and receive detailed feedback drafts of each section of their paper before submitting a final version for assessment.</p>	<p>* Students wishing to take this course should have already completed Introductory Technical Writing. Class size is limited to 12 students. This class is the same contents as OAL0002. For exchange students, only those enrolled in the SIE program are eligible to take this course. Lecture is conducted in English, face-to-face  * To enroll, please sign up on TWINS and come to the first class. During the first two weeks, priority will be given to students from Systems and Information Engineering. During this time, students from other graduate schools can register and attend. However, this does not guarantee enrollment. After week 2, if there is space, students from other graduate schools can enroll.</p>



OAL0004	Academic Presentations 1	1	1.0	1, 2	SprAB	Tue2	3Z108	Millar Neil	<p>In this practical course students will develop skills to help them make English academic presentations with clarity and confidence. Students will learn about and make three types of presentations: (1) Academic Introductions; (2) Describing and Comparing Objects; and (3) Explaining a Process. In class, students will analyse and discuss sample presentations and learn useful techniques and language. There will be a strong focus on developing clear diction - e.g. pronunciation, word stress, sentence stress and pausing. There will be plenty of opportunities for students to practice presentation skills and to evaluate their own and other's work.</p>	<p>* Class size is limited to 18 students. This class is the same contents as OAL0005. For exchange students, only those enrolled in the SIE program are eligible to take this course. Lecture is conducted in English. face-to-face  * To enroll, please sign up on TWINS and come to the first class. During the first two weeks, priority will be given to students from Systems and Information Engineering. During this time, students from other graduate schools can register and attend. However, this does not guarantee enrollment. After week 2, if there is space, students from other graduate schools can enroll.</p>
OAL0005	Academic Presentations 1	1	1.0	1, 2	SprAB	Tue3	3Z108	Millar Neil	<p>In this practical course students will develop skills to help them make English academic presentations with clarity and confidence. Students will learn about and make three types of presentations: (1) Academic Introductions; (2) Describing and Comparing Objects; and (3) Explaining a Process. In class, students will analyse and discuss sample presentations and learn useful techniques and language. There will be a strong focus on developing clear diction - e.g. pronunciation, word stress, sentence stress and pausing. There will be plenty of opportunities for students to practice presentation skills and to evaluate their own and other's work.</p>	<p>* Class size is limited to 18 students. This class is the same contents as OAL0004. This 3rd period class will take place only if the 2nd period class is full. For exchange students, only those enrolled in the SIE program are eligible to take this course. Lecture is conducted in English. face-to-face  * To enroll, please sign up on TWINS and come to the first class. During the first two weeks, priority will be given to students from Systems and Information Engineering. During this time, students from other graduate schools can register and attend. However, this does not guarantee enrollment. After week 2, if there is space, students from other graduate schools can enroll.</p>

OAL0006	Academic Presentations 2	1	1.0	1, 2	FallAB	Tue2	3Z108	Millar Neil	<p>This course continues from Academic Presentations 1. In this practical course students will develop skills to help them present their research in English with clarity and confidence. The first part of the course, students will learn about two types of presentations: (1) Defining a Concept; and (2) Problem-Solution Speech. In class students will analyse and discuss sample presentations and learn useful techniques and language. In the second part, students will make a presentation based on an aspect of their research. This will involve applying skills and knowledge that they have learnt in both courses.</p>	<p>* Class size is limited to 18 students. This class is the same contents as OAL0007. For exchange students, only those enrolled in the SIE program are eligible to take this course. Lecture is conducted in English. face-to-face  * To enroll, please sign up on TWINS and come to the first class. During the first two weeks, priority will be given to students from Systems and Information Engineering. During this time, students from other graduate schools can register and attend. However, this does not guarantee enrollment. After week 2, if there is space, students from other graduate schools can enroll.</p>
OAL0007	Academic Presentations 2	1	1.0	1, 2	FallAB	Tue3	3Z108	Millar Neil	<p>This course continues from Academic Presentations 1. In this practical course students will develop skills to help them present their research in English with clarity and confidence. The first part of the course, students will learn about two types of presentations: (1) Defining a Concept; and (2) Problem-Solution Speech. In class students will analyse and discuss sample presentations and learn useful techniques and language. In the second part, students will make a presentation based on an aspect of their research. This will involve applying skills and knowledge that they have learnt in both courses.</p>	<p>* Class size is limited to 18 students. This class is the same contents as OAL0006. This 3rd period class will take place only if the 2nd period class is full. For exchange students, only those enrolled in the SIE program are eligible to take this course. Lecture is conducted in English. face-to-face  * To enroll, please sign up on TWINS and come to the first class. During the first two weeks, priority will be given to students from Systems and Information Engineering. During this time, students from other graduate schools can register and attend. However, this does not guarantee enrollment. After week 2, if there is space, students from other graduate schools can enroll.</p>

OAL0008	Academic Speaking 1	1	1.0	1, 2	SprAB	Thu2	3Z112-1	Millar Neil	<p>This course aims to help students improve their speaking skills for communicating in both academic and general contexts. Each lesson is based around a written text or video related a current general science topic (e.g. vaccines, space exploration, robotics, artificial intelligence). Students will learn related vocabulary, practice a selected language function or form and discuss the topic in groups. While the course integrates all four skills areas (speaking, listening, reading and writing), there is a stronger focus on speaking. Each week students will record and submit a spoken homework assignment related to the topic studied in class.</p>	<p>* Class size is limited to 35 students. For exchange students, only those enrolled in the SIE program are eligible to take this course. Lecture is conducted in English. face-to-face * To enroll, please sign up on TWINS and come to the first class. During the first two weeks, priority will be given to students from Systems and Information Engineering. During this time, students from other graduate schools can register and attend. However, this does not guarantee enrollment. After week 2, if there is space, students from other graduate schools can enroll.</p>
OAL0010	Academic Speaking 2	1	1.0	1, 2	FallAB	Thu2	3Z108	Millar Neil	<p>This course aims to help students develop academic skills that they will need when studying in English. The lessons are based around general (but non-specialised) academic themes, including health and medicine, science and robots, alternative energy and genetic engineering. The course integrates all four skills areas (speaking, listening, reading and writing), with a stronger focus on speaking. Each week students will record and submit a spoken homework assignment related to the topic studied in class.</p>	<p>* Class size is limited to 35 students. For exchange students, only those enrolled in the SIE program are eligible to take this course. Lecture is conducted in English. face-to-face * To enroll, please sign up on TWINS and come to the first class. During the first two weeks, priority will be given to students from Systems and Information Engineering. During this time, students from other graduate schools can register and attend. However, this does not guarantee enrollment. After week 2, if there is space, students from other graduate schools can enroll.</p>
OAL0013	MDA Interdisciplinary Collaborative Seminar	2	2.0	1, 2	Annual	by request		<p>URATA Junji, Kawashima Hiroichi, TOBITA Mikio, EOM SUNYONG</p>	<p>Omnibus classes will be conducted by experts in the fields of mathematics, data science, and AI (MDA) from researchers, companies, and local governments in Japan and abroad, as well as featuring lectures on recent significant issues. The primary objective of these classes is to nurture problem-solving skills and foster innovation by leveraging MDA methodologies and integrating knowledge from other interdisciplinary fields.</p>	

[Graduate School of Science and Technology] Interdisciplinary Foundation Courses

Course Number	Course Name	Instru- ctional Type	Credit s	stand- ard regist- ration year	Term	Meeting Days, Per- iod etc.	Classro- om	Instructor	Course Overview	Remarks
OAHO101	Safety and Health for Chemists	4	1.0	1, 2	SprAB	Tue3	3A301	Sato Tomoo, Momotake Atsuya, Nagatomo Shigenori, Kotani Hiroaki, Ohyoshi Takayuki	Hazardousness of chemical substances will be explained for graduate students who handle chemical substances. Basic and expert knowledge and skills to use, store and dispose of chemical substances safely will also be covered.	face-to-face
OAHO102	Basis and Application in Radiological Science	5	1.0	1, 2	SprABC	Intensive		Sakaguchi Aya, Yamasaki Shinya, Furukawa Jun	In this course, students can learn the recent advanced radiation science and radiosience. In addition, lectures on the "laws and regulations for handling radiation/radioisotopes" and practical training on "basic techniques for handling radiation/radioisotopes" will be given in accordance with the official course of beginner users of radiation/radionuclides at the University of Tsukuba. Students will be able to measure radiation levels and conduct contamination-check in order to deepen their understanding of radiation and radioisotopes.	詳細はTWINS掲示板を確認
OAHO103	History of the Universe	1	1.0	1, 2	FallB	Intensive		Esumi Shinichi, Ohsuga Ken, Miyake Yutaka, Ukegawa Fumihiko, Wada Hiroshi, Takeuchi Yuji, Shoji Mitsuo, Nishimura Shunji, Kuno Nario, Tsunogae Toshiaki	Although the universe does sound/look like continuing forever, this is known to be incorrect, and we now know it begins with an explosive big-bang, followed by formations of elements as well as births of stars, galaxies and solar system including our earth later on. Human race and civilization have been evolved after the birth of life on the earth in the long history of the universe. The different stages of time in the history of the universe are focused and discussed in terms of elementary particle, nuclear, astro- and bio- physics, earth-geoscience, biology, human and civilization history, a series of lectures will be given by the specialists of each topics.	face-to-face 詳細はTWINS掲示板を確認
OAHO111	Fundamental Physical Constants and Metrology	1	1.0	1, 2	FallIAB	Fri5		Ozawa Akira, Kaneko Nobuhisa, Fujii Kenichi, Shimizu Yukiko, Takamizawa Aki-fumi, Tanaka Hideyuki, HIRAI Akiko	Physical standards and physical constants are the bases that support all science and technology. The systematics and the precise advanced technology to obtain them are explained. In particular, precise measurements for electric quantity, time, length, temperature, and mass, and their evaluation will be described in detail.	Identical to O1BA004. face-to-face or Online (on-demand)
OAHO112	Presentation Skill for Engineers and Scientists	1	1.0	1, 2	Sum Vac	Intensive		Sharmin Sonia	プレゼンテーション技術はあらゆる場面において求められる現代の重要なスキルである。本講義では、プレゼンテーションの基本技術と、国際会議等における英語を用いた論文発表や口述講演に必要な科学・技術英語の技法を学ぶ。具体的には、論文の章立て、優れた論文の特徴、プレゼンテーションの準備、スライドの作成、効果的なプレゼンテーションにおける言語・非言語コミュニケーションの重要性について学ぶ。	Identical to O1BA005. Instructional Type : Online
OAHO113	Science in Japan I	1	1.0	1	FallIAB	Thu6		Sellaiyan Selvakumar	This course introduces the basic concepts of the operation of the semiconductor devices that comprise today's integrated circuits. Topics to be discussed (1) Semiconductor materials, basic device physics, p-n junctions, metal-semiconductor junctions and transistors, bipolar device and metal-oxide semiconductor. (2) The growth of semiconductors as a single crystal, crystal cutting and polishing and wafer production in the semiconductor industry. (3) The fundamentals of defects such as point defects of semiconductors, dislocation, atomic diffusion, etc. and how they affect material properties and the device characteristics. (4) The defect related optoelectronic application. (5) The development of solar power energy and recent challenges in the semiconductor industry in Japan. Finally the recent trends in some other advanced materials will be also discussed.	Identical to O1BA008. Online (Asynchronous)

0AH0114	Science in Japan II	1	1.0	1	SprAB	Wed1	3Z108	Science in Japan II 担当非常勤講師	Elementary course on the developments of science and technology in Japan.	Identical to 01BA009. Lecture is conducted in English. Details will be announced. face-to-face
0AH0201	Designing and Planning for National Land (I)	1	2.0	1, 2	SprBC	Wed5, 6		Okamoto Naohisa, Arita Tomokazu, Taniguchi Mamoru	To deepen understanding of policies in the fields of national land transportation function, tourism, housing and town development based on issues such as environment / energy problems, declining birthrate and aging population, population decline, and international urbanization through introduction of concrete policies in recent years. With the goal. This course aims to widely convey to the research science students the current state awareness and decision-making ability cultivated in the administrative organization that supports the foundations of Japan's land, region, and city and realizes the safety and security of economy and living. This will help students acquire the ability to predict and evaluate the effects and impacts of technology on society, as well as deepen their understanding of social demands and engineer ethics for engineers and researchers. For this reason, lectures will be given each time by welcoming people involved in policy from the Ministry of Land, Infrastructure, Transport and Tourism.	Online (partially face-to-face) オンライン (LIVE配信) を基本とする。
0AH0202	Designing and Planning for National Land (II)	1	2.0	1, 2	FallAB	Wed5, 6		Okamoto Naohisa, Arita Tomokazu, Taniguchi Mamoru	The purpose of this course is to develop the ability to understand the role of cities and roads in Japan's society and economy and daily life, and to consider how to manage them. This course aims to widely convey to the research science students the current state awareness and decision-making ability cultivated in the administrative organization that supports the foundations of Japan's land, region, and city and realizes the safety and security of economy and living. This will help students acquire the ability to predict and evaluate the effects and impacts of technology on society, as well as deepen their understanding of social demands and engineer ethics for engineers and researchers. For this reason, lectures will be given each time by welcoming people involved in policy from the Ministry of Land, Infrastructure, Transport and Tourism.	Online (partially face-to-face) オンライン (LIVE配信) を基本とする。
0AH0203	Renewable Energy Engineering	1	2.0	1, 2	FallAB	Wed1, 2	3B303	Aki Hirohisa	This course provides discussions on renewable energy from various viewpoints: fundamental principle, technology development and challenges, and expected roles in energy system, social impact including state holders.	Students from various departments are welcome. Online (partially face-to-face)
0AH0204	Introduction to Risk and Resilience Engineering	1	1.0	1	SprAB	Mon3	3Z0110	Aoyama Hisae, Fukushima Sachiko, Yagyu Tomohiko, Masaki Hiroumi, Takayasu Akitoshi, Omote Kazumasa, Suzuki Kengo, Saito Yuichi, Kinoshita Yohei, Suzuki Tsutomu, Hatano Yuku, Furukawa Hiroshi, Sato-Ilic Mika, Endo Yasunori, Okajima Keiichi, Taniguchi Ayako, Itoh Makoto, Shoji Gaku, Umemoto Michitaka, Nishide Takashi, Akimoto Yutaro, KITAJIMA SO, HOSHIKAWA Naoto, ABDULRAHMAN JOUBI	The areas related to risk resilience engineering include various fields such as environment, energy, city planning, information security, etc. The concept of risk appears in various fields. You will learn risk and resilience among various areas and difference among those areas.	face-to-face

0AH0205	Special Lecture on Social Innovation by ICT	4	2.0	1, 2	Fall/AB	Thu5, 6	3B311	SHOUNO Kazuhiro et al.	<p>This class aims to nurture "human resources who initiate innovation" by utilizing ICT through lectures and exercises by lecturers invited from the industrial world. The class consists of an overview section and an exercise section. In the overview section, students will learn the key concepts and methods for innovation in society and business by referring to various innovation case studies from Japan and abroad. In the exercise section, participants will learn the process of design thinking to generate creative ideas. Through group work, students will practice everything from fieldwork to proposing service models for issues around them.</p> <p>This class is supported by the Digital Business Innovation Center of CeFIL (DBIC), a non-profit organization that promotes digital transformation (DX). DBIC is an organization that promotes digital transformation (DX) and social innovation projects, and was established in 2014. 31 major corporations such as finance, insurance, manufacturing, IT, aviation, postal services, railroad and other industries are listed as members.</p>	If the number of applicants exceeds 30 people, participants will be selected by a lottery. Online (partially face-to-face) Refer to manaba for details. Any changes in the class format will be announced on the Twins bulletin board.
0AH0206	Computational Science Literacy	1	1.0	1, 2	Spr/Vac	Intensive	3B401	Kusaka Hiroyuki, Nakatsukasa Takashi, harada ryuhei, YOSHIKAWA Kohji, Tong Xiao-Min, Ishizuka Naruhito, Kameda Yoshinari, Takahashi Daisuke, Bou Savong, Doan Quang Van, Yajima Hidenobu	<p>超高性能計算機を用いた数値解析により科学の未踏領域を切り拓く計算科学は実験・理論に並ぶ、重要かつ最先端の研究手段であり、その重要性を増している。これからの科学を探究するには計算科学の基礎的な知識と方法論を身に付けておくのは必須であり、いわば「読み書き」すなわちリテラシーであるといえる。この講義はこれからの科学にとってのリテラシーである計算科学についての入門編である。計算科学研究センターの教員により各分野における計算科学による研究を概説し、さらに計算科学から科学諸分野を分野横断的かつ包括的に捉える大局的な視点を与えることを目指す。また、計算科学を支える最新の計算機技術についても概説する。</p>	face-to-face (partially online)
0AH0207	Computational Science Literacy	1	1.0	1, 2	Spr/Vac	Intensive	3B406	Kusaka Hiroyuki, Nakatsukasa Takashi, harada ryuhei, YOSHIKAWA Kohji, Tong Xiao-Min, Ishizuka Naruhito, Kameda Yoshinari, Takahashi Daisuke, Bou Savong, Doan Quang Van, Yajima Hidenobu	<p>Computational science, which opens up unexplored areas of science through numerical analysis using ultra-high performance computers, is an important and cutting-edge research tool that ranks alongside experiment and theory, and its importance is increasing. In order to explore the future of science, it is essential to acquire basic knowledge and methodology of computational science, which can be called "reading and writing" or literacy. This lecture is an introduction to computational science, which is the literacy for the future of science. Faculty members of the Research Center for Computational Science will give an overview of research in computational science in various fields, and aim to give a broad perspective on various scientific fields from computational science in a cross-disciplinary and comprehensive manner. The latest computer technologies supporting computational science will also be outlined.</p>	Lecture is conducted in English. face-to-face (partially online)
0AH0208	High Performance Parallel Computing Technology for Computational Sciences	1	1.0	1, 2	Sum/Vac	Intensive		Boku Taisuke, Tatebe Osamu, Takahashi Daisuke, Nukada Akira, Tadano Hiroto, Fujita Norihisa, Kobayashi Ryohei	<p>High performance computing is the basic technology needed to support today's large scale scientific simulations. It covers a wide variety of issues on hardware and software for high-end computing such as high speed computation, high speed networking, large scale memory and disk storage, high speed numerical algorithms, programming schemes and the system softwares to support them. Current advanced supercomputer systems are based on large scale parallel processing systems. Nowadays, even application users are required to understand these technologies to a certain level for their effective utilization. In this class, we focus on the basic technology of high-end computing systems, programming, algorithms and performance tuning for application users who aim to use these systems for their practical simulation and computing.</p>	face-to-face

0AH0209	High Performance Parallel Computing Technology for Computational Sciences	1	1.0	1, 2	Spr Vac	Intensive	Boku Taisuke, Tatebe Osamu, Takahashi Daisuke, Nukada Akira, Tadano Hiroto, Fujita Norihisa, Kobayashi Ryohei	High performance computing is the basic technology needed to support today's large scale scientific simulations. It covers a wide variety of issues on hardware and software for high-end computing such as high speed computation, high speed networking, large scale memory and disk storage, high speed numerical algorithms, programming schemes and the system softwares to support them. Current advanced supercomputer systems are based on large scale parallel processing systems. Nowadays, even application users are required to understand these technologies to a certain level for their effective utilization. In this class, we focus on the basic technology of high-end computing systems, programming, algorithms and performance tuning for application users who aim to use these systems for their practical simulation and computing.	Lecture is conducted in English. face-to-face
0AH0210	Basis and practical training of machining	5	1.0	1, 2	Sum Vac	Intensive	Enami Kazuhiro	This course describes the basis of machining and cutting in order to enrich the knowledge and experience of machining, which is the base of manufacturing. Students learn the basic operation of machines by practical training of turning and milling at the workshop. Successful candidates get permission to use the open workshop of engineering workshop division.	face-to-face 講義と実習は対面形式で行う。 なお、実習の制限により、受講希望者の人数によっては抽選によって受講者を決定する。
0AH0301	Introduction to Earth Evolution Sciences	1	1.0	1, 2	Annual	Intensive	Tsunogae Toshiaki	地球史における地球表層および内部の進化プロセスについて講義する。地球進化的な視点から地球の表層(たとえば地層、地殻、大陸の形成、生物の進化と絶滅、付加体の形成、プレート運動など)、および内部(地球の層状構造の形成、地震の発生、マグマの発生、鉱物の相転移など)で起こる様々な地質学的現象に関する知識と基本的な研究能力を修得するとともに、その背後にある基本原理を探求する能力を身につけることができる。地球科学の研究コンプライアンスに関わる内容を含む。	
0AH0303	Analysis of Environmental Dynamics of Radionuclides	1	1.0	1, 2	SprAB	Thu1	Onda Yuichi, 津旨大輔, Sakaguchi Aya, Sueki Keisuke, Hatano Yuko, Asanuma Jun, Yamaji Keiko, Furukawa Jun, Takahashi Junko, Kato Hiroaki	原発事故等に伴って環境中に放出された放射性核種について、その拡散、沈着、移行過程と水・物質循環との関わりを理解するとともに、環境影響評価のためのモニタリング手法およびモデリング手法を紹介する。	
0AH0304	Lecture on Geographic Information	1	1.0	1, 2	FallAB	Tue2	Yamashita Akio, Kureha Masaaki, Tsutsumi Jun, Matsui Keisuke, Morimoto Takehiro, Kubo Tomoko	地図と地理空間情報を用いた基礎的・応用的研究について講義する。アナログ情報としての地図の歴史、日本や諸外国における都市や農村を対象としたさまざまな地図の特徴について解説する。また、観光や防災・環境など特定の主題を扱った地図の表現法や研究への活用などについて解説する。デジタル情報としての地理空間情報の仕組みや普及・発展の歴史、地理学や関連諸分野におけるそれらを活用した具体的な地域分析手法や研究事例について紹介する。	
0AH0305	Omnibus Lecture in Biology	1	1.0	1, 2	FallA	Intensive	OKAMOTO Akihiro, tanaka norio, 正木隆, Nagamune Kisaburo, Maruyama Kyonoshin, Shitara Hiroshi, Tajima Yuko, Chiba Yoko, 藤原 すみれ, 保坂健太郎, Matsui Hisanori, Yabuki Akinori, 守屋 繁春	生命の基本原理や生物界の多様性を理解することを目的として、特に、先端細胞生物学、ならびに、先端分子生物学における総論的な教養教育の講義を実施する。国内の著名な研究機関において先端的な生命科学の方法論を用いて行われている最前線の研究をオムニバス形式で紹介する。	Identical to 01AA007. 10/28-10/29 Online (Synchronous)

0AH0306	Diversity of Organisms	1	1.0	1, 2	FallC	Intensive		Ishida Ken-ichiro, Hirakawa Yoshihisa	生命の基本原理や生物界の多様性を理解することを目的として、系統分類・進化学、生態学、植物発生・生理学、動物発生・生理学、分子細胞生物学、ゲノム情報学、先端細胞生物学、先端分子生物学における総論的な教養教育の講義を実施する。生命の樹(生物界全体の系統樹)を視野に、生物界の多様性の実態とそれを生み出した系統進化の歴史を解明しようとする最前線の研究を紹介する。当該分野の最新、かつ、幅広い知識を習得することで、理論的な思考を養い、専門領域を超えた自らの研究能力の向上に役立てる。	Open in even number academic years. Identical to 01AA041.
0AH0307	Evolution of Organisms	1	1.0	1, 2					With the aim of understanding the basic principles of life and the diversity of the living world, systematic classification/evolutionary chemistry, ecology, plant development/physiology, animal development/physiology, molecular cell biology, genomic informatics, advanced cell biology, . Conduct general liberal arts education in advanced molecular biology science. With a view to the tree of life (a phylogenetic tree of the entire living world), we will introduce the forefront research that seeks to elucidate the evolutionary mechanism at the molecular, individual, and collective levels that created the diversity of the living world. By gaining the latest and broadest knowledge in the field, we will develop theoretical thinking and help improve one's research ability beyond the specialized field.	Open in odd number academic years. Identical to 01AA048. face-to-face(partially online)
0AH0308	Molecular Mechanisms of Life	1	1.0	1, 2	FallB	Intensive		Chiba Tomoki, Tsuruta Fuminori	生命の基本原理や生物界の多様性を理解することを目的として、系統分類・進化学、生態学、植物発生・生理学、動物発生・生理学、分子細胞生物学、ゲノム情報学、先端細胞生物学、先端分子生物学における総論的な教養教育の講義を実施する。生命のセントラルドグマを中心とした多様な分子カスケードによって生み出される生命の遺伝、代謝、調節機構を解明しようとする最前線の研究を紹介する。当該分野の最新、かつ、幅広い知識を習得することで、理論的な思考を養い、専門領域を超えた自らの研究能力の向上に役立てる。	Open in even number academic years. Identical to 01AA043.
0AH0309	Cells as a Unit of Life	1	1.0	1, 2					生命の基本原理や生物界の多様性を理解することを目的として、系統分類・進化学、生態学、植物発生・生理学、動物発生・生理学、分子細胞生物学、ゲノム情報学、先端細胞生物学、先端分子生物学における総論的な教養教育の講義を実施する。細胞は生命の基本単位であり、その理解は生物学の根幹となる。この細胞の形態と機能の相関を解明しようとする最前線の研究を紹介する。当該分野の最新、かつ、幅広い知識を習得することで、理論的な思考を養い、専門領域を超えた自らの研究能力の向上に役立てる。	Open in odd number academic years. Identical to 01AA045. face-to-face(partially online)
0AH0310	Special Lecture on Science Communication	4	1.0	1, 2	SprB	Intensive		Wood Matthew Christopher	This course introduces the practice of science communication and its roles in the the complex relationship between science and society. Through a series of active discussion-based classes, we will review the foundational theories of science communication, and examine the practices, relevance and importance of science communication in the modern world.	Identical to 01AA010. Identical to 01AA010. Lectures are conducted in English if requested. face-to-face
0AH0311	Introduction to Agro-Bioresources Science and Technology	1	1.0	1	SprAB	Fri4	2B411	Kashiwabara Shin-ichi, Ujiiie Kiyokazu, Yamashita Yuji, Yoshimoto Syuhei, Nomura Nobuhiko, Utada Andrew S, Kumano Takuto, Kimura Keiji, Oguchi Taichi, Fukuda Naoya, Yoshioka Yosuke	生物資源科学の基盤を形成する学問体系を紹介するとともに、当該関連分野の基本的な知識と様々な研究手法について学ぶ。生物資源科学分野の最新、かつ、幅広い知識を系統的に学習することで、理工情報生命学術院における研究課題の設定と計画の立案・遂行に必要な基礎的な知識と能力の向上に役立つ。	生物資源科学学位プログラムの学生においては生物資源科学関連科目。授業形式については、manaba等で周知する。 Online(partially face-to-face)



0AH0312	Introduction to International Agro-Bioresources Science and Technology	1	1.0	1	SprC	Wed1,2	Nomura Koji, Shuto Hisato, Takeshita Norio, Sugimoto Takuya, Kokawa Mito, Kang Seung Won, Abe Junichi P., Ishii Atsushi, Tofael Ahamed, Neves Marcos Antonio	Students will be introduced to the academic systems that form the foundation of bioresource science and learn about the basic knowledge and various research methods in the relevant fields. By systematically learning the latest and broadest knowledge in the field of bioresource science from an international perspective, this course will help students improve their basic knowledge and abilities necessary for setting up and planning research projects in the Faculty of Science, Technology, Information and Life Sciences. Classes will be conducted in English.	生物資源科学学位プログラムの学生においては生物資源科学関連科目 教室2C棟102 face-to-face オンデマンドでも行う
0AH0313	Topics in Agrobiological Science I	1	1.0	1, 2	FallB	Intensive	Nomura Koji	Students will learn basic knowledge and various research methods in the field of agrobiological science related to plant breeding, crop science, olericulture and floriculture science, pomology and postharvest physiology of fruit, animal science, biological systems regulation science, epigenetics, plant parasitic mycology, applied entomology and zoology, forest ecotopology, conservation of regional resources science, environmental soil chemistry etc. By systematically learning the latest and broadest knowledge in the field, this lecture will help students improve their basic knowledge and abilities necessary for setting up and planning research themes, and conducting experiments in the Faculty of Science, Technology, Information and Life Sciences.	生物資源科学学位プログラムの学生においては生物資源科学関連科目 face-to-face (partially online)
0AH0314	Topics in Agricultural Economics and Sociology I	1	1.0	1, 2	FallB	Intensive	Shuto Hisato	農林社会経済学領域の生物資源経済学、国際資源開発経済学、農業経営学及び関連産業経営学、農村社会・農史学、森林資源経済学、森林資源社会学、国際農林業開発学、地域森林資源開発学、生物圏情報計測制御学、食品品質評価工学、国際生物資源循環学に関連する今日的な課題を整理し、掘りどころとすべき専門分野の学術的な基礎について講述する。当該分野の最新、かつ、幅広い知識を系統的に学習することで、理工情報生命学院における研究課題の設定と計画の立案・遂行に必要な基礎的な知識と能力の向上に役立つ。	生物資源科学学位プログラムの学生においては生物資源科学関連科目 face-to-face
0AH0315	Topics in Bioresource Environment Engineering I	1	1.0	1, 2	Sum Vac	Intensive	Neves Marcos Antonio, Obataya Eiichi	Students will learn basic knowledge and various research methods related to environmental colloid and interface engineering, bioresource conversion engineering, watershed conservation engineering, water conservancy and environmental engineering, production infrastructure system engineering, bioproduction mechanics, protected area management, food resource engineering, biomaterial chemistry, biomaterial engineering, and agricultural food process engineering in the field of bioresource environmental engineering. Engineering methods for the harmonious and sustainable use and management of biological resources will be introduced with examples of domestic and international research results. By systematically learning the latest and broadest knowledge in the field, this course will help students improve their basic knowledge and abilities necessary for setting up and planning and executing research projects in the Faculty of Science, Technology, Information and Life Sciences.	生物資源科学学位プログラムの学生においては生物資源科学関連科目 face-to-face

0AH0316	Introduction to Environmental Sciences	1	2.0	1	Fall AB	Wed1, 2	C103 Nat. Sci.	環境科学学位プログラム担当教員, Mizunoya Takeshi	This course introduces the core issues globally in environmental sciences and approaches relating to hydrology, biology, ecosystem science, analytical chemistry, climate system science, urban engineering, environmental engineering, social science, and environmental health. Through this course, students can learn the fundamentals and applications of environmental sciences from multi-perspectives on difference scales. It aims to foster students from both global/local and high-/low-angle views.	0AH0316 and OAND001 must be taken at the same time. The lecture will be conducted in English. In-person class or on-line. Lecture is conducted in English. face-to-face. Online (Asynchronous) . Online (Synchronous)
0AH0317	Liberal arts in Mountain Studies	1	1.0	1, 2	Fall A	Intensive		Tsuda Yoshiaki	It is estimated that 20-25% of the world's land area is mountainous, about 12% of the earth's people live in mountainous regions, and 40% live in mid- and lower-mountain areas. People have engaged in various types of work and livelihoods according to the diverse landscape spaces that make up the mountains. In addition, in recent years, mountainous areas have added value as targets for tourism and recreation. Through omnibus lectures by people active in the field of mountains in various capacities in industry, government, academia, and the private sector, this course aims to provide students with a deeper understanding of what mountains are like, what problems they face, what kind of human resources are needed, and to cultivate a broad knowledge of mountain science.	Required for students in the Mountain Studies degree program 11/9-11/10 主専攻/主学位プログラム必修科目. Online (Synchronous) Intensive lectures by adjunct lecturers active in various fields in the mountain region. In the event that the number of students cannot be accommodated, priority will be given to students enrolled in the Mountain Science degree program.
0AH0318	Topics and Issues in Science Communication	1	1.0	1, 2	Spr C	Intensive		Wood Matthew Christopher	This course explores Science Communication as an academic field of study and research. We will examine a series of issues which regularly draw the attention of science communication scholars, along with current topics in science communication research. Through active participation in class discussions and contribution to course content, students will become more familiar with both the breadth and nature of the field of science communication.	face-to-face