Akashi College	Mechanical and Electronic System Engineering	Year	2022

Department Goals

Course Category		Course Title	Course Code	Credit Type	Credits	Class Hours per Week								Instructor	Division in Learning
						Adv. 1st Y				Adv. 2nd Y					
						1st		2nd		1st		2nd			
						1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q		
General	Compulsory	Ethics for Engineers	4001	Academic Credit	2			2						ITOH Hitoshi	
General	Compulsory	Global Studies	4002	Academic Credit	2	2								ARAKAWA Hironori	
General	Elective	Geophysics	4003	Academic Credit	2			2						YOKOYAMA Masahiko	
General	Elective	Introduction to Nano Materials Design	4004	Academic Credit	2	2								NAKANISHI Hiroshi	
General	Elective	Culture and Communication	4005	Academic Credit	2	2								INOUE Hidetoshi	
General	Elective	Overseas Training	4006	School Credit	2	2	2								
Specialized	Compulsory	Creative Faculty Development	4007	School Credit	2			4						NAKANISHI Hiroshi	
Specialized	Compulsory	Engineering Topics for Advanced Course Students	4008	Academic Credit	2			2						KANDA Keiichi,HIRAISHI Toshihiro,NAKANISHI Hiroshi,NOMURA Hayato,ONISHI Shosaku	
Specialized	Compulsory	Engineering Presentation Ⅰ	4009	School Credit	1	2								NAKAI Yuichi,TAKEDA Naho	
Specialized	Compulsory	Industrial Materials	4010	Academic Credit	2	2								SAKAIDA Akiyoshi,KAJIMURA Yoshihiro,TAKEDA Naho,HIRAISHI Toshihiro	
Specialized	Elective	Information Processing	4011	Academic Credit	2	2								INOUE Kazunari	
Specialized	Elective	Analytical Mechanics	4012	Academic Credit	2	2									

Specialized	Elective	Inclusive Design	4013	Academic Credit	2	2							OTSUKA Takehiko,AKITA Naoshige,IWATA Naoki,HIRAI Yasuyuki,OKAMURA Hideki	
Specialized	Compulsory	Off-Campus Practical Training	4014	School Credit	2	2	2							
Specialized	Compulsory	Preliminary Research Studies	4015	School Credit	4	4	4							
Specialized	Elective	System Control Engineering	4016	Academic Credit	2	2							KAMI Yasushi	
Specialized	Elective	Advanced Instrumentation Engineering	4017	Academic Credit	2	2							FUJIWARA Seiji	
Specialized	Elective	Random Signal Analysis	4018	Academic Credit	2			2					INOUE Kazunari	
Specialized	Elective	Advanced Electromagnetics	4019	Academic Credit	2			2					KAJIMURA Yoshihiro	
Specialized	Elective	Advanced Strength of Materials	4020	Academic Credit	2			2					MORISHITA Tomohiro	
Specialized	Elective	Production Systems	4021	Academic Credit	2	2							ONISHI Shosaku	
Specialized	Elective	Energy Technology I	4022	Academic Credit	2			2					FUJIWARA Seiji	
Specialized	Elective	Tribology	4023	Academic Credit	2			2					ABO Masayoshi	
Specialized	Elective	Advanced Electrical Circuits	4024	Academic Credit	2			2					HOSOKAWA Atsushi	
Specialized	Elective	Advanced Heat Transfer	4025	Academic Credit	2			2					KUNIMINE Kanji	
General	Elective	Japanese Language and Communication	4026	Academic Credit	2					2			ZENTOH Masashi	
General	Elective	Environmental Science	4027	Academic Credit	2					2			WATANABE Moriyoshi,HIRAISHI Toshihiro	

General	Elective	Cross-Cultural Understanding	4028	School Credit	2					2	2		HERBERT John C.	
Specialized	Compulsory	Engineering Presentation Ⅱ	4029	School Credit	1							2	HIRAISHI Toshihiro,ONISHI Shosaku	
Specialized	Compulsory	Research Studies	4030	School Credit	8					8	8			
Specialized	Elective	Mechatro-system	4031	Academic Credit	2					2			SEKIMORI Daisuke	
Specialized	Elective	Computational Mechanics	4032	Academic Credit	2					2			KUNIMINE Kanji	
Specialized	Elective	Energy Technology II	4033	Academic Credit	2					2			TANAKA Seiichi	
Specialized	Elective	Strength and Fracture of Materials	4034	Academic Credit	2							2	SAKAIDA Akiyoshi	
Specialized	Elective	Optoelectronics Devices	4035	Academic Credit	2					2			SUYAMA Taikei	
Specialized	Elective	Algorithms	4036	Academic Credit	2							2	HAMADA Yukihiro	
Specialized	Elective	Advanced Electronic Circuit	4037	Academic Credit	2					2			INOUE Kazunari	
Specialized	Elective	Mathematical Informatics	4038	Academic Credit	2					2			TSUCHIDA Shuhei	
Specialized	Elective	Digital Circuit Design	4039	Academic Credit	2					2			INOUE Kazunari	
Specialized	Elective	Optimization Design	4040	Academic Credit	2							2	SHI Fenghui	
Specialized	Elective	Micromachine	4041	Academic Credit	2							2	MATSUZUKA Naoki	

Akashi College	Year	2022	Course Title	Ethics for Engineers

Course Information

Course Code	4001	Course Category	General / Compulsory
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	Second Semester	Classes per Week	2
Textbook and/or Teaching Materials	齊藤・坂下編:「はじめての工学倫理」、昭和堂 and Printed materials		
Instructor	ITOH Hitoshi		

Course Objectives

(1) Understand the characteristics of an engineer's job and what kind of ethical responsibilities engineers have in response to them.
(2) Understand what ethical issues engineers may face in their day-to-day work.
(3) Have sufficient knowledge of the important social systems related to engineers when dealing with the above-mentioned issues.
(4) Develop the ability to devise effective solutions for typical ethical issues that engineers will encounter, based on the understanding and knowledge of (1) to (3).
In order to achieve the goals, students will need to study the prescribed textbooks in advance.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Fully understand the characteristics of an engineer's job and their ethical responsibilities.	Understand the characteristics of an engineer's job and their ethical responsibilities.	Do not fully understand the characteristics of an engineer's job and their ethical responsibilities.
Achievement 2	Fully understand what ethical issues engineers may face.	Understand what ethical issues engineers may face.	Do not understand what ethical issues engineers may face.
Achievement 3	Have sufficient knowledge of the important social systems related to engineers.	Have knowledge of the important social systems related to engineers.	Do not have knowledge of the important social systems related to engineers.
	Fully have the ability to devise effective solutions for ethical issues that engineers will encounter.	Have the ability to devise effective solutions for ethical issues that engineers will encounter.	Do not have the ability to devise effective solutions for ethical issues that engineers will encounter.

Assigned Department Objectives

Teaching Method

Outline	The daily lives of people today are based on highly developed science and technology. This science and technology is used by highly trained engineers who have a responsibility to society to use it properly based on their expertise. This responsibility is now becoming more important, and social interest is growing, too. This course will examine the specific details of this responsibility that engineers bear, what problems may arise in achieving it, and how to deal with that.
Style	Classes will be held in a lecture style. At the end of each class, students should write and submit a summary of the class content, their opinions, etc. and this will be evaluated as a small report. The liaison for this course is Omota.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. The class will use videos, newspaper articles. etc., and take many examples from recent accidents and corporate morals. Reference materials and other materials are introduced as appropriate during the class. Therefore, we would like students to show interest in areas other than their specialty field. Students who miss 1/3 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
2nd Semester	3rd Quarter	1st	Why engineering ethics? Why is it necessary for those who aspire to be engineers to learn ethics? Clarify the links between engineers and ethics through today's social background, the codes of ethics established by the engineering academic societies, etc., and learn and confirm their significance.	Understand the links between engineers and ethics based on today's social background and the code of ethics.
		2nd	The space shuttle Challenger accident 1 Deal with the space shuttle Challenger accident, the most famous case in engineering ethics, and discuss the decisions made by the engineers and executives in the organization.	Understand the characteristics and relationships of the decisions made by the engineers and executives.
		3rd	The space shuttle Challenger disaster 2 Following the previous class, use the case of the Challenger accident as a guide and consider what responsibilities engineers have for making organization risk management function effectively.	Understand the responsibilities and abilities required of engineers for organization risk management.
		4th	The Tokaimura JCO criticality accident 1 Use the JCO criticality accident as an example to consider the significance of improvement activities that have supported the Japanese manufacturing industry, the challenges facing them, and how engineers should engage with them.	Understand the significance and challenges of improvement activities.

		5th	The Tokaimura JCO criticality accident 2 Following the previous class, use the JCO criticality accident to discuss group thinking, which collective organizations are prone to, and how technicians should deal with it to ensure safety and quality.	Learn the characteristics of group thinking and the abilities needed to deal with it and secure safety.
		6th	Whistleblowing 1 Discuss the purpose of the recently introduced whistleblower protection system, criticisms of the current laws, and the relationship between this system and engineers.	Acquire knowledge of the whistleblower protection system, and understand its issues.
		7th	Whistleblowing 2 Following the previous class, deal with whistleblowing. An increasing number of companies have established help desks, etc. as part of their efforts to enhance their compliance systems. Examine this trend's significance in the relationship between organizations and individuals.	Understand what needs to be kept in mind to ensure proper organizational behavior.
		8th	Product Liability Act Review the details of the Product Liability Act—which is said to be the most relevant law for engineers—and discuss that it is important for engineers to establish it as a manufacturing belief.	Gain appropriate knowledge of the Product Liability Act and become able to use it as a manufacturing belief.
	4th Quarter	9th	Intellectual properties Confirm the significance of the patent, copyright, and other systems for technology development, and examine the issues, etc., facing them that accompany information technology development, etc.	Acquire knowledge of intellectual property rights and understand their significance in manufacturing.
		10th	The Bhopal disaster 1 Use the agricultural chemicals factory accident in Bhopal, India—the biggest industrial accident in history—as an example to discuss the further increasing problems associated with overseas industrial activities as globalization progresses.	Acquire knowledge of the issues faced in overseas industrial activities.
		11th	The Bhopal disaster 2 Based on the previous class, examine the fact that there is a need for engineers to take into account that technology development is deeply related to the interaction between social conditions, culture, history, and thoughts, etc., that surround it.	Deepen understanding of the previous class and learn effective methods for overseas industrial activities.
		12th	The Roppongi Hills revolving door accident 1 Introduces the activities of the Door Project, which took place after the revolving door accident, and discuss the ideas and significance of failure studies and topics such as Heinrich's law in risk management.	Acquire knowledge of failure studies and Heinrich's law.
		13th	The Roppongi Hills revolving door accident 2 Based on the previous class, discus how engineers also have their own culture as engineers, and that it is important to pass down knowledge to overcome the problems that result from this.	Understand that in order to understand and use technology effectively, it is necessary to properly understand and communicate technology ideas.
		14th	Universal design Confirm that there is a political aspect to new technology development that gives birth to new power struggles and discrimination, whereas universal design is an attempt to democratize it.	Understand the concept of universal design and the systems necessary for achieving it.
		15th	The scope of engineering ethics New technology developments by engineers have had a variety of impacts in sectors such as information society and medical care. Consider the sort of relation that engineers should have to ethics in these other areas.	Understand the relationship between engineers and modern society and what their place in it should be.
		16th	No final exam	

Evaluation Method and Weight (%)

	Final Report	Short Reports＆Presentation	CBT of ethics for researcher	Total
Subtotal	60	30	10	100
Basic Proficiency	60	30	10	100
Specialized Proficiency	0	0	0	0
Cross Area Proficiency	0	0	0	0

Akashi College	Year	2022	Course Title	Global Studies

Course Information

Course Code	4002	Course Category	General / Compulsory
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials	Think about International Society in 21st century(shonho sha)		
Instructor	ARAKAWA Hironori		

Course Objectives

(1) Possess international qualities as an engineer who is active in the world.
(2) Understand the current international situation that is in flux.
(3) Understand and consider the future of the 21st century and the new international society.
(4) Understand and explain the concepts of race and nation.
(5) Understand the fundamentals of cross-border societies.
(6) Be able to delve deeply into issues of interest through the study of the international oneself, carry out research, including fieldwork, and prepare presentations and papers based on the results.
(7) Be able to engage in discussions on various global issues.

Rubric

	Excellent	Good	Insufficient
Achievement 1	Possess the international qualities of a global engineer.	Almost have the international qualities of a global engineer.	Inability to possess the international qualities of a global engineer.
Achievement 2	Understand the current international situation that is in flux.	Understand the current international situation that is in a state of flux.	Inability to understand the current international situation that is in flux.
Achievement 3	Understand and consider the 21st century and the future of the new international society.	Able to consider what is required to understand and consider the 21st century and the future of the new international society.	Cannot understand and reflect on the 21st century and the future of the new international society.
Achievement 4	Understand and fully explain the concepts of ethnicity and nation.	Almost understand and explain the concepts of ethnicity and nation.	Cannot understand and explain the concepts of ethnicity and nation.
Achievement 5	Understand the fundamentals of transnational societies.	Almost understand the fundamentals of transnational societies.	Cannot understand the fundamentals of transnational societies.
Achievement 6	Through students' own study of international relations, be able to delve deeply into issues of interest, conduct research, including fieldwork, and prepare presentations and papers based on the results of that research.	Almost can carry out research, including fieldwork, and can write a presentation and a thesis based on the results of the research.	Cannot carry out research, including fieldwork, and prepare a presentation or thesis based on the results of that research.
Achievement 7	Be able to discuss various global issues.	Almost can discuss and debate global issues.	Cannot discuss global issues.

Assigned Department Objectives

Teaching Method

Outline	This course is designed to introduce students to various issues in the global society, and after understanding the basic concepts of social science and international sociology, students will select a topic related to international society and independently research, present, and discuss the topic. The objective is for students to acquire the knowledge of global issues necessary for engineers and researchers, and to actively cultivate their own future-oriented thinking about various issues and their ability to approach society.
Style	Textbooks and reference books will be used, but the class will also focus on presentations on various global issues that arise from time to time. After the lecture on international social issues, each student will choose a theme based on the textbook or reference book in which he/she is interested, delve deeply into it, and conduct research, including fieldwork and surveys (even online) if possible. Students are required to present the results of their research and ultimately write a thesis. In the presentation, students will be evaluated on their own research as well as their interpretations of the textbook and class discourse, so preparation for reading the respective books is required.
Notice	The total amount of study time for this course is equivalent to 90 hours, which is the sum of the study time guaranteed in class, preparation, and review, and the standard self-study time required to prepare the presentation and the assigned paper. Global Studies is a discipline that is constantly changing according to social conditions. Students are expected to approach class with a daily interest in current affairs. Each presenter is required to prepare a resume for his/her topic, and the audience will be graded on the questions they ask in response to the presentation. Therefore, please be sure to read the relevant sections of the textbook for each presentation. Proactive participation is essential. Absences not counted toward passing (percentage): 1/3 or more of the total number of absences

Characteristics of Class / Division in Learning

☑ Active Learning	☑ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals

1st Semester	1st Quarter	1st	What is Global Studies? How international societies are created and why we need a theory of international relations.	To fully understand the differences between the natural and social sciences, which are usually studied, and the international community.
		2nd	MDGs and SDGs Focuses on new ways of setting goals in the international community and considers international cooperation.	Understand the new international sustainable development goals and the role of Japan in the industrial world.
		3rd	Contemporary International Political Economy International Politics Students will learn about economics and the actual international financial crisis and examine it in light of the market and legal system.	Understand the basic mechanisms of international politics and the international economy, which are closely related to the industry.
		4th	Security, International Cooperation, and National Interests Students will learn about the transformation of the international community and the resocialization of the concept of security, and examine and discuss the relationship between the state and the international community.	Understand the relationship between the state and the international community, and be able to articulate this understanding in their own discourse.
		5th	International Sociology (Migration Issues and the EU) (1) Each student will present a case study of immigration policy in the U.S. and various issues in the EU, and deepen their awareness of these issues through discussion and other means.	Understand the current situation of immigration in the U.S. and Europe, and be able to formulate one's own opinions on the pros and cons of immigration policies.
		6th	International Sociology (Migration Issues) (2) Students will present various issues of immigration in the former Soviet Union, Germany, and the UK based on each case study. The discussion will be held on the problems and the way forward.	Understand various problems occurring in various countries, including refugee issues, and be able to consider the relationship between the state and its people.
		7th	Quizzes and assigned reports To confirm the discourse in Global Studies and to test the understanding of various students on each of the issues. Provide guidance on the progress and content of the assigned reports related to each student's presentation.	Understand the importance of knowing what each student is interested in in the international community and expressing it in writing.
		8th	Issues in Asia (1) Students will present on political, historical, and economic issues in East Asia (China, Taiwan, and the Korean Peninsula). Each student will also discuss and debate the geographical proximity and relationship with Japan.	Understand geopolitical issues in East Asia, which is geographically close to Japan.
	2nd Quarter	9th	Issues in Asia (2) Each student will present a paper on various issues in Southeast Asia and Oceania, including actual surveys.	To understand Southeast Asia and Oceania in general, with which we have many academic exchanges.
		10th	Issues in Asia (3) To encourage consideration of international society from the perspective of Okinawa. The faculty will also report on field research conducted by the faculty on ethnic issues in South Asia and the current state of happiness surveys in Bhutan, the Land of Happiness, and consider national strategies.	Understand the geopolitical role of Okinawa, a crossroads of civilizations. Understand geopolitical issues in South Asian countries, including Bhutan.
		11th	Challenges to Development, Poverty, and Discrimination (1) Each student will present in-depth case studies from Nepal, Thailand, and Cambodia and discuss the pros and cons of development.	Understand that Japan has been actively involved in development in Southeast Asia and South Asia, including the reasons for this.
		12th	Challenges to Development, Poverty, and Discrimination (2) Recent examples of gender in South Asia, development in Africa and Latin America will be used to examine what international development should look like. We will also deepen our understanding of JICA, the actual Japanese government development organization.	Understand that the elimination of poverty is one of the most urgent issues in the SDGs, and think about what each student can do as an industrialist to solve this problem.
		13th	The 21st Century and the New International Society (1) The latest discourses on globalization and its paradoxes will be presented and examined through presentations and discussions.	Understand globalism, localism, and globalization, and have knowledge of specific corporate movements and social movements.

		14th	The 21st Century and the New International Society (2) The course will examine issues of terrorism in contemporary international society, based on an understanding of its dynamism.	Able to understand the reality of international terrorism and the current situation. Understand what measures countries are taking to deter such terrorism.
		15th	The 21st Century and the New International Society (iii) The reality of environmentally conscious behavior will be learned from the current situation in environmentally advanced countries, and the relationship between industrial people and the environmental issues surrounding them internationally will be examined.	Understand the various discourses on global studies that have been presented. To be able to have an opinion on how to deal with international issues as an industrialist.
		16th	Final Examination	A final exam and a final report will be required.

Evaluation Method and Weight (%)

	Assignments & Exams	Presentation	Peer Evaluation	Attitude (attendance and questions asked in class)	Portfolio	Other/Quiz	Total
Subtotal	50	20	0	20	0	10	100
Basic Skills	25	10	0	20	0	0	55
Specialized Skills	15	0	0	0	0	10	25
Cross Field Skills	10	10	0	0	0	0	20

Akashi College	Year	2022	Course Title	Geophysics

Course Information

Course Code	4003	Course Category	General / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	Second Semester	Classes per Week	2
Textbook and/or Teaching Materials	Printed materials		
Instructor	YOKOYAMA Masahiko		

Course Objectives

(1) Learn about the observation techniques and results characteristics for the physical properties related to the solid Earth (gravity, seismic waves, geomagnetism, thermal flow, etc.) and understand their meaning. Also understand the basic principles of observation equipment.
(2) Learn about how the Earth's internal structure, surface phenomena, and history have been interpreted using the observations described in (1). By doing this, comprehensively understand the solid Earth system.
(3) Understand the concept of plate tectonics and the relationship between them and the movement of the Earth's layers and topography. By doing so, learn the basic knowledge for considering the global environment and disasters such as earthquakes and volcanic eruptions.
It is necessary to self-study the basic theorems of mechanics and electro-magnetism in order to achieve these goals.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Fully understand the mechanism for estimating the physical properties of objects from the observation results.	Understand the mechanism for estimating the physical properties of objects from the observation results.	Do not understand the mechanism for estimating the physical properties of objects from the observation results.
Achievement 2	Fully understand what kinds of observation evidence the modern understanding of the Earth is estimated on.	Understand what kinds of observation evidence the modern understanding of the Earth is estimated on.	Do not understand what kinds of observation evidence the modern understanding of the Earth is estimated on.
Achievement 3	Fully understand natural phenomena such as earthquakes and volcanic eruptions through the concept called plate tectonics.	Understand natural phenomena such as earthquakes and volcanic eruptions through the concept of plate tectonics.	Do not understand natural phenomena such as earthquakes and volcanic eruptions through the concept called plate tectonics.

Assigned Department Objectives

Teaching Method

Outline	The course will have lectures on how the structure and properties of the Earth (mainly the solid Earth) are currently understood. Since the purpose of geophysics is to capture the Earth quantitatively using physical quantities such as gravity and heat, the main purpose of this course is to understand the physical properties of the materials that make up the Earth, and explain the basic properties and observation techniques of each physical quantity. It will also explain the laws of physics and basic structures used in the observation equipment. It will be taught by a faculty member who is investigating the magnetic properties of deep-sea sediment obtained in core drilling at Academia Sinica in Taiwan.
Style	Classes are held in a lecture style. The liaison for this course is Takeuchi.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. The course plan may change. Lessons are serial, not standalone. Students who miss 1/3 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☑ Instructor Professionally Experienced

Course Plan

			Theme	Goals
2nd Semester	3rd Quarter	1st	Course guidance / The shape and size of the Earth (1) Explain, as guidance, the course policy and overview. Introduce a perception of the Earth's shape and size in ancient times.	Understand the role played by the academic field of "geophysics" and the role that physics development plays in understanding the Earth's internal structure.
		2nd	The shape and size of the Earth (2) Explain the definitions of the currently recognized shapes for the Earth (Earth ellipsoid and geoid), and also describe the basics of positioning, too.	Understand the basics of positioning using geometry.
		3rd	Gravity Explain what gravity means, by showing the Earth's mass and density obtained by using it. Also explain the meaning of gravity anomaly.	Understand how to estimate the Earth's internal structure from the laws and observed values of gravity that acts on it.
		4th	Isostasy Explain the concept of isostasy and its relationship with gravity. Also introduce examples of crustal movement caused by it.	Understand the concept of isostasy and the characteristics of the Earth's gravity that is related to it.
		5th	Seismic waves Explain the nature of seismic waves, and explain the methods for surveying underground structures using them.	Understand the characteristics of seismic waves and how to estimate earthquake information using them.

		6th	The interior structure of the Earth (1) Introduce the larger structure of the Earth's interior, which has been estimated mainly using seismic wave analysis.	Understand the principles of a seismic refraction survey and the method for estimating the Earth's interior structure that uses it.
		7th	The interior structure of the Earth (2) Introduce the subterranean structure of the Earth's surface layer, which has been estimated mainly using seismic wave analysis.	Understand the principles of a seismic reflection survey and the method for estimating the shallow subterranean part's structure that uses it.
		8th	Earth heat Explain what is the source of heat inside the Earth, and show the calorimetric distribution on the surface layer of the Earth.	Understand the meaning of heat in physics and the state of the Earth's interior that can be estimated from the calorimetric distribution on the its surface.
	4th Quarter	9th	Geomagnetism Explain the magnetic distribution on the Earth's surface and how geomagnetism was created. Furthermore, explain magnetic anomalies.	Understand the causes of geomagnetism by understanding "What does magnetism mean?"
		10th	Rock magnetism and paleomagnetism Explain the mechanism for rocks becoming magnetized and introduce the magnetism shifts from the past that have been investigated using it.	Understand the mechanism that records past geomagnetic information in rocks.
		11th	Continental drift Introduce the classic continental drift theory by Wegener. Also explain the continental position's restoration by paleomagnetism that has triggered a revival of continental drift theory.	Understand the original information for "continental drift theory," its interpretations, and how to estimate the continental drift using current observation data.
		12th	The spreading of the seafloor Explain seafloor's topography and underground structure and the relationship between magnetic anomaly distribution in the ocean and the theory of seafloor spreading.	Understand the hypothesis that associates geomagnetic records with continental drift.
		13th	Plate tectonics (1) Explain the concept and movement of plates and the shape their boundaries as the basis for plate tectonics.	Understand the original meaning of the concept called plate tectonics and its difference from continental drift theory.
		14th	Plate tectonics (2) Use plate tectonics to explain the movement of the Earth's layers (earthquakes, volcanic activity, orogeny, etc.)	Understand how natural phenomena such as earthquakes and volcanic activities can be explained with plate motions.
		15th	Plate tectonics (3) Introduce the properties of hotspots, and explain the difference between relative and absolute plate motions. Furthermore, explain the driving force of plate motions.	Understand how plate motions work within the mechanism of the entire Earth.
		16th	Final exam	

Evaluation Method and Weight (%)

	Exercise	Examination	Total
Subtotal	30	70	100
Basic Proficiency	30	70	100
Specialized Proficiency	0	0	0
Cross Area Proficiency	0	0	0

Akashi College	Year	2022	Course Title	Introduction to Nano Materials Design

Course Information

Course Code	4004	Course Category	General / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials	Handouts		
Instructor	NAKANISHI Hiroshi		

Course Objectives

Objectives are to:
Evaluation 1: Understand the various laws that govern the natural world and learn the methods in applying the laws to nanomaterials design through the lectures.
Evaluation 2: Deepen one's understanding of quantum mechanics and develop presentation skills in expressing one's opinions and ideas to others plainly through exercises and a presentation.
Evaluation 3: Develop the basic skills in applying and expanding nanomaterials design to researches in one's major field. (D, E, H)

Rubric

	Ideal Level of Achievement	Standard Level of Achievement	Unacceptable Level of Achievement)
Evaluation 1	The student clearly understands and explains the nanomaterials design methods.	The student describes that material properties come from the quantum mechanics.	The student did not describe that material properties come from the quantum mechanics and did not explain the nanomaterials design methods.
Evaluation 2	The student clearly understands and explains how to utilize the quantum mechanic algebra.	The student utilizes the quantum mechanics algebra.	The student did not utilize the quantum mechanics algebra.
Evaluation 3	The student applies the nanomaterials design for developing her/his field.	The student proposes the application of the nanomaterials design in her/his field.	The student did not propose the application of the nanomaterials design in her/his field.

Assigned Department Objectives

Teaching Method

Outline	Nanomaterials design is a method of designing various materials that support the present and future science and technologies. An objective of this course is to develop a scientific way of thinking by learning nanomaterial design. First, students are going to learn the outline of quantum mechanics, which explains the motions of nuclei and electrons that make up a material. Second, the students are going to learn how quantum mechanics clarifies the composition and characteristics (physical properties) of materials. Lastly, the students are going to learn the state-of-the-art nanomaterials design method to design highly-functional materials, which will be required in various engineering fields in the future.
Style	Outline and necessary subjects will be illustrated through theory lectures, followed by practice lectures. The student is expected to solve the practice problems with her/his own hands, and to explain her/his solutions to other students easy to understand.
Notice	In this course, the learning time guaranteed in the class and the total of the standard self-study time necessary for the preparation / review are 90 hours of study content. More than four-fifth of the attendance is required.

Characteristics of Class / Division in Learning

☑ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Outline of Quantum Mechanics (First Half) Learn the outline of quantum mechanics and differences between quantum mechanics and Newtonian mechanics by comparing the two mechanics.	The student explains the differences between quantum mechanics and Newtonian mechanics
		2nd	Outline of Quantum Mechanics (Second Half) Learn the method of expressing motions quantum mechanically.	The student explains the description of the particle motion in quantum mechanics.
		3rd	Basics of Quantum Mechanics 1 (Operator Algebra) Learn operator algebra, which is necessary to learn quantum mechanics	The student handles the basic algebra necessary in quantum mechanics.
		4th	Basics of Quantum Mechanics 2 (Schrödinger Equation) Schrodinger wave equation is the basic equation in quantum mechanics. Learn Schrödinger wave equation.	The students explains the relation between wave packet and particle motion.
		5th	Basics of Quantum Mechanics 3 (Commutation Relations I: Coordinates and Momentum) Learn the commutation relation between coordinates and momentum.	The students operates the commutator brackets to coordinates and momentum.
		6th	Basics of Quantum Mechanics 4 (Commutation Relations II: Angular Momentum) Learn the commutation relation regarding an angular momentum.	The students operates the commutator brackets to coordinates and momentum.

		7th	Basics of Quantum Mechanics 5 (Hermitian Operators) Learn about Hermitian operators.	The student explains the Hermitian, and calculates the time evolution of expectation value of physical quantity.
		8th	Basics of Quantum Mechanics 6 (Square well Potential) Learn the quantum states of a particle bound by a square-well potential.	The student derives the quantum states of a particle bound by a square-well potential.
	2nd Quarter	9th	Basics of Quantum Mechanics 7 (One-Dimensional Scattering Problem and Tunnel Effect) Learn about scattering problems and understand the tunnel effects.	The student derives the transmission probability through the square-well potential energy barrier.
		10th	Basics of Quantum Mechanics 8 (Harmonic Oscillators) Learn about the quantum states of harmonic oscillators.	The student derives the quantum states of Harmonic Oscillator.
		11th	Basics of Quantum Mechanics 9 (Lattice Specific Heat) Learn about Einstein solid.	The student derives the heat capacity of Einstein solid.
		12th	Electron Configuration of Atom 1 Learn about the quantum states of an electron bounded by the Coulomb force.	The student explains the quantum states of an electron in an atom.
		13th	Electron Configuration of Atom 2 (Spin and Quantum Statistics) Learn about the existence of spin, the outline of the quantum statistics, and the periodic laws of elements.	The student explains the electron configuration in an atom.
		14th	Cohesion Mechanism of atoms in materials (Ionic Bond, Covalent Bond and Metallic Bond) Learn the cohesion mechanisms of atoms in materials.	The student explains the ionic bond, covalent bond and metallic bonds) Learn the cohesion mechanisms of atoms in materials.
		15th	Density Functional Theory and Computational Material Design Learn the density functional theory, the first principle calculation based on the density functional theory, and nanomaterials design using the first-principle calculations.	The student explains the nanomaterials design methods.
		16th	Term-end examination	

Evaluation Method and Weight (%)

	Examination	Practice & Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	80	20	0	0	0	0	100
Basic Ability	20	5	0	0	0	0	25
Technical Ability	50	5	0	0	0	0	55
Interdisciplinary Ability	10	10	0	0	0	0	20

Akashi College	Year	2022	Course Title	Culture and Communication

Course Information

Course Code	4005	Course Category	General / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	INOUE Hidetoshi		

Course Objectives

(1) Deepen understanding of different cultures.
(2) Improve one's ability to follow English pronunciation and rhythm.
(3) Become proficient with TOEIC format questions.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Fully deepened understanding of different cultures.	Deepened understanding of different cultures.	Did not deepen understanding of different cultures.
Achievement 2	Fully gained English pronunciation and rhythm.	Gained English pronunciation and rhythm.	Did not gain English pronunciation or rhythm.
Achievement 3	Fully became proficient with TOEIC format questions.	Became proficient with TOEIC format questions.	Did not become proficient with TOEIC format questions.

Assigned Department Objectives

Teaching Method

Outline	Learning a language is more than just learning words. It also includes cultural learning aspects, such as the thoughts and values of the people who speak it. Therefore, these exercises will cover language, culture, and communication. Taking the UK and business English as an example, the goal is to improve students' English skills by understanding the differences and commonalities with Japan. The level of English to be used in this exercise is somewhat easy, so it is not intended as an advanced course.
Style	In order to achieve the goals, students will need to self-study as follows: - Look up important words in advance and understand them in English. - Review the model dialogs learned in the class and practice using the accompanying CD until able to recite it.
Notice	- Ensure adequate preparation time for assignments. - Reassessments will not be permitted if students are late or absent from the class and unable to work or give presentations without reasons such as absence due to suspension, etc. Students who miss 1/4 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☐ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	First semester class guidance Explain an overview of the first semester classes, assignments, and evaluation method	
		2nd	Check In and Work Out Listening and reading comprehension about conversations at the counter Chapter 1: Daily life	Understand conversations at the counter.
		3rd	What Will the Weather Be Like? Listening and reading comprehension about the weather Chapter 2: Clothing	Understand the weather.
		4th	A London without Red Buses? Listening and reading comprehension about London buses Chapter 3: Grocery Shopping	Understand London buses.
		5th	Back to the Future Listening and reading comprehension about railways Chapter 4: Cooking	Understand railways.
		6th	Shop-'n'-Chat Listening and reading comprehension about shopping Chapter 5: Eating out	Understand shopping.
		7th	First semester overall review	Review the topics covered in the first semester.
		8th	Midterm exam	
	2nd Quarter	9th	More Than Just a Post Office Listening and reading comprehension about the concept of post offices Chapter 6: Shopping for Clothing	Understand the concept of post offices.
		10th	Off the Beaten Path Listening and reading about tourism Chapter 7: Housing	Understand tourism.

		11th	Dining Out Diversity Listening and reading comprehension about food culture Chapter 8: The Weather	Understand food culture.
		12th	Afternoon Tea Listening and reading about afternoon tea Chapter 9: At a Movie Theater	Understand afternoon tea.
		13th	The Beatles Are Forever Reading about the Beatles Chapter 10: Sports	Understand the Beatles.
		14th	Football: Sport or Business? Reading about football Chapter 11: Traffic and Commuting	Understand football.
		15th	Second semester overall review	Review the topics covered in the second semester.
		16th	Final exam	

Evaluation Method and Weight (%)

	Examination	Short Tests	Other	Total
Subtotal	80	20	0	100
Basic Proficiency	80	20	0	100
Specialized Proficiency	0	0	0	0
Cross Area Proficiency	0	0	0	0

Akashi College	Year	2022	Course Title	Overseas Training

Course Information

Course Code	4006	Course Category	General / Elective
Class Format	Practical training	Credits	School Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	Year-round	Classes per Week	2
Textbook and/or Teaching Materials	none		
Instructor			

Course Objectives

(1) To enhance the educational experience through active participation in overseas training.
(2) To achieve a broad perspective by joining activities in different cultural environments.
(3) Communicate using English.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	To enhance the educational experience through active participation in overseas training.	To enhance the educational experience through active participation in overseas training.	Did not enhance the educational experience through active participation in overseas training.
Achievement 2	To achieve a broad perspective by joining activities in different cultural environments	To achieve a broad perspective by joining activities in different cultural environments	Did not achieve a broad perspective by joining activities in different cultural environments
Achievement 3	Communicate using English	Communicate using English	Can not communicate using English

Assigned Department Objectives

Teaching Method

Outline	This course aims to allow the student to acquire through various training experiences overseas to think with a global perspective and improve their communication skills. The training period is during the summer holiday period. The number of training days shall be ten days or more. This course requires self-study time equivalent to 90 hours or more, including overseas training, prior guidance (manner education, a preliminary survey of training destinations), post-event report meeting, and reports to handle the related organizations. Advanced Course Committee decides whether or not the overseas training participated fulfill this course requirement.
Style	
Notice	Keep close contact with your principal academic advisor. Actively engage with local people during the training period, communicate with them, keep an attitude suitable for trainees, being careful with manners such as clothes and language.

Characteristics of Class / Division in Learning

☑ Active Learning	☑ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Guidance	Explanation of the course, advice about etiquette at the training safety.
		2nd	Practice	Individual technical experience at overseas training destinations.
		3rd	idem	idem
		4th	idem	idem
		5th	idem	idem
		6th	idem	idem
		7th	idem	idem
		8th	No mid term exams	
	2nd Quarter	9th	idem	idem
		10th	idem	idem
		11th	idem	idem
		12th	idem	idem
		13th	idem	idem
		14th	idem	idem
		15th	idem	idem
		16th	No End Term Exams	
2nd Semester	3rd Quarter	1st	idem	idem
		2nd	idem	idem
		3rd	idem	idem
		4th	idem	idem
		5th	idem	idem
		6th	idem	idem
		7th	idem	idem

		8th	No mid term exams	
	4th Quarter	9th	idem	idem
		10th	idem	idem
		11th	idem	idem
		12th	idem	idem
		13th	idem	idem
		14th	idem	idem
		15th	idem	idem
		16th	No End Term Exams	

Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	0	0	0	0	0	0	0
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	0	0	0	0	0	0	0
Cross Area Proficiency	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Creative Faculty Development

Course Information

Course Code	4007	Course Category	Specialized / Compulsory
Class Format	Experiment	Credits	School Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	Second Semester	Classes per Week	4
Textbook and/or Teaching Materials			
Instructor	NAKANISHI Hiroshi		

Course Objectives

(1) Can set goals and plan work on a group basis, perform work voluntarily, and report on work progress and work results effectively.
(2) Can apply expertise and present problem solution plan.
(3) Can demonstrate communication skills and teamwork through cooperation and work distribution in group work.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Can set goals and plan work on a group basis, perform work voluntarily, and report on work progress and work results effectively.	Can set goals and plan work on a group basis, perform work voluntarily, and report on work progress and work results.	Cannot set goals and plan work on a group basis, perform work voluntarily, and report on work progress and work results.
Achievement 2	Can apply expertise and present practicable problem solution plans.	Can applyexpertise and present a problem solution plan.	Cannot apply knowledge and present a problem solution plan.
Achievement 3	Can effectively cooperate, distribute work, and demonstrate communication skills and teamwork through group work.	Can cooperate, distribute work, and demonstrate communication skills and teamwork through group work.	Cannot cooperate, distribute work, and demonstrate communication skills and teamwork through group work.

Assigned Department Objectives

Teaching Method

Outline	In this course, students will experience cooperation, work distribution, and administrative roles through group work, and will foster their ability to solve problems in engineering design in a practical manner. In the process of working on a task, they will widely develop the relevant knowledge through assembling equipment, handling devices, and investigating performance, etc. to foster creativity through engineering design assignments.
Style	They will apply their knowledge of the fields of their Advanced Course study and conduct creative experiments and exercises for assignments under the faculty in charge. Students will form groups of around 4 members from different Advanced Courses and work on the assignment. After the assignment theme is presented and explanations on basic knowledge, etc. are given, students will conduct all of the Plan-Do-See activities in groups within the given time and submit a report. Results will be presented verbally in the discussion and presentation session.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. Students will be divided into groups during guidance. Students who miss 1/5 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☑ Active Learning	☑ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
2nd Semester	3rd Quarter	1st	Class guidance, team division, and team building Receive class guidance and check the overall schedule, activity conditions, and evaluation methods. Divide into teams and do team building activities.	Understand the course aims and assignment content.
		2nd	Create problem solution plans for the assignment and formulate and implement an action plan in groups.	Can act voluntarily in group activities and contribute to the team by demonstrating communication skills and teamwork.
		3rd	Same as week 2	Same as week 2
		4th	Plan discussions and presentations: Present problem solution plans for the assignment and give an oral presentation of an implementation plan.	Can explain to others how effective and reasonable the proposed solutions and plans are.
		5th	Can reconsider in groups the activity plans and make a better implementation plan based on the results of the planning discussion.	Same as week 2
		6th	Same as week 5	Same as week 2
		7th	Same as week 5	Same as week 2
		8th	Same as week 5	Same as week 2
	4th Quarter	9th	Same as week 5	Same as week 2
		10th	Same as week 5	Same as week 2
		11th	Same as week 5	Same as week 2

		12th	Same as week 5	Same as week 2
		13th	Same as week 5	Same as week 2
		14th	Same as week 5	Same as week 2
		15th	Results presentation: Present the implemented problem solution plan and give an oral presentation of the outcome of implementing it.	Can explain to others how reasonable the implemented solution plan was and the outcome of implementing it.
		16th	No final exam	

Evaluation Method and Weight (%)

	Examination	Presentation	Report	Behavior	Portfolio	Other	Total
Subtotal	0	40	50	10	0	0	100
Basic Proficiency	0	5	5	10	0	0	20
Specialized Proficiency	0	10	20	0	0	0	30
Cross Area Proficiency	0	25	25	0	0	0	50

Akashi College	Year	2022	Course Title	Engineering Topics for Advanced Course Students

Course Information

Course Code	4008	Course Category	Specialized / Compulsory
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	Second Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	KANDA Keiichi,HIRAISHI Toshihiro,NAKANISHI Hiroshi,NOMURA Hayato,ONISHI Shosaku		

Course Objectives

(1) Understand the latest technological issues in one's own area of specialty, their solutions and the status of their efforts.
(2) Learn about the latest issues in areas different from one's own area of specialty.
(3) Learn and understand topics about technologies and research that are co-existence friendly in each area of specialty.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Understand the latest technological issues in one's own area of specialty, their solutions and the status of their efforts.	Understand the latest technological issues in one's own area of specialty, their solutions and the status of their efforts.	Do not understand the latest technological issues in one's own area of expertise, their solutions and the status of their efforts.
Achievement 2	Learn about the latest issues in areas different from one's own area of specialty.	Learn about the latest issues in areas different from one's own area of specialty.	Do not learn about the latest issues in areas different from one's own area of specialty.
Achievement 3	Learn and understand topics about technologies and research that are co-existence friendly in each area of specialty.	Learn and understand topics about technologies and research that are co-existence friendly in each area of specialty.	Do not learn and understand topics about technologies and research that are co-existence friendly in each area of specialty.

Assigned Department Objectives

Teaching Method

Outline	In order to broaden students' backgrounds as an engineers, it is important for them to actively learn not only their own areas of specialty but learn other areas, too. In this course, faculty members from different areas of expertise will give knowledge of the trends in technological development in an interdisciplinary manner both inside and out of this course. Classes will cover various topics and take place in a relay form: Nakanishi: Guidance and interdisciplinary area (three classes) Onishi: Mechanical systems (three classes) Nomura: Electronic and information systems (three classes) Kanda: Urban systems (three classes) Hiraishi: Building system (three classes) By learning about various development and research processes, students will develop universal thinking and flexible development capabilities beyond their respective technical fields.
Style	Of the 15 week-period, Nakanishi will teach the guidance in week 1 in a lecture-style format. Onishi will teach classes from weeks 2 to 4 in a lecture-style format. Nomura will teach classes from weeks 5 to 7 in a lecture-style format. Kanda will teach classes from weeks 8 to 10 in a lecture-style format. Hiraishi will teach classes from weeks 11 to 13 in a lecture-style format. In weeks 14 and 15, Nakanishi will teach classes in the form of off-campus exercises.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. Although there will be many topics outside of students' own specialties, they will be explained in a way that is easy to understand, so students should be able to properly learn them. Students who miss 1/5 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☑ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
2nd Semester	3rd Quarter	1st	Course aims (Nakanishi) Explain the purpose of Engineering Topics for Advanced Course Students. Inform the evaluation methods and other details. Explain the importance of actively learning a wide range of knowledge through self-experience, recent science and technology topics, etc.	Understand an overview of this class and create a pre-learning plan.
		2nd	Lecture on the basics of mechanical materials, and on the method of tensile testing to obtain a material's representative properties and the meaning of the material properties obtained from that. (Onishi)	Can explain the basics of materials science, such as crystal structure and dislocation. Can also explain tensile testing and properties.
		3rd	Lecture on fracture toughness and fatigue properties of metal materials. Requirements for machinery and equipment are becoming sophisticated in recent years, and as a result, their fracture behaviors that have to do with fracture toughness and fatigue are increasing. Lecture on the basic knowledge of the metals used in machinery and equipment. (Onishi)	Can explain the use and meaning of fracture toughness and fatigue properties.

		4th	Lecture on the concept of material selection for machinery and equipment. Metals (ferrous and non-ferrous) and plastic are used in machinery and structures, and one must have various viewpoints when selecting materials that fit the purpose. Lecture on the vital points on those viewpoints. (Onishi)	Can explain the necessary viewpoints for material selection for the design of machinery and equipment (including functional materials) and structures.
		5th	Information visualization 1 (Nomura) Learn about systems and concepts for data analysis and applications, with the subject of a database of gathered information on the relationship between engineering elements and products.	Can explain structuring for visualization.
		6th	Information visualization 2 (Nomura) Learn about mechanical information extraction and organization based on text mining and formatting.	Can implement methods for extracting and formatting the desired information from a large amount of data.
		7th	Information visualization 3 (Nomura) Select a field from the database of engineering elements and do visualizing exercises.	Can extract and visualize information from the database according to one's own objectives.
		8th	Global environmental problems 1 (Kanda) Environmental deterioration can affect the health and comfort of people in the future and in other regions. Through group discussions, discuss regional and intergenerational disparities in environmental deterioration.	Can fully understand and explain the regional and intergenerational disparities of environmental deterioration to others through group discussions.
	4th Quarter	9th	Global environmental problems 2 (Kanda) Outline the mechanism of global warming and its impact on the ecosystem, and examine the current status of greenhouse gas concentrations and their sources, distribution, and migration forms.	Fully understand and can explain to others the mechanism of global warming, its impact on the ecosystem, and the current status of greenhouse gas concentrations and their sources, distribution, and migration forms.
		10th	Global environmental problems 3 (Kanda) Outline the mechanism of ozone layer depletion and its impact on the ecosystem, and think about the locations and distribution of ozone holes and predictions and countermeasures for their future growth.	Fully understand and can explain to others the mechanism of ozone layer depletion and its impact on the ecosystem, the locations and distribution of ozone holes, and predictions and countermeasures for their future growth.
		11th	Assistance for developing countries and disaster areas (Hiraishi) Give an introduction on assistance for developing countries and disaster areas that have been provided so far, and consider the way in which technologies can be applied to local characteristics in the global community.	Can recognize the importance of local characteristics also in a globalized society.
		12th	Appropriate technology (Hiraishi) Give an introduction on the need for appropriate technology, examples of its application in developing countries and those in environmental measures in Japan to think about the way technology should work.	Can explain the definition of appropriate technology and give examples of it.
		13th	Recycling and benefits of biological organics (Hiraishi) Explain how to treat biological organic materials such as fallen leaves, weeds, woods, food waste, and human waste, and how the system for a recycling-based society should work.	Can explain examples of material recycling in a recycling-based society.
		14th	Interdisciplinary area 1 (Nakanishi) As a summary of this course, learn about a wide range of the latest science and technology, including shipbuilding, navigating, communicating, port and city planning, through an exercise on board the Graduate School of Maritime Sciences Kobe University's training ship, KAIJINMARU.	Can organize and explain the knowledge gained through the on-board exercise.
		15th	Interdisciplinary area 2 (Nakanishi) As a summary of this course, learn about a wide range of the latest science and technology, including shipbuilding, navigating, communicating, port and city planning, through an exercise on board the Graduate School of Maritime Sciences Kobe University's training ship, KAIJINMARU. The will be an intensive course combined with week 14.	Can organize and explain the knowledge gained through the on-board exercise.
		16th	No final exam	

Evaluation Method and Weight (%)

	Report	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	90	0	0	10	0	0	100
Basic Proficiency	20	0	0	10	0	0	30
Specialized Proficiency	30	0	0	0	0	0	30

Cross Area Proficiency	40	0	0	0	0	0	40

Akashi College	Year	2022	Course Title	Engineering Presentation I

Course Information

Course Code	4009	Course Category	Specialized / Compulsory
Class Format	Seminar	Credits	School Credit: 1
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials	A separate handout will be provided.		
Instructor	NAKAI Yuichi,TAKEDA Naho		

Course Objectives

(1) Can set a problem for the given theme, prepare materials (e.g., summary and slides) for the presentation, and present and discuss them orally.
(2) Can set a theme on one's own in Theme 1, prepare materials (e.g., summary and slides) for the presentation, and present and discuss them orally.
(3) Understand engineering ethics through research of the ethics codes, etc. of the professional academic societies covered in Theme 2 and presentations of its results.
(4) Understand the importance of role sharing through team work in Theme 2.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Can set a problem for the given theme, prepare materials (e.g., summary and slides) for the presentation, and present and discuss them orally in a persuasive manner.	Can set a problem for the given theme, prepare materials (e.g., summary and slides) for the presentations, and present and discuss them orally.	Cannot set a problem for the given theme, prepare materials (e.g., summary and slides) for the presentations, and present and discuss them orally.
Achievement 2	Can set a theme on one's own, prepare materials (e.g., summary and slides) for the presentation, and present and discuss them orally in a persuasive manner.	Can set a theme, prepare materials (e.g., summary and slides) for the presentation, and present and discuss them orally.	Cannot set a theme, prepare materials (e.g., summary and slides) for the presentation, and present and discuss them orally.
Achievement 3	Fully understand and can explain engineering ethics through research of the ethics codes, etc. of the professional academic societies and presentations of its results.	Understand engineering ethics through research of the ethics codes, etc. of the professional academic societies and presentations of its results.	Do not understand engineering ethics through research of the ethics codes, etc. of the professional academic societies and presentations of its results.
Achievement 4	Understand and can practice the importance of role sharing through team work.	Understand the importance of role sharing through team work.	Do not understand the importance of role sharing through team work.

Assigned Department Objectives

Teaching Method

Outline	This course will have lectures and exercises on fundamental approaches such as written presentations, graphical presentations, oral presentations, etc. in order to enhance students' ability to express technical matters. Students will be given a variety of assignments, and asked to evaluate each other based on the viewpoints of (1) subject clarity, (2) content clarity, (3) appeal, etc. In addition, the teaching staff will offer their impressions and critiques to raise the levels of the content. Furthermore, students will understand the importance of sharing roles and other matters by preparing for presentations through team work. (See class content for the teacher and scheduling information.)
Style	After Nakai and Takeda have given their lectures on the fundamental topics, etc., students will give presentations on their themes. Lessons will then be taught by Nakai and Takeda together.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. Emphasis will be on presenting and discussing the summary and slides students have prepared by themselves within the determined time. Students are expected to be able to evaluate other students' presentations. Students who miss 1/5 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☑ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	How to write a report (Part 1: Takeda) Explain how to write a report as a written presentation. Learn how to express sentences in a written report based on specific samples. Set a theme for writing a 1- or 2-page report on A4 paper.	Understand the basics of writing a report.
		2nd	How to write a report (Part 2: Takeda) Exchange and correct reports written on the given theme and exchange opinions either by everyone individually or by group.	Understand the basic writing of a report in practice.
		3rd	Presentation rules (Part 1: Nakai) There are several important points to keep in mind when creating materials for presentations. They are explained here with examples.	Understand the key points for creating materials.

		4th	Presentation rules (Part 2: Nakai) There are several important points to keep in mind when giving presentations in public. They are explained here with examples.	Understand the do's and don'ts when giving presentations.
		5th	Theme 1 (Free choice): Preparing reports and slides (Nakai and Takeda) Prepare a report with an individually set theme and prepare a 10-minute presentation.	Can create a report with an individually set theme and prepare a 10-minute presentation.
		6th	Theme 1 presentation (Part 1: Nakai and Takeda) Each individual will give a 10-minute presentation about Theme 2 followed by a 5-minute discussion with everyone.	Give a 10-minute presentation about Theme 1 and have a 10-minute discussion with everyone. Also, evaluate each other's presentations.
		7th	Theme 1 presentation (Part 2: Nakai and Takeda) Same as above	Give a 10-minute presentation about Theme 1 and have a 10-minute discussion with everyone. Also, evaluate each other's presentations.
		8th	Theme 1 presentation (Part 3: Nakai and Takeda) Same as above	Give a 10-minute presentation about Theme 1 and have a 10-minute discussion with everyone. Also, evaluate each other's presentations.
	2nd Quarter	9th	Theme 1 presentation (Part 4: Nakai and Takeda) Same as above	Give a 10-minute presentation about Theme 1 and have a 10-minute discussion with everyone. Also, evaluate each other's presentations.
		10th	Theme 1 presentation (Part 5: Nakai and Takeda) Same as above	Give a 10-minute presentation about Theme 1 and have a 10-minute discussion with everyone. Also, evaluate each other's presentations.
		11th	Presentation rules (Part 3: Takeda) Practice the key points of public presentations with actual examples.	Learn the key points for public presentations.
		12th	Theme 2 (Code of ethics): Preparing reports and slides (Part 1: Nakai and Takeda) In teams of two to four, research the code of ethics of respective professional academic societies. Prepare to compile reports and deliver a 10-minute presentation.	In teams of two to four, can research the code of ethics of the professional academic societies that they belong to.
		13th	Theme 2 (Code of ethics): Preparing reports and slides (Part 2: Nakai and Takeda) Same as above	Working together in teams, can prepare a 10-minute presentation on and summarize in a report the ethics of the respective professional academic societies that they belong to.
		14th	Theme 2 presentation (Part 1: Nakai and Takeda) In teams, give a 10-minute presentation about Theme 1 and have a 10-minute discussion with everyone.	In teams, give a 10-minute presentation about Theme 2 and have a 10-minute discussion with everyone. Also, evaluate each other's presentations.
		15th	Theme 2 presentation (Part 2: Takeda and Nakai) Same as above	In teams, give a 10-minute presentation about Theme 2 and have a 10-minute discussion with everyone. Also, evaluate each other's presentations.
		16th	No final exam	

Evaluation Method and Weight (%)

	Resume	Presentation&Discussion	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	30	60	10	0	0	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	30	60	10	0	0	0	100
Cross Area Proficiency	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Industrial Materials

Course Information

Course Code	4010	Course Category	Specialized / Compulsory
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials	A separate handout will be provided.		
Instructor	SAKAIDA Akiyoshi,KAJIMURA Yoshihiro,TAKEDA Naho,HIRAISHI Toshihiro		

Course Objectives

(1) Understand the basic issues related to metal materials and learn their characteristics and how to test the strength. (taught by Sakaida).
(2) Become able to think about technological innovation through the fusion of different fields for the construction, maintenance, and control of concrete structures. (taught by Takeda).
(3) Understand the factors to consider when making environmentally friendly choices for materials, and deepen understanding by individually studying and explaining materials of interest to each other. (taught by Hiraishi).
(4) Understand the physical quantities related to magnetism along with units, and aim to understand and explain the properties of various magnetic materials. (taught by Kajimura).

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Understand the basic issues related to metal materials and can explain specifically their characteristics and how to test the strength.	Understand the basic issues related to metal materials and can explain their characteristics and how to test the strength.	Do not understand the basic issues related to metal materials and cannot explain their characteristics and how to test the strength.
Achievement 2	Can explain the relationship between their own specialty and concrete engineering, and make new proposals.	Can explain the relationship between their own specialty and concrete engineering.	Cannot explain the relationship between their own specialty and concrete engineering.
Achievement 3	Can perform LCA analysis for making environmentally friendly choices for industrial materials.	Understand the items to consider for making environmentally friendly choices for industrial materials.	Do not understand the need to make environmentally friendly choices for industrial materials.
Achievement 4	Understand the physical quantities related to magnetism, along with units, and understand and can explain the properties and applications of various magnetic materials.	Understand the physical quantities related to magnetism, along with units, and understand and can explain the properties of various magnetic materials.	Do not understand the physical quantities related to magnetism, along with units, and do not understand and cannot explain the properties of various magnetic materials.

Assigned Department Objectives

Teaching Method

Outline	(1) With a focus on steel materials, explain the characteristics and types of metal materials, and methods for strengthening them together with breakdown phenomena under various conditions. (8 hours, taught by Sakaida.) (2) Explain the mechanical properties and reinforcement methods of concrete (a typical material for urban construction), maintenance and control techniques, and consideration for environmental issues. (6 hours, taught by Takeda.) (3) Deepen understanding by individually studying and explaining materials' environmental impact and the properties of various industrial materials. (8 hours, taught by Hiraishi.) (4) Understand the characteristics and properties of various magnetic materials and explain their application cases. (8 hours, taught by Kajimura.)
Style	The class will be held in an omnibus format by four faculty members. Weeks 1-4: Sakaida will teach classes in a lecture-style format. Weeks 5-7 (Takeda): Students will learn about the mechanical properties of concrete, reinforcement methods, maintenance and control techniques, and consideration for environmental issues. Weeks 8-11 (Hiraishi): After explaining choices of industrial materials and the difference in their environmental impact according to a Life Cycle Assessment (LCA), students will select one industrial material related to their graduate study's special research and use PowerPoint to present its advantages, disadvantages, and environmental impact. Weeks 12-15 (Kajimura): Students will learn the physical quantities related to magnetism along with units, and become able to understand and explain the properties of various magnetic materials. Students will also investigate application cases.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. Students who miss 1/3 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Introduction to metal materials (Sakaida) Learn about the crystal structures and plastic deformation mechanism of metal materials.	Can explain the crystal structures and plastic deformation mechanism of metal materials.
		2nd	Types and characteristics of metal materials (Sakaida) Learn about the types and characteristics of metal materials that are used as materials for machinery and construction.	Can explain the types and characteristics of metal materials that are used as materials for machinery and construction.

		3rd	Methods for strengthening metal materials (Sakaida) Learn about heat treatment, strengthening methods, and reinforcement mechanisms for steel materials.	Can explain heat treatment, strengthening methods, and reinforcement mechanisms for steel materials.
		4th	Mechanical properties of metal materials (Sakaida) Learn about the mechanical properties of metal materials and how to test the strength.	Can explain the mechanical properties of metal materials and how to test the strength.
		5th	Introduction to concrete (Takeda) Learn about concrete (a typical material for urban construction), its constituent materials, and its mechanical properties.	Can explain concrete's constituent materials and mechanical properties.
		6th	Durability, maintenance and control techniques for concrete structures (Takeda) Learn how to reinforce concrete structures, and how to deal with deterioration that affects its durability.	Can explain the maintenance and control techniques for concrete structures.
		7th	Innovation in the construction field (Takeda) Learn about environmental issues and new technologies in the construction field	Can explain how to deal with environmental problems and new technologies in the construction field.
		8th	Materials and environmental impact (Hiraishi) Learn about the results of analyzing various industrial materials' environmental impact using an LCA (Life Cycle Assessment) method.	Can analyze the difference between various industrial materials by means of an LCA (Life Cycle Assessment).
	2nd Quarter	9th	Study a material's properties (Hiraishi) Give a presentation on the characteristics of an industrial material of interest.	Can explain the applications, advantages, and disadvantages of an industrial material related to special research.
		10th	Study a material's properties (Hiraishi) Give a presentation on the characteristics of an industrial material of interest. Create presentation materials.	Can explain the applications, advantages, and disadvantages of an industrial material related to special research.
		11th	Study a material's properties (Hiraishi) Give a presentation on the characteristics of an industrial material of interest.	Can explain the applications, advantages, and disadvantages of an industrial material related to special research.
		12th	An outline of magnetic materials (Kajimura) Outline the development history of magnetic materials and their characteristics. Also learn about specific cases that are widely used in many fields today.	Outline the development history of magnetic materials and their characteristics. Can also explain the specific cases that are widely used in many fields today.
		13th	Physical properties of magnetic materials (Kajimura) Learn about the basics of magnetism and the physical properties of magnetic materials as learned in the field of electricity, etc. Investigate use and application cases of interest in the respective areas of specialty and deepen understanding of their principles.	Learn about the basics of magnetism and the physical properties of magnetic materials as learned in the field of electricity, etc. Can investigate use and application cases of interest in the respective areas of specialty and deepen understanding of their principles.
		14th	Principles and application examples of magnetic sensors that use magnetic materials (Kajimura) Introduce principles and application examples of magnetic sensors that use magnetic materials, and also introduce intelligent materials and intelligent magnetic materials.	Can explain the principles and application examples of magnetic sensors that use magnetic materials, and explain intelligent materials and intelligent magnetic materials.
		15th	Applications examples in various fields (Kajimura) Compile into a report the results of an investigation into magnetic materials in one's own area of specialty.	Can compile into a report and explain the results of an investigation into magnetic materials in one's own area of specialty.
		16th	Final exam	

Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	100	0	0	0	0	0	100
Basic Proficiency	50	0	0	0	0	0	50
Specialized Proficiency	50	0	0	0	0	0	50
Cross Area Proficiency	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Information Processing

Course Information

Course Code	4011	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	INOUE Kazunari		

Course Objectives

(1) Have knowledge of the various data formats that a computer handles and can make appropriate choices (H).
(2) Understand the characteristics of data formats, and can convert them to required formats and process them using appropriate tools (D).
(3) Can express one's own information to others in a way that is easy to understand (E).

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Fully understand the data formats that computers handle, and their management and protection.	Understand the data formats that computers handle, and their management and protection.	Do not understand the data formats that computers handle, and their management and protection.
Achievement 2	Fully understand how to prepare technical documentation and presentation materials, and various techniques.	Understand how to prepare technical documentation and presentation materials, and various techniques.	Do not understand how to prepare technical documentation and presentation materials, and various techniques.
Achievement 3	Fully understand statistical calculations and processing using Excel and ipyson.	Understand statistical calculations and processing using Excel and ipyson.	Do not understand statistical calculations and processing using Excel or ipyson.

Assigned Department Objectives

Teaching Method

Outline	The proper handling of information is essential for engineers in all areas of specialty. Improving the ability to create the materials used in various types of presenting is an important task for conveying technology. This includes papers, posters, and presentations. From the data handled by computers to material creation using various applications, the aim of this course is to learn advanced information application technology and provide explanations aimed at boosting skills.
Style	The lessons on data formats that computers handle and their management and protection in weeks 1 and 2 will be taught in a lecture-style format. From week 3 to week 15, lessons on creating technical documentation and presentation materials using MS Office and statistical calculations and processing using Excel and ipyson, will be taught in lecture-style and exercise formats.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. Since there is no prerequisite knowledge required, students from all departments can take the course. Students who miss 1/3 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☑ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Explain the data formats that computers handle and their characteristics.	Understand the data formats that computers handle and their characteristics.
		2nd	Explain the internal structure, storage, and networks of computers.	Understand the internal structure, storage, and networks of computers.
		3rd	Explain styles, chapters, sections, paragraphs, fonts, and indents found in document creation.	Understand styles, chapters, sections, paragraphs, fonts, and indents found in document creation.
		4th	Explain paste link and paste metafile for pictures and tables, and cross-reference.	Understand paste link and paste metafile for pictures and tables, and cross-reference.
		5th	Create and submit technical documentation using Word	Create and submit technical documentation using Word
		6th	Create technical documentation using PowerPoint. Describe how to create different diagrams, templates, and slides / masters.	Create technical documentation using PowerPoint. Understand how to create different diagrams, templates, and slides / masters.
		7th	Explain effective techniques and playback, including image, audio, and video data.	Understand effective techniques and playback, including image, audio, and video data.
		8th	Create technical presentation documentation using PowerPoint	Create technical presentation documentation using PowerPoint
	2nd Quarter	9th	Explain various functions and data analysis.	Understand various functions and data analysis.
		10th	Explain macro functions and how to run them.	Understand macro functions and how to run them.
		11th	Submit statistical calculations and processing using Excel	Submit statistical calculations and processing using Excel

		12th	Explain file protection, encryption, and security.	Can protect, encrypt, and secure files.
		13th	Explain a cloud-assisted interactive program development environment.	Understand a cloud-assisted interactive program development environment.
		14th	Explain database analysis that used interactive execution.	Understand database analysis that used interactive execution.
		15th	Summary	Understand the summary.
		16th	No final exam	No final exam

Evaluation Method and Weight (%)

		Assignments					Total
Subtotal	0	100	0	0	0	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	0	100	0	0	0	0	100
Cross Area Proficiency	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Analytical Mechanics

Course Information

Course Code	4012	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor			

Course Objectives

(1) Understand that Lagrangian mechanics are formulated by developing Newtonian mechanics with a focus on the handling of constraints.
(2) Understand the basic concepts of vibration in multi-degree of freedom systems (including continua, which are infinite degrees of freedom systems), with a focus on normal vibration.
(3) Learn the calculus of variations, and understand that the basic laws of mechanics can be formulated as variation principles.
(4) Understand that Hamiltonian mechanics (canonical formulation) is formulated by making the equations of motion, second-order differential equations, into first-order ones.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Fully understand the formulation of Lagrangian mechanics.	Understand the formulation of Lagrangian mechanics.	Do not understand the formulation of Lagrangian mechanics.
Achievement 2	Fully understand the basic concepts of multi-degree of freedom vibration systems.	Understand the basic concepts of multi-degree of freedom vibration systems.	Do not understand the basic concepts of multi-degree of freedom vibration systems.
Achievement 3	Fully understand the formulation of mechanics by variation principles.	Understand the formulation of mechanics by the variation principles.	Do not understand the formulation of mechanics by the variation principles.
Achievement 4	Fully understand the formulation of Hamiltonian mechanics.	Understand the formulation of Hamiltonian mechanics.	Do not understand the formulation of Hamiltonian mechanics.

Assigned Department Objectives

Teaching Method

Outline	Analytical mechanics is the mathematical development of Newtonian mechanics and is one of the important fundamental departments involved in the wide area of engineering. The theory of analytical mechanics is composed of the Lagrangian and Hamiltonian mechanics (canonical formulation). In this course, students will mainly study the Lagrangian mechanics. The Lagrangian mechanics is designed to handle various mechanics problems well. It is also the basis for learning the Hamiltonian mechanics, which is introduced at the end of the semester.
Style	Classes are held in a lecture style.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. Be aware that class time makes up a small percentage of the overall expected learning time, and students are advised to thoroughly pre-study or review. * Liaison: Ogasawara Students who miss 1/3 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	The principle of virtual work and d'Alembert's principle	Learn the basics about the principle of virtual work and d'Alembert's principle.
		2nd	The method of Lagrange multipliers	Learn the basics of the method of Lagrange multipliers.
		3rd	Lagrange's equations of motion of the first kind	Learn the basics of Lagrange's motion equations of the first kind.
		4th	Generalized coordinates and generalized velocity	Learn the basics of generalized coordinates and generalized velocity.
		5th	Lagrange's equations of motion (the second kind)	Learn the basics of Lagrange's equations of motion.
		6th	Normal coordinates in a coupled oscillation system	Learn the basics of coupled oscillation systems.
		7th	Normal coordinates in a coupled oscillation system	Learn the basics of coupled oscillation systems.
		8th	Waves	Learn the basics of waves.
	2nd Quarter	9th	Lagrangian formulation for continua	Learn the basics of Lagrangian formulation for continua.
		10th	Calculus of variations and Euler's differential equations	Learn the basics of the calculus of variations and Euler's differential equations.
		11th	Hamilton's principle	Learn the basics of Hamilton's principle.

		12th	Hamilton's canonical equations	Learn the basics of Hamilton's canonical equations.
		13th	Hamilton's canonical equations	Learn the basics of Hamilton's canonical equations.
		14th	Variation principle in Hamiltonian mechanics	Learn the basics of variation principle in Hamiltonian mechanics.
		15th	Summary and supplementary notes	Understand the relationship between Lagrangian and Hamiltonian mechanics.
		16th	Final exam	

Evaluation Method and Weight (%)

	Examination	Exercise	Total
Subtotal	70	30	100
Basic Proficiency	0	0	0
Specialized Proficiency	70	30	100
Cross Area Proficiency	0	0	0

Akashi College	Year	2022	Course Title	Inclusive Design

Course Information

Course Code	4013	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	OTSUKA Takehiko,AKITA Naoshige,IWATA Naoki,HIRAI Yasuyuki,OKAMURA Hideki		

Course Objectives

The goals are to:
(1) Understand inclusive design in Japan and Europe
(2) Understand user-participation methods
(3) Cultivate solid knowledge and practical ability, and humanity to comprehensively support the lives of diverse people with disabilities.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Fully understand and can explain inclusive design	Understand and can explain inclusive design	Do not understand or can explain inclusive design.
Achievement 2	Can fully apply multiple kinds of knowledge and present multiple ideas instead of a single solution.	Can apply multiple kinds of knowledge and present multiple ideas instead of a single solution.	Cannot apply multiple kinds of knowledge and present multiple ideas instead of a single solution .
Achievement 3	Fully understand and can explain various user characteristics	Understand and can explain various user characteristics.	Do not understand and cannot explain various user characteristics.

Assigned Department Objectives

Teaching Method

Outline	Inclusive design is a concept aimed at mainstream design development that includes users who have been excluded until now, and makes good business sense. Recently, in particular, it has been attracting attention as an effective method of UX (user experience) and innovation. This course focuses on case studies in specific fields such as medical and welfare, and discusses inclusive design in Europe and Japan, and the user-participation method as that process. It aims to understand this through WS, etc. Hirai has been a designer for 14 years and is currently a professor at the Graduate School of Kyushu University. Akita has worked as a designer for seven years and is currently an assistant professor at the Graduate School of Kyushu University. Iwata has been a designer for 27 years. Asao has been managing a company in the nursing care and barrier-free housing sector for 32 years. The classes will make use of all their experiences.
Style	The classes are taught in ways including lectures and exercises such as workshops. The materials required for classes will be distributed in the lectures as appropriate. Reference Books: Hirai et al. Inclusive Design: Shakai no Kadai o Kaiketsusuru Sankagata Design (Inclusive Design: Participatory Design to Solve Social Problems) (Gakugei Shuppansha)
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. The course is open to students from any department. Classes will be taught as simply as possible, and group workshops will also be held. Students who miss 1/4 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☐ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	What is an inclusive design? 1) (Yasuyuki Hirai, professor at Kyushu University) Understand accessible design around the world. What is the difference between conventional and inclusive design? Think together to discover why there is a need for this using specific cases as a subject.	Understand universal design from accessible and barrier-free design around the world.
		2nd	What is an inclusive design? 2) (Hirai) Using specific cases in the medical and pharmaceutical fields to think together on topics, including the background behind inclusive design and the differences between it and other similar concepts such as universal and barrier-free design.	Understand the concepts and methodologies of inclusive design.
		3rd	Week 3: Barrier-free design in schools by simulation, Otuska Conduct a facility inspection at Akashi College using various simulation equipment.	Understand each user's special features through simulations as the elderly, visually impaired, etc.

		4th	Office space and inclusive design 1 (Naoshige Akita, Assistant Professor, Kyushu University), Otsuka Companies are developing products based on their management philosophy and vision. Consider inclusive design at companies by referring to the relationship between corporate management and manufacturing, the relationship with the market, and the relationship with customers.	Learn how to research users based on examples of office-space inclusive design.
		5th	Office spaces and inclusive design 2 (Akita) What is an office, what functions are in an office space, and what products are there? Consider what to do in order to plan an office and design its space.	Can think about inclusive design in an office space with the parties concerned.
		6th	Office spaces and inclusive design 3 (Akita) Products used in the office include stationery and furniture. Study based on examples, how they are designed through concepts and processes.	Understand the inclusive design process in an office space.
		7th	Office spaces and inclusive design 4 (Akita), Otsuka Discuss in groups things all noticed in the class room and school space, set challenges, and share ideas.	Can set social challenges based on behavioral observation, and solve them.
		8th	Team-made design 1 (Naoki Iwata, Atelier Caprice) Learn and experience the "team-made designs" that are actually applied in society. Hold a lecture on "graphic design."	Understand participatory and co-creational design .
	2nd Quarter	9th	Team-made design 2 (Iwata), Otsuka Practice "graphic design" (a department introduction brochure and DVD produced by students) based on team-made designs. Identify issues by practically doing and validating it.	Create a graphic design (brochure) using a team-made design
		10th	ICF and the welfare community (Hiroyasu Asao, Amenity & Safety Corporation) Recognize the relevance and importance of the ICF's thinking, which has become mainstream for welfare, and its living environment. Study the points for building a living environment for each case of disease from practical examples, and learn approaches toward diverse people.	Recognize the relevance and importance of the ICF's thinking and living environment, and understand the basics of building a living environment.
		11th	Living environment and housing facilities: Simulated learning (Asao), Otsuka Examine the main facilities and design of barrier-free housing, comprehensively capture the lives of people with physical disabilities, conduct problem analysis, and learn approaches.	Students will learn the basics of inclusive barrier-free house development.
		12th	Social innovation through dialog with the parties concerned, Otsuka Explain the outlines of Japan's "User Expert System" that involves participation of parties concerned, the "Advisor for Welfare Community Development" scheme in the Hyogo Prefectural Welfare Community Development Ordinance, and so on.	Understand the development of welfare communities in Japan's local governments.
		13th	Inclusive design workshop 1 (Akita), Otsuka Hold a workshop with the theme "Design aspiration: What design can do." Explains as an introduction, the workshop's concept and how it will run.	Research various issues through inclusive design methodology with the parties concerned.
		14th	Inclusive design workshop 2 (Akita), Otsuka Identify and visualize key issues from needs within the process. Organize insights from direct user interaction and observations to identify key issues.	Identify, research, and visualize social issues and solve them.
		15th	Inclusive design workshop 3: Review sessions (Akita), Otsuka Design solutions for the key issues identified. Finally, present them in teams.	Can present solutions for important issues through inclusive design.
		16th	No final exam	

Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	Behavior	Report	Other	Total
Subtotal	0	70	0	0	30	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	0	0	0	0	0	0	0
Cross Area Proficiency	0	70	0	0	30	0	100

Akashi College	Year	2022	Course Title	Off-Campus Practical Training

Course Information

Course Code	4014	Course Category	Specialized / Compulsory
Class Format	Practical training	Credits	School Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	Year-round	Classes per Week	前期:2 後期:2
Textbook and/or Teaching Materials			
Instructor			

Course Objectives

(1) Can experience some of the actual technical activities at the host companies and work on solving problems with the necessary assistance.
(2) Can work collaboratively in the assigned workplaces and think freely.
(3) Can report effectively what has been learned empirically.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Can experience some of the actual technical activities at the host companies and actively work on solving problems with the necessary assistance.	Can experience some of the actual technical activities at the host companies and work on solving problems with the necessary assistance.	Cannot experience some of the actual technical activities at the host companies and work on solving problems with the necessary assistance.
Achievement 2	Can work collaboratively in the assigned workplace and actively think freely.	Can work collaboratively in the assigned workplace and think freely.	Cannot work collaboratively in the assigned workplace and think freely.
Achievement 3	Can effectively and appropriately report what has been learned empirically.	Can effectively report what has been learned empirically.	Cannot effectively report what has been learned empirically.

Assigned Department Objectives

Teaching Method

Outline	This course is set up as part of an introduction for an internship and sandwich system. The aim is to gain a sense of practical technology through technical experience in companies or government agencies, etc., and to use the results obtained from technical experience in learning.
Style	Follow the host company instructor's instructions.
Notice	Read the Akashi Kosen Graduate Study Internship Guidelines carefully, and closely communicate with the department principal or with the faculty of basic engineering research or special research. During the internship period, students should actively try to acquire technical and other skills, and dress and use language that is appropriate for an intern. The internship period shall be at least 10 working days during the summer holidays, etc. The graduate study internship may include up to 15 hours of preliminary guidance (manner lesson, preliminary research on the host company), debrief sessions, and time for preparing reports, with a total of 90 hours. If it is determined that conducting the internship at a company or other institution will be difficult due to things like social circumstances, and if it is necessary to provide reasonable consideration for students, the internship will be replaced with research on companies, etc., related to the field of graduate study. In that case, the evaluation will consist of an evaluation by research advisers for students' research on companies, etc. (30%), the research report (30%), and outcomes debrief session results (40%). In the Course Objectives and Aims and the Rubric Evaluation items, the following items should be replaced as follows: (1) "Experience some of the actual technical activities at the host companies, etc." as "conduct research and study using the specified methods of the companies, etc., of research target and to obtain advice from the members or supervising faculty member of research there." (2) "Work collaboratively in the assigned workplace" as "contribute to the activities of company of target research." (3) "What has been learned empirically" as "one's own research result."

Characteristics of Class / Division in Learning

☑ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Guidance	Reminders about precautions of internship and manners at the host company, etc.
		2nd	Internship	Get individual technical experience at the host company.
		3rd	Same as above	Same as above
		4th	Same as above	Same as above
		5th	Same as above	Same as above
		6th	Same as above	Same as above
		7th	Same as above	Same as above
		8th	Same as above	Same as above
	2nd Quarter	9th	Same as above	Same as above
		10th	Same as above	Same as above
		11th	Same as above	Same as above
		12th	Same as above	Same as above
		13th	Same as above	Same as above

		14th	Same as above	Same as above
		15th	Same as above	Same as above
		16th	No final exam	
2nd Semester	3rd Quarter	1st	Same as above	Same as above
		2nd	Same as above	Same as above
		3rd	Same as above	Same as above
		4th	Same as above	Same as above
		5th	Same as above	Same as above
		6th	Same as above	Same as above
		7th	Same as above	Same as above
		8th	Same as above	Same as above
	4th Quarter	9th	Same as above	Same as above
		10th	Same as above	Same as above
		11th	Same as above	Same as above
		12th	Same as above	Same as above
		13th	Same as above	Same as above
		14th	Same as above	Same as above
		15th	Internship debrief session	A presentation on the overall outcomes of the internship .
		16th	No final exam	

Evaluation Method and Weight (%)

	Evaluation of the training destination	Report	Debriefing session	Total
Subtotal	30	30	40	100
Basic Proficiency	0	0	0	0
Specialized Proficiency	30	30	40	100
Cross Area Proficiency	0	0	0	0

Akashi College	Year	2022	Course Title	Preliminary Research Studies

Course Information

Course Code	4015	Course Category	Specialized / Compulsory
Class Format	Seminar	Credits	School Credit: 4
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	Year-round	Classes per Week	4
Textbook and/or Teaching Materials			
Instructor			

Course Objectives

(1) Can integrate and deepen expertise, and examine it theoretically, systematically, practically, and creatively from a wide perspective toward solving problems.
(2) Can summarize obtained research results as reports and posters, communicate them verbally to others, and discuss them.
(3) Can engage in learning and research independently and continuously.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Can integrate and deepen expertise, and examine it theoretically, systematically, practically, and creatively from a wide perspective toward solving problems.	Can integrate and deepen expertise, and examine it theoretically, systematically, and practically from a wide perspective toward solving problems.	Cannot integrate and deepen expertise, and examine it theoretically, systematically, and practically from a wide perspective toward solving problems.
Achievement 2	Can fully summarize obtained research results as reports and posters, communicate them verbally in a comprehensible manner to others, and discuss them.	Can summarize obtained research results as reports and posters, communicate them verbally to others, and discuss them.	Cannot summarize obtained research results as reports and posters, communicate them verbally to others, and discuss them.
Achievement 3	Can fully engage in learning and research independently and continuously.	Can engage in learning and research independently and continuously.	Cannot engage in learning and research independently and continuously.

Assigned Department Objectives

Teaching Method

Outline	This course is based on graduation research in the department, and will conduct research in the mechanical and electronic system engineering fields at a higher level under the supervision of the faculty member in charge. The aim is to acquire the background knowledge that serves as a foundation for graduate study's special research.
Style	In the course, as it is particularly important for students to work towards research voluntarily, the faculty members in charge will first present planned themes for setting up a research theme. The theme will then be decided after discussing with students with utmost respect to their engineering interests. Furthermore, from exploring the issues given, thinking about the approach methods, right up to answering the questions, students will carry out each research process independently and based on their own judgment as much as possible.
Notice	This course's content will amount to 180 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. Promote research independently and actively based on the background knowledge cultivated in the department. Other conditions for missing classes that will make students ineligible for a passing grade

Characteristics of Class / Division in Learning

☑ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Setting the research theme Each faculty member in charge will explain and direct each individual.	Can determine research themes independently under each teaching staff.
		2nd	Individual research Carry out separately under supervision of each faculty member in charge.	Can independently and continuously conduct studies and research under each teaching staff.
		3rd	Individual research Same as above	Same as above
		4th	Individual research Same as above	Same as above
		5th	Individual research Same as above	Same as above
		6th	Individual research Same as above	Same as above
		7th	Individual research Same as above	Same as above
		8th	Individual research Same as above	Same as above
	2nd Quarter	9th	Individual research Same as above	Same as above

		10th	Individual research Same as above	Same as above
		11th	Individual research Same as above	Same as above
		12th	Individual research Same as above	Same as above
		13th	Individual research Same as above	Same as above
		14th	Individual research Same as above	Same as above
		15th	Individual research Same as above	Same as above
		16th	No final exam	
2nd Semester	3rd Quarter	1st	Individual research Same as above	Same as above
		2nd	Individual research Same as above	Same as above
		3rd	Individual research Same as above	Same as above
		4th	Individual research Same as above	Same as above
		5th	Individual research Same as above	Same as above
		6th	Individual research Same as above	Same as above
		7th	Individual research Same as above	Same as above
		8th	Individual research Same as above	Same as above
	4th Quarter	9th	Individual research Same as above	Same as above
		10th	Individual research Same as above	Same as above
		11th	Individual research Same as above	Same as above
		12th	Individual research Same as above	Same as above
		13th	Individual research Same as above	Same as above
		14th	Individual research Same as above	Same as above
		15th	Presentation review meeting	Can summarize obtained research results as reports and posters, communicate them verbally to others, and discuss them.
		16th	No final exam	

Evaluation Method and Weight (%)

	Examination	Presentation	Report	Autonomy	Portfolio	Other	Total
Subtotal	0	30	40	30	0	0	100
Basic Proficiency	0	10	20	10	0	0	40
Specialized Proficiency	0	20	20	20	0	0	60
Cross Area Proficiency	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	System Control Engineering

Course Information

Course Code	4016	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	KAMI Yasushi		

Course Objectives

1. Can derive the state-space representation
2. Can determine the stability of a linear time-invariant system using Lyapunov's stability determination method
3. Can calculate state feedback gains to achieve the specified pole position through conversion to a controllable canonical form
4. Can calculate observer gains to achieve the specified pole arrangement using a dual system
5. Can explain control performance that can be achieved (adjusted) using an optimal regulator
6. Can explain the characteristics and stability conditions of the composition of the aggregation system's poles

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Can derive the state-space representation for any linear time-invariant system	Can derive the state-space representation for some typical system examples	Do not know the definition of the state-space representation
Achievement 2	Can determine the stability based on the determination procedure in Lyapunov's stability determination method	Can explain the determination procedure in Lyapunov's stability determination method	Do not know Lyapunov's stability determination method
Achievement 3	Can calculate the desired state feedback gains by converting to a controllable canonical form	Can explain the matrix to be stabilized in state feedback control	Do not know the state feedback control rule
	Can calculate the desired observer gains using a dual system	Can explain the matrix to be stabilized in the observer design	Do not know the observer
	Can explain the control performance tradeoffs that can be achieved with an optimal regulator	Can explain the control performance that can be achieved with an optimal regulator	Do not know the optimal regulator
	Can explain the stability conditions based on the composition of the aggregation system's poles	Can explain the characteristics of the composition of the aggregation system's poles	Do not know the characteristics of the composition of the aggregation system's poles

Assigned Department Objectives

Teaching Method

Outline	In classical control, the transmission function that focuses only on input and output relationships is the basis for which a control system is designed in the frequency domain. By contrast, modern control theory is based on a state-space representation that use variables (state variables) that represent the internal state of a system to design a control system in a time domain. This course will cover the basic contents of modern control theory.
Style	Students will learn about topics such as the derivation of state equations, Lyapunov's stability determination method, controllability and observability, and how to design state feedback controllers and observers. In almost every class, after the content of the lesson is explained, there will be exercises to review the content.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. Furthermore, the course assumes that students have a basic knowledge of topics such as Laplace transform, transfer functions, and eigenvalues and matrix inversion (the very basics of matrix theory. There will be no makeup exams to cover poor performance. Students who miss 1/3 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☑ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	An introduction to state-space representation	Can write the expression for state-space representation Can explain the process for deriving a state-space representation
		2nd	Solutions for equations of state	Can derive the solution for an equation of state Can explain the meaning of a state-transition matrix Can calculate a state-transition matrix
		3rd	Relationship between an equation of state and a transfer function, and the stability condition	Can calculate a transfer function from the state-space matrix Can explain the stable conditions of a system represented by a state-space representation

		4th	Similarity conversion invariants and transfer functions	Can explain the formula for a similarity transformation Can similarly transform states using the given similarity transformation matrix
		5th	Concept of stability and Lyapunov's stability determination method (1)	Can explain the relationship between stability and convergence values of state variables Can explain Lyapunov's stability determination method
		6th	Lyapunov's stability determination method (2)	Can determine the stability of the linear time-invariant system given by a state-space representation, based on Lyapunov's stability determination method
		7th	Exercise	Do exercises to review content from lectures in the first semester.
		8th	Midterm exam	
	2nd Quarter	9th	State feedback and controllability	Can explain state feedback control rules Can determine controllability based on control conditions
		10th	The nature of a controllable canonical form and the design of a control system	Can explain the characteristics of the system matrix in controllable canonical form and their correspondence with a transfer function Can calculate the state feedback gain that achieves the specified pole position through conversion to a controllable canonical form
		11th	Observers and observability	Can explain the configuration of an observer Can determine observability based on the observation conditions
		12th	The nature of observable canonical form and the design of observers using a dual system	Can explain the characteristics of the system matrix in observable canonical form and the correspondence with a transfer function Can calculate observer gain to achieve the specified pole arrangement using a dual system
		13th	Pole-zero offset, controllability / observability, optimal regulators, and the Kalman filter	Can explain the relationship between pole-zero offset and the establishing controllability and observability Can explain the control implications for optimal regulators and the Kalman filter
		14th	State feedback control using state observation instruments (aggregation system)	Can explain the composition of the aggregation system's poles Can explain the stability conditions of the aggregation system
		15th	Exercise	Do exercises to review content from lectures in the second semester.
		16th	Final exam	

Evaluation Method and Weight (%)

	Examination	Exercise	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	80	20	0	0	0	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	80	20	0	0	0	0	100
Cross Area Proficiency	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Advanced Instrumentation Engineering

Course Information

Course Code	4017	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	FUJIWARA Seiji		

Course Objectives

The goal is to achieve a comprehensive understanding of each of the following items and to appropriately apply the knowledge learned.
(1) Measurement data processing (units and standards, and statistical data processing)
(2) Measurement systems analysis and characterization (system evaluation methods and digital signal processing)
(3) Various basic measurement principles (basic principles and their applications)

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Understand and can apply measurement data processing (units and standards, and statistical data processing).	Understand measurement data processing (units and standards, and statistical data processing).	Do not understand measurement data processing (units and standards, and statistical data processing).
Achievement 2	Understand and can apply measurement systems analysis and characterization (system evaluation methods, and digital signal processing).	Understand measurement systems analysis and characterization (system evaluation methods, and digital signal processing).	Do not understand measurement systems analysis and characterization (system evaluation methods, and digital signal processing).
Achievement 3	Understand and can apply various basic measurement principles (basic principles and their applications).	Understand various basic measurement principles (basic principles and their applications).	Do not understand various basic measurement principles (basic principles and their applications).

Assigned Department Objectives

Teaching Method

Outline	Recent breakthroughs in technology demand more accurate measurements. In addition, there is an increasing need for computer-based measurement automation and online and in-process measurement in production systems. This lecture will 1) briefly review the basic items common to various applied measurements (what is measurement engineering, units and standards, measurement data processing, measurement system characteristics and system analysis, etc.); then 2) discuss in detail the various basic measurement principles (basic principles of signal conversion).
Style	Classes will be held in a lecture style.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. Students who miss 1/3 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☐ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Introduction What is metrology? Study the engineering meaning of measurement, instrumentation, weighing, etc. and the purpose of measurement.	Understand what metrology is and its basic concepts.
		2nd	Measurement basics Study units and standards, and solidify knowledge of SI base units and dimensional analysis. Study the basic methods of measurement and measurement system planning and clarify the purpose of measurement.	Study units and standards and understand SI base units and dimensional analysis.
		3rd	Measurement data error and accuracy Study measurement errors and measurement accuracy, identify the causes of errors, and study how to reduce errors and improve accuracy.	Understand measurement errors and accuracy, and how to reduce error.
		4th	Measurement data statistical processing Study the statistical processing of measurement data and learn the correct data processing methods through examples.	Understand the statistical processing of measurement data.
		5th	Measurement systems and system analysis Study the basic configuration and characteristic analysis of measurement systems, and learn basic characteristic analysis techniques.	Understand the basic configuration and characteristic analysis of measurement systems.
		6th	Mechanical sensors (1) Study mechanical expansion principles (screws, gears, and lever).	Understand mechanical extension principles (screws, gears, and lever).

		7th	Mechanical sensors (2) Study the application of elastic deformation to sensors and the measurement of vibration using the seismic system.	Understand the application of elastic deformation to sensors and the measurement of vibration using the seismic system.
		8th	Mechanical sensors (3) Study the gyro principle and its application.	Understand the gyro principle and its application.
	2nd Quarter	9th	Electric and electronic sensors (1) Study the application of impedance changes, in particular the principle and application of resistance line strain gauges that have extensive range of applications.	Understand the application of impedance changes, in particular the principle and application of resistance line strain gauges that have extensive range of applications.
		10th	Electric and electronic sensors (2) Study the application of impedance changes (changes in capacitance and electromagnetic induction).	Understand the application of impedance changes (changes in capacitance and electromagnetic induction).
		11th	Electric and electronic sensors (3) Study the application of piezoelectric and Seebeck effect to sensors.	Understand the application of piezoelectric and Seebeck effect to sensors.
		12th	Fluid type sensor Study fluid volume measurement using the fluid principle and the principle of an air micrometer.	Understand the fluid volume measurement using the fluid principle and the principle of an air micrometer.
		13th	Optical sensors Study the principles and applications of the optical interference and Moiré methods. Study measurement improved accuracy and its factors through the accuracy of optical sensors.	Study the principles and applications of the optical interference and Moiré methods. Understand measurement improved accuracy and its factors through the accuracy of optical sensors.
		14th	Other methods Study sensors using wave phenomena.	Understand sensors using wave phenomena.
		15th	Summary Study a measurement system's case study as a conclusion for the total 14 weeks.	Understand a measurement system's case study as a conclusion for the total 14 weeks.
		16th	Report assignment	

Evaluation Method and Weight (%)

	Understanding and efforts the lecture	Report	Total
Subtotal	60	40	100
Basic Proficiency	0	0	0
Specialized Proficiency	60	40	100
Cross Area Proficiency	0	0	0

Akashi College	Year	2022	Course Title	Random Signal Analysis

Course Information

Course Code	4018	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	Second Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	INOUE Kazunari		

Course Objectives

(1) Can explain basic issues and calculate probability using basic rules in relation to probability and probability theory
(2) Can calculate queues using parameters such as average arrival and average service in relation to queuing theory.
(3) Can calculate the failure rate, life expectancy, and reliability of parallel and series systems, in relation to reliability analysis.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Can fully explain the basic issues and calculate probability using the basic rules.	Can explain the basics issues and calculate the probability using basic rules.	Cannot explain the basics issues and calculate the probability using basic rules.
Achievement 2	Can fully calculate queues using parameters such as average arrival and average service.	Can calculate queues using parameters such as average arrival and average service.	Cannot calculate queues using parameters.
Achievement 3	Fully understand how to calculate the failure rate, life expectancy, and reliability of series-parallel and redundant systems.	Understand how to calculate the failure rate, life expectancy, and reliability of series-parallel and redundant systems.	Do not understand how to calculate the failure rate, life expectancy, and reliability of series-parallel and redundant systems.

Assigned Department Objectives

Teaching Method

Outline	Handling cumbersome and large amounts of data requires statistical thinking. Statistical analysis of data leads to the fastest possible solution. This course will be held in lecture and exercise formats while introducing irregular data cases.
Style	From weeks 1 to 15, classes will be held in lecture and exercise formats. Assignment exercises will be based on each item set in the Course Objectives and Aims.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. Students who miss 1/3 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☑ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
2nd Semester	3rd Quarter	1st	Explain the guidance, what is covered in this course, and evaluation method.	Understand the guidance, what is covered in this course, and evaluation method.
		2nd	Explain the statistical handling of events and probability, independence and dependency, and probability. Explain binding events, independence, conditional probability, and Bayes' theorem.	Understand the statistical handling of events and probability, independence and dependency, and probability. Understand binding events, independence, conditional probability, and Bayes' theorem.
		3rd	Understand variance and deviation, and Z-conversion as indicators of scattered data.	Understand variance and deviation, and Z-conversion as indicators of scattered data.
		4th	Explain how to organize 2D data and about orthogonality and correlation.	Can understand how to organize 2D data and about orthogonality and correlation.
		5th	Exercise 1 Submit within class time	Exercise 1 Submit within class time
		6th	Explain about calculating using moving average methods and noise reduction.	Understand about calculating using moving average methods and noise reduction.
		7th	Explain signals and noise, and S/N ratio decibel calculations.	Understand signals and noise, and S/N ratio decibel calculations.
		8th	Explain Type 1 and Type 2 errors, and testing.	Understand Type 1 and Type 2 errors, and testing.
	4th Quarter	9th	Exercise 2 Submit within class time	Exercise 2 Submit within class time
		10th	Explain the bathtub curve, failure rate for a period of time, and life expectancy. Explain the calculation of the average remaining count and reliability from the initial number and failure rate.	Understand the bathtub curve, failure rate for a period of time, and life expectancy. Understand the calculation of the average remaining count and reliability from the initial number and failure rate.
		11th	Explain the calculation of the reliability of parallel and series systems and redundant configurations.	Understand the calculation of the reliability of parallel and series systems and redundant configurations.

		12th	Exercise 3 Submit within class time	Exercise 3 Submit within class time
		13th	Program development environment using Jupyter notebook Explain data analysis using pandas and DataFrame creation and editing.	Program development environment using Jupyter notebook Understand program data analysis using pandas, and DataFrame creation and editing.
		14th	Explain visualization with Matplotlib and various graph creation.	Understand visualization with Matplotlib and various graph creation.
		15th	Exercise 4 Submit within class time	Exercise 4 Submit within class time
		16th	No final exam	No final exam

Evaluation Method and Weight (%)

	Exercise						Total
Subtotal	100	0	0	0	0	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	100	0	0	0	0	0	100
Cross Area Proficiency	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Advanced Electromagnetics

Course Information

Course Code	4019	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	Second Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	KAJIMURA Yoshihiro		

Course Objectives

Evaluation item (1) Can formulate laws and problems of electrostatic field phenomena and solve applied problems.
Evaluation item (2) Understand the nature of dielectrics and can solve problems related to the quantitative evaluation of electric fields during polarization.
Evaluation item (3) Can formulate laws and problems of current and magnetic field phenomena and solve applied problems.
Evaluation item (4) Can derive Maxwell's electromagnetic equations and solve applied problems.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Can formulate laws and problems of electrostatic field phenomena and solve applied problems.	Can formulate laws and problems of electrostatic field phenomena and solve problems.	Cannot formulate laws and problems of electrostatic field phenomena and solve problems.
Achievement 2	Understand the nature of dielectrics and can solve applied problems related to the quantitative evaluation of electric fields during polarization.	Understand the nature of dielectrics and can solve problems related to the quantitative evaluation of electric fields during polarization.	Do not understand the nature of dielectric materials and cannot solve problems related to the quantitative evaluation of electric fields during polarization.
Achievement 3	Can formulate laws and problems of current and magnetic field phenomena and solve applied problems.	Can formulate laws and problems of current and magnetic field phenomena and solve problems.	Cannot formulate laws and problems of current and magnetic field phenomena and solve problems.
	Can derive Maxwell's electromagnetic equations and solve applied problems.	Can derive Maxwell's electromagnetic equations and solve problems.	Cannot derive Maxwell's electromagnetic equations and solve problems.

Assigned Department Objectives

Teaching Method

Outline	This course is based on Electromagnetics I and II taught in the Electrical and Computer Engineering Department and aims to further enhance and develop the content. Electromagnetics I and II also largely provide university-level lessons, however some parts were either omitted due to academic constraints (related to peripheral basic academic ability, etc.), or simplified by relaxing their stricter handling. However for the Advance Courses, it is desirable to maintain the academic ability for basic subjects like electromagnetics at a university level both in name and reality. Therefore, the course aims to further raise the level while supplementing the content of Electromagnetics I and II.
Style	The evaluation will be based 100% on periodic exam scores. The pass mark is a score of 60 or more in total for these. Handouts will have content on electromagnetic theory, formulation, and specific computational problems.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. It is recommend that students have studied Electromagnetics I and II (in years 3 and 4) at our school's Electrical and Computer Engineering Department prior to taking this course. Students who miss 1/3 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
2nd Semester	3rd Quarter	1st	Electrostatic fields in a vacuum Explain about the virtual concepts of electric fields and electric power lines as fields of electrical phenomena. Define the electric potential as potential of an electric field, and consider the electric field as an electric potential gradient. Use ▽ and grad for calculations in this case.	Understand the virtual concepts of electric fields and electric power lines as fields of electrical phenomena. Can define the electric potential as potential of an electric field, and consider the electric field as an electric potential gradient.
		2nd	Gauss's theorem Explain Gauss's theorem, which is most likely to be used when calculating electric fields, in terms of its meaning in physics and application to calculations, and introduce example problems.	Understand "Gauss's theorem", which is most likely to be used when calculating electric fields, in terms of its meaning in physics and application to calculations, and solve example problems.
		3rd	Laplace's and Poisson's equations Examine the divergence of electric power lines and vectors in both physical and mathematical terms by introducing divergence (div). Also, explain example uses for Laplace's and Poisson's equations, which are the most versatile and well-known equations for describing electrostatic fields.	Can examine the divergence of electric power lines and vectors in both physical and mathematical terms by introducing divergence (div). Also understand how to use Laplace's and Poisson's equations, which are the most versatile and well-known equations for describing electrostatic fields.

		4th	Capacitance Outline the potential and capacity factors, and the energy of conductive systems, in regards to a charged conducting system. Learn more about the two most popular conducting systems, namely capacitance, including examples of actual calculations.	Understand the potential and capacity factors, and the energy of conductive systems, in regards to a charged conducting system. Understand the two most popular conducting systems, namely capacitance, including examples of actual calculations.
		5th	Dielectric materials (polarization) In many cases, capacitors have insulators (dielectrics) rather than vacuums (air). Learn about various materials' dielectric properties by introducing the concept of flux density in order to understand the physical phenomena of dielectric materials in electric fields.	In many cases, capacitors have insulators (dielectrics) rather than vacuums (air). Can explain various materials' dielectric properties by introducing the concept of flux density in order to understand the physical phenomena of dielectric materials in electric fields.
		6th	Electric fields in dielectric materials Solve example problems and explain the handling of electric fields in dielectric materials, in particular, the interface conditions for dielectric devices, electric power line refraction, the energy density of electric fields, and the forces acting on dielectric materials (the virtual displacement method).	Can solve example problems and explain the handling of electric fields in dielectric materials, in particular, the interface conditions for dielectric devices, electric power line refraction, the energy density of electric fields, and the forces acting on dielectric materials (the virtual displacement method).
		7th	Electric field imaging When finding electric fields in vacuums and dielectrics, while it is generally necessary to solve Laplace's and Poisson's equations, in some special boundary conditions, one can use a sophisticated and simple "imaging" method that has been known for many years. Explain this "imaging" method.	When finding electric fields in vacuums and dielectrics, while it is generally necessary to solve Laplace's and Poisson's equations, in some special boundary conditions, one can use a sophisticated and simple "imaging" method that has been known for many years. Can explain this "imaging" method.
		8th	Current fields and electrostatic fields When a current is distributed through a continuous conductor there are times when problems may be easily solved by using similarities with the electrostatic field. Also, electromagnetically express Kirchhoff’s Law, which often appears in circuits.	When a current is distributed through a continuous conductor there are times when problems may be easily solved by using similarities with the electrostatic field. Also, electromagnetically express Kirchhoff’s Law, which often appears in circuits.
	4th Quarter	9th	Magnetic field Explain in detail the process that starts with the Biot–Savart law and derives Ampère's circuital integral law, from the fundamental point of view that currents are the sources of magnetic fields.	Can explain the process that starts with the Biot–Savart law and derives Ampère's circuital integral law, from the fundamental point of view that currents are the sources of magnetic fields.
		10th	Calculation of magnetic field distribution In describing a magnetic field that has a different starting point from that of an electric field, it becomes necessary to have a mathematical expression that differs from that of an electric field. In magnetic fields, the vector rotation (rot) is important. Explain vector potential, forces acting on electric currents, etc.	In describing a magnetic field that has a different starting point from that of an electric field, it becomes necessary to have a mathematical expression that differs from that of an electric field. Can explain vector rotation (rot) in magnetic fields, vector potential, forces acting on electric currents, etc.
		11th	Magnetic substances Most actual electric equipment that utilize magnetic fields use magnetic substances (ferromagnetic substances). Explain magnetic substances that are difficult to handle theoretically, including the correspondence between magnetic and electrostatic fields (BD- and HE-compatible), magnetic circuits, and the energy density of magnetic fields.	Most actual electric equipment that utilize magnetic fields use magnetic substances (ferromagnetic substances). Can explain magnetic substances that are difficult to handle theoretically, including the correspondence between magnetic and electrostatic fields (BD- and HE-compatible), magnetic circuits, and the energy density of magnetic fields.
		12th	Electromagnetic induction phenomenon Electromagnetic induction phenomenon is the principle for many kinds of equipment such as generators. However, electromotive force is generated by both the temporal variation of the magnetic flux itself and the relative motion of the conductor to it. Treat this phenomenon mathematically and derive Maxwell's electromagnetic equations.	Electromagnetic induction phenomenon is the principle of many kinds of equipment such as generators. However, electromotive force is generated by both the temporal variation of the magnetic flux itself and the relative motion of the conductor to it. Can treat this phenomenon mathematically and derive Maxwell's electromagnetic equations.
		13th	Inductance Inductance often appears as a representative element in electrical circuits. Learn about self-inductance and mutual inductance from the perspective of magnetic field energy, and explain the wave propagation speed of the reciprocating line as a calculation example.	Inductance often appears as a representative element in electrical circuits. Learn about self-inductance and mutual inductance from the perspective of magnetic field energy, and can calculate the wave propagation speed of the reciprocating line using calculation examples.
		14th	Maxwell's electromagnetic equations Explain Maxwell's electromagnetic equations in detail, which have critical meaning for those who learn electrical and electronic engineering as well as physics. In addition to deriving equations, do reverse derivations for the basic laws of electric field magnetic fields that have been studied.	Can explain Maxwell's electromagnetic equations in detail, which have critical meaning for those who learn electrical and electronic engineering as well as physics. In addition to deriving equations, can do reverse derivations for the basic laws of electric field magnetic fields that have been studied.
		15th	Solutions for Maxwell's electromagnetic equations and electromagnetic waves Solve Maxwell's electromagnetic equations as simultaneous differential equations and calculate electromagnetic waves' presence and velocity as a result of doing this. Also explain the basic characteristics of electromagnetic waves.	Can solve Maxwell's electromagnetic equations as simultaneous differential equations and calculate electromagnetic waves' presence and velocity as a result of doing this. Can also explain the basic characteristics of electromagnetic waves.

		16th	Final exam	

Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	100	0	0	0	0	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	100	0	0	0	0	0	100
Cross Area Proficiency	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Advanced Strength of Materials

Course Information

Course Code	4020	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	Second Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	MORISHITA Tomohiro		

Course Objectives

1) Systematically understand the methods for solving stress, strain, and displacement in a multiaxial stress state and can apply them to basic problems.
2) Understand the basic issues related to flat plate bending problems, and can compare and examine one-dimensional and two-dimensional problems.
3) Understand the advanced issues related to stress, strain, and elastic moduli, and can use them to three-dimensionally examine various problems of strength of materials.
4) Understand the mechanical behaviors related to the elastoplasticity of materials and how to analyze them, and can apply them to intensity calculations.
5) Can explain the above matters to others.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Systematically understand the basic formula for multiaxial stress and can apply it to basic problems.	Can apply various formulae for multiaxial stress to basic problems.	Cannot apply various formulae for multiaxial stress to basic problems.
Achievement 2	Understand the basics issues related to flat plate bending problems and can explain the difference between beams.	Can calculate stress and deflection of basic problems by using formula related to flat plate bending problems.	Cannot calculate stress and deflection of basic problems related to flat plate bending.
Achievement 3	Understand the advanced issues related to stress, strain, and elastic moduli, and use them to three-dimensionally examine various problems of strength of materials.	Understand the advanced issues related to stress, strain, and elastic moduli.	Do not understand the advanced issues related to stress, strain, and elastic moduli and remain limited to only a one-dimensional understanding.
	Understand the mechanical behaviors related to the elastoplasticity of materials and how to analyze them, and can apply them to intensity calculations.	Understand the mechanical behaviors related to the elastoplasticity of materials and how to analyze them.	Do not understand the mechanical phenomena related to elastoplasticity of materials.
	Can discuss various problems of strength of materials with others based on logical thinking.	Can explain basic concepts and formulae to others on various problems of strength of materials.	Cannot explain to others the formation of various formulae and examples of their use on various problems of strength of materials.

Assigned Department Objectives

Teaching Method

Outline	The aim is to be able to calculate and evaluate the strength of structural and mechanical components, independently and continuously learn related matters, think logically, and have technical discussions. Based on the year 3's Strength of Materials I, year 4's Strength of Materials II, and year 5's Strength of Materials III, students will learn more advanced issues and prepare for Fracture Mechanics in the second year of graduate study.
Style	Classes will be taught in a lecture style with exercises in the second half of class.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard study time required for pre-study / review, and completing assignment reports. Students should try to think and understand for themselves. Students who miss 1/3 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
2nd Semester	3rd Quarter	1st	Review of multiaxial stress (1)	Can show a simple application example of stress-strain and displacement-strain relations in the multiaxial stress state.
		2nd	Review of multiaxial stress (2)	Can use equilibrium equations in a rectangular coordinate system. Can derive Navier–Stokes equations. Can use the basic formula in cylindrical and spherical coordinate systems. Can transform various formulae from a rectangular coordinate system to polar coordinate.
		3rd	Flat plate bending (1): Beams and flat plates	Can drive the formulas for beam. Can explain the similarities and extensibility of beams and flat plates.

		4th	Flat plate bending (2): Basic formula for rectangular plates	Understand the handling of unknown functions in bending rectangular plates and can explain the relationship with the basic formula.
		5th	Flat plate bending (3): Stress and deflection of rectangular plates	Can apply the basic formula for rectangular plates to basic problems, and calculate stress and deflection.
		6th	Flat plate bending (4): Axisymmetric bending of circular plates	Can apply the basic formula for a circular plate that is expressed in polar coordinates to a basic problem, and calculate stress and deflection.
		7th	Review of plane stress and plane strain	Can explain the coordinate transformation formulae for stresses in the plane stress states and principal and maximum shear stresses. Can also explain the coordinate transformation formulae for strains in plane strain states and principal and maximum shear strains.
		8th	Stress and strain (1): Direction cosines and coordinate transformations	Can use direction cosines to describe stress coordinate transformations.
	4th Quarter	9th	Stress and strain (2): Stress	Can explain the calculation of principal and maximum shear stresses in a three-dimensional stress state. Can explain stress invariants.
		10th	Stress and strain (3): Strain, strain energy at multiaxial stress, and yield criterion	Can explain the coordinate transformation formula for strain in three-dimensional deformation. Can calculate strain energy in a three-dimensional stress state, and apply it to intensity design.
		11th	Stress and strain (4): Stress-strain equation	Understand generalized stress-strain relations and can explain the elastic modulus for anisotropic elastic bodies.
		12th	Stress and strain (5): Index notation	Can express the formulas using index notation.
		13th	Elastoplastic problems (1): Material models and torsion and bending of elastic-perfectly plastic bodies	Can explain the relationship between load and deformation in the torsion and bending of elastic-perfectly plastic bodies.
		14th	Elastoplastic problems (2): Limit loads and residual stress caused by plastic deformation	Can explain the limit loads in combination rods, the limit loads in beams, and plastic joints. Can explain residual stress caused by plastic deformation.
		15th	Elastoplastic problems (3): Spherical symmetry and axisymmetric problems	Can explain the yield start condition and residual stress of elastic-perfectly plastic spherical shells, cylinders, and rotating circular plates.
		16th	Final exam	

Evaluation Method and Weight (%)

	Examination	Exercise	Total
Subtotal	80	20	100
Basic Proficiency	0	0	0
Specialized Proficiency	80	15	95
Cross Area Proficiency	0	5	5

Akashi College	Year	2022	Course Title	Production Systems

Course Information

Course Code	4021	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	ONISHI Shosaku		

Course Objectives

1) Understand that design activities in a broad sense are an important and major part of building a production system. Comprehensibly understand the concepts and methods of specific function deployment, focusing on mechanical and electrical elements, when the required function that is the starting point for design activities has been provided or found by oneself.
2) Have the skills to be able to embody the above in 1).
3) Acquire skills through reports and lectures to be able to design from a comprehensive and broad perspective, since this course's content falls within part of basic engineering and within the basic background knowledge that forms the basis of combined fields (mechanical and electronic systems).

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Fully understand that design activities in a broad sense are an important and major part of building a production system. Upon doing so, find the required function by oneself and comprehensibly understand the concepts and methods of specific function deployment, focusing on mechanical and electrical elements.	Understand that design activities in a broad sense are an important and major part of building a production system. Upon doing so, regarding the provided required function, understand the concepts and methods of specific function deployment, focusing on mechanical and electrical elements.	Do not fully understand that the design activities in a broad sense are an important and major part of building a production system. In addition, regarding the provided required function, do not fully understand the concepts and methods of specific function deployment, focusing on mechanical and electrical elements.
Achievement 2	Can find the required function on one's own and realize and apply specific function deployment.	Can realize specific function deployment when the required function is provided.	Cannot fully realize specific function deployment when the required function is provided.
Achievement 3	Can design from a comprehensive and broad perspective.	While insufficient, can work towards designing from a comprehensive and broad perspective.	Do not work toward designing from a comprehensive and broad perspective.

Assigned Department Objectives

Teaching Method

Outline	In order to produce products, engineers need extensive knowledge and information. Manufacturing requires an understanding of manufacturing systems (production systems), with a focus on design in a broad sense, that starts with identifying the customer needs. This course features lectures focused on how to design in a broad sense, which is an important and major part of building a production system, and aims to acquire the knowledge concerned with this. This course will be taught by faculty members who have been responsible for planning, design (design in a broad sense), etc. in a company and will make use of their experiences.
Style	The goal is to learn the way of thinking needed for the practical design of the design process' key parts. In the first half, lectures will be conducted mainly using textbooks, and in the second half, handouts will be distributed as necessary. To ensure that the course content is both understood and learned, students should pre-study and review each lesson. In addition, in order to enhance understanding toward a comprehensive and broad manufacturing, students will be given report assignments on themes including social issues as well as design. They must submit all assignments. Students who miss 1/3 or more of classes will not be eligible for a passing grade.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. Overall evaluation formula: Grade (marks out of 100) = Exam (midterm) × 0.4 + Exam (final) × 0.4 + Report (marks out of 20)

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☑ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Orientation Lecture on an outline of production systems. (The relationship between production systems and design in a broad sense)	Can explain the aims and how classes will be conducted. Can also explain an outline of a production system (the relationship between the production system and the design in a broad sense).
		2nd	Lecture on the significance of design: "What is design?"	Can explain attitudes, basic perspectives, and the development of machinery and design. Can also explain the necessity for sustainable development based on the significance of design.

		3rd	Lecture on the process of design: "What do you decide on and what are the steps?"	Can explain the overall process and matters to decide.
		4th	Lecture on the process of design: "What do you decide on and what are the steps?"	Can explain topics such as planning, concept design, development planning, detailed design, production, inspection, testing, and post-design processes (including patents, and external announcement).
		5th	Lecture on design concepts: "How do you create ideas?"	Can explain attitudes, way of thinking, creating an overview and idea of value offered to customer at the concept design stage.
		6th	Lecture on design concepts: "How do you create ideas?" (Part 2)	Can explain the required function's concept and creating an overview for mechanisms and structures.
		7th	Lecture on function and mechanism realization: "How do you give form to your idea?"	Can explain topics such as functions and systems, basic functions and mechanical elements, electronics, software, function-to-mechanism deployment, and the future of mechatronics.
		8th	Midterm exam	Can answer questions on content learned in the first half of the semester.
	2nd Quarter	9th	Return the exam results and explain the model answers. Lecture on compliance (conforming to laws, specifications, and standards).	Can explain the content of the midterm exam. Can explain compliance's importance, laws, standards, specifications and standards.
		10th	Lecture on matters relating to contracts (when making quotations , signing contracts, and placing orders).	Can explain the key points for making quotations, basic knowledge of legal matters, things to note when making quotation, signing contracts, and placing orders.
		11th	Lecture on production systems and control techniques for production and processing.	Can explain an outline of production systems, production control, quality assurance and quality control, measurement and measurement technologies.
		12th	Lecture on maintenance.	Can explain an overview of maintenance, methods of preventive maintenance and their features, facility diagnostic techniques, and life cycle assessments.
		13th	Lecture on safety, security, and project management.	Can explain social requirements and intrinsic safety. Can explain an outline of project management.
		14th	Lecture on universal design.	Can explain the general concept of universal design.
		15th	Lecture summarizing the production system lectures' content from weeks 1 to 14.	Can explain the main and important parts of this course.
		16th	Final exam	Can answer questions on content learned in the second half of the semester.

Evaluation Method and Weight (%)

	Mid-term exam	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Final exam	Report	Total
Subtotal	40	0	0	0	0	0	40	20	100
Basic Proficiency	0	0	0	0	0	0	0	0	0
Specialized Proficiency	40	0	0	0	0	0	40	20	100
Cross Area Proficiency	0	0	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Energy Technology I

Course Information

Course Code	4022	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	Second Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	FUJIWARA Seiji		

Course Objectives

The goal is to be able to understand and calculate the following for the numerical analysis of heat fluids in energy engineering.
(1) Understand the basic equation of heat fluid analysis.
(2) Understand the discretization method of basic equations.
(3) Understand the HSMAC method.
(4) Set a problem and perform simulations on one's own.
(5) Present answers to one's own problem through presentations.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Fully understand and can derive the basic equations for heat fluid analysis.	Understand the basic equations for heat fluid analysis.	Do not understand the basic equations for heat fluid analysis.
Achievement 2	Understand the discretization method of basic equations and can derive them on its own.	Understand the discretization method of basic equations.	Do not understand the discretization method of basic equations.
Achievement 3	Understand the HSMAC method and can program it on one's own.	Understand the HSMAC method.	Do not understand the HSMAC method.
	Can set a problem, perform simulations, and analyze data on one's own.	Can set a problem and perform simple simulations on one's own.	Cannot set a problem and perform simple simulations on one's own.
	Can clearly present the answers to one's own problem in English in an easy-to-understand presentation.	Can present the answers to one's own problem in a presentation.	Cannot present the answers one's own problem in a presentation.

Assigned Department Objectives

Teaching Method

Outline	In general energy equipment, power is taken from fluid motion by turbines, etc. and converted to electrical energy through generators. In addition, how the movement of water and electrolytes is controlled has a major effect on performance in fuel cells, etc. In developing energy equipment, numerical analyses of heat fluid are widely conducted with the aim of reducing development costs and obtaining detailed data. In this course, students will learn about the HSMAC method, which is one of the methods to numerically analyze heat fluid, and learn how to analyze incompressible fluids.
Style	The first half of the class is made up of lecture-style sessions. In the second half, students will conduct exercises while discussing important matters related to energy engineering.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. While it is desirable for students to have a basic knowledge of fluid dynamics and thermodynamics, thorough reviewing of the lessons will help students understand the content. Furthermore, students need to have a minimum knowledge of C language. In addition, this course will fundamentally be conducted in English. Students who miss 1/3 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☐ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
2nd Semester	3rd Quarter	1st	Basic equations for heat fluid simulation (1)	Understand the equations of the fluid continuum and the derivation of equations of motion.
		2nd	Basic equations for heat fluid simulation (2)	Understand the derivation of fluid equations of motion and equations of energy.
		3rd	Basic equations for heat fluid simulation (3)	Can convert the energy equation of fluid to one for uncompressed fluid. Also, understand the method of the Boussinesq approximation as a treatment of buoyancy terms.
		4th	About nondimensionalizing basic equations	Understand the significance of nondimensionalizing basic equations, and how to make it dimensionless.
		5th	Discretization method of basic equations (1)	Understand how to discretize differential equations that are basic equations. Also, understand the solution's accuracy and the stability conditions.

		6th	Discretization method of basic equations (2)	Understand how to discretize differential equations that are basic equations. Also, understand the solution's accuracy and the stability conditions.
		7th	MAC method, and SMAC method	Can derive Poisson's equation on pressure, and understand the MAC and SMAC methods, which are two of the explicit methods for incompressible fluid.
		8th	HSMAC method	Understand the HSMAC method to solve the Poisson's equation on pressure using Newton's method.
	4th Quarter	9th	Explanation of assignment 1	Can create a vector diagram using free software as an example of a flow in a cavity containing thermal convection.
		10th	Exercise	Can calculate the heat transfer coefficient from the analysis results.
		11th	Exercise	Understand the relationship between mesh refinement and analysis accuracy.
		12th	Explanation of assignment 2	Can review the engineering problems on one's own, and can discuss the problems proposed with teachers and set an appropriate problem.
		13th	Exercise	Can program and run simulations for the problem on one's own.
		14th	Exercise	Can program and run simulations for the problem on one's own.
		15th	Presentation	Can present simulation results for the problem in English.
		16th	No final exam	

Evaluation Method and Weight (%)

	Examination	Presentation	Assignments	Behavior	Portfolio	Other	Total
Subtotal	0	30	70	0	0	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	0	30	70	0	0	0	100
Cross Area Proficiency	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Tribology

Course Information

Course Code	4023	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	Second Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	ABO Masayoshi		

Course Objectives

(1) Can deepen understanding of the complex friction and wear phenomena that occur on relative motion surfaces, and establish a method for evaluating them in an appropriate manner.
(2) Can establish effective use of friction and methods to control friction and wear such as lubrication.
(3) Can establish various guidelines and specific methods for designing frictional parts of equipment.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Can deepen understanding of the complex friction and wear phenomena that occur on relative motion surfaces, and establish a method for evaluating them in an appropriate manner.	Can deepen understanding of the complex friction and wear phenomena that occur on relative motion surfaces and understand how to evaluate them in an appropriate manner.	Cannot deepen understanding of the complex friction and wear phenomena that occur on relative motion surfaces and do not understand how to evaluate them in an appropriate manner.
Achievement 2	Can establish effective use of friction and friction wear controls such as lubrication.	Understand the effective use of friction and methods to control friction and wear such as lubrication.	Do not understand the effective use of friction and methods to control friction and wear such as lubrication.
Achievement 3	Can establish various guidelines and specific methods for designing frictional parts of equipment.	Understand the various guidelines and specific methods for designing frictional parts of equipment.	Do not understand the various guidelines and specific methods for designing frictional parts of equipment.

Assigned Department Objectives

Teaching Method

Outline	The aim of this course is to deepen the understanding of tribological problems—i.e., the complex friction and wear phenomena that occur on relative motion surfaces—and to explain how to evaluate them in an appropriate manner, and also explain the effective use of friction and methods to control friction and wear such as lubrication. Students will also learn the various guidelines and specific methods for designing frictional parts of equipment.
Style	Classes will focus on a lecture style format and have exercises, assignments, and group work as appropriate. The contents of the report will be instructed according to the progress of the class and the students' levels of understanding. The report assignments are as follows: 1) An exercise about the contact condition between two objects. 2) An exercise for friction coefficients which take into account interface shear strength. 3) A survey and summary of various types of wear. 4) A study on tribology application technologies. 5) The derivation of the double integral part of the Reynolds equation. 6) A survey on solid lubricants and greases. 7) An exercise on bearing design methods. 8) A study on hard and soft thin layers. 9) An exercise on the amount of wear. 10) Literature research on tribology This course is based on and assumes students have a basic knowledge of the following subjects: Strength of Materials I (compulsory in year 3), Fluid Mechanics I (compulsory in year 4), and Engineering Design II (compulsory in year 4).
Notice	Before taking the course, read the text, familiarize yourself with the content, and be prepared to ask questions during the course. This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. Students who miss 1/3 or more of classes, miss 5-10 minutes of a student's presentation, or fail to submit a report will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
2nd Semester	3rd Quarter	1st	What is tribology? Explain an outline of tribology, lubrication methods, and lubrication by oil.	Learn an outline of tribology, lubrication methods, and about lubrication by oil.
		2nd	Solid surface contact I Explain the properties of solid surfaces and the structure and properties of surface layers in order to properly understand tribology phenomena.	Learn about the nature of solid surfaces and the structure and properties of surface layers
		3rd	Solid surface contact II Explain the mechanisms for two-surface contact and true contact area wear with exercise problems.	Learn about the mechanisms for two-surface contact and true contact area wear.

		4th	Friction between solid surfaces I Explain dry friction and lubricated friction, Amonton-Coulomb's laws, the causes of friction, adhesion theory of friction, and the formula for friction theory.	Learn about friction causes and friction theory.
		5th	Friction between solid surfaces II Explain the temperature rises of friction surfaces, the speed characteristics of friction and stick-slip, friction properties in a vacuum, the effects of temperature on friction, and methods for testing friction.	Learn about friction characteristics and how to test friction.
		6th	Wear on solid surfaces I Define and classify wear and explain the theoretical handling of each of the important abrasives.	Learn about the definition and classification of wear.
		7th	Solid surface wear II Explain the concept of wear maps, and discuss testing methods of wear.	Learn about wear maps and wear testing methods.
		8th	Fluid lubrication I Explain the physical significance of fluid lubrication and its principles.	Learn about the physical significance of fluid lubrication.
	4th Quarter	9th	Fluid lubrication II Explain Reynolds' fluid lubrication theory and the pressure distribution analysis of bearings.	Learn about Reynolds' fluid lubrication theory and the pressure distribution analysis of bearings.
		10th	Boundary and mixed lubrication I Explain the concept of boundary and mixed lubrication, and boundary membrane's lubricating properties .	Learn about boundary and mixed lubrication.
		11th	Boundary and mixed lubrication II Explain the types, properties, and applications of grease and solid lubricants that are used for lubrication in situations where oil cannot.	Learn about the types, properties, and applications of grease and solid lubricants.
		12th	Surface reforming technology Explain the physical significance of surface reforming technology, its method, and examples of friction wear improvement and future prospects.	Learn about the physical significance of surface reforming technology, its methods, and examples of friction wear improvement.
		13th	Bearings design Explain the basic aspects of design using journal bearings as an example.	Learn about the basic aspects of bearing design using journal bearings as an example.
		14th	Applications of tribology in current technologies Introduce a case from the many current technologies where tribology plays an important role and explain the relationship using basic knowledge.	Learn about the current application of tribology in current technologies.
		15th	Presentation Introduce videos or research related to tribology.	Learn about research related to tribology.
		16th	No final exam	

Evaluation Method and Weight (%)

	Short Tests	Report	Presentation	Behavior	Other	Total
Subtotal	30	40	10	20	0	100
Basic Proficiency	0	0	0	0	0	0
Specialized Proficiency	30	40	10	20	0	100
Cross Area Proficiency	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Advanced Electrical Circuits

Course Information

Course Code	4024	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	Second Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	HOSOKAWA Atsuishi		

Course Objectives

1) Understand the various theorems that form the basis for electrical circuit analysis.
2) Can perform analysis and design of a number of electrical circuits.
3) Can select and use appropriate methods for analyzing and designing electrical circuits, with multidimensional thinking.

Assignments will be handed out for review purposes at the end of the lecture. It is important to do them through self-study.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Understand the various theorems that form the basis for electrical circuit analysis and can use them for circuit analysis.	Understand the various theorems that form the basis for electrical circuit analysis.	Do not understand the various theorems that form the basis for electrical circuit analysis.
Achievement 2	Can perform analysis and design various complex electrical circuits.	Can perform analysis and design various basic electrical circuits.	Cannot perform analysis and design various basic electrical circuits.
Achievement 3	Can select and use the most appropriate method for analyzing and designing electrical circuits.	Can select and use an appropriate method for analyzing and designing electrical circuits.	Cannot select and use an appropriate method for analyzing and designing electrical circuits.

Assigned Department Objectives

Teaching Method

Outline	An electrical circuit is a circuit made up of elements of resistance, inductance, and capacitance. It forms the basis for electrical engineering including electronic, communication, and information engineering. The aim of this course is to learn about the relationship between current and voltage in electrical circuits and to be able to perform circuit analysis.
Style	Classes are mainly conducted by taking notes. There will be handouts as necessary. There will be exercises and assignments every week.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. This course assumes students have taken Electrical Circuits I and II, Circuit Theory, and Transient Analysis on Electric Circuits (compulsory in years 1 to 4) taught in the Electrical and Computer Engineering Department, or have taken Electrical and Electronics Engineering I (compulsory in year 4), and Electrical and Electronics Engineering II (selected for year 5) taught in the Mechanical Engineering Department in Akashi Kosen. Students need to have a basic knowledge of the contents of these subjects. If students wish, they can take a midterm exam outside of class hours. The evaluation for the exam in this case will be the average score of the midterm and final exams. Students who miss 1/4 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
2nd Semester	3rd Quarter	1st	AC circuits	Understand how to analyze AC circuits using the vector notation and vector locus.
		2nd	Circuit analysis and miscellaneous theorems (1)	Understand how to analyze circuits using closed circuit and node equations.
		3rd	Circuit analysis and miscellaneous theorems (2)	Understand how to analyze circuits using the superposition, reciprocity, and compensation theorems.
		4th	Circuit analysis and miscellaneous theorems (3)	Understand the methods of circuit analysis using Thévenin's, Norton's, and Millman's theorems.
		5th	Resonant circuits and mutual induction circuits	Understand resonant and mutual induction circuits.
		6th	Three-phase AC	Understand voltage, currents, and power in three-phase AC.
		7th	Distorted wave AC	Understand voltage, currents and power in distorted wave AC.
		8th	Summary of weeks 1 to 7	Understand the content from weeks 1 to 7.
	4th Quarter	9th	One-port circuits	Understand one-port circuits.
		10th	Two-port circuits	Understand the various parameters that represent two-port circuits.

		11th	Transient phenomena in single-energy circuits	Understand the transient phenomena in circuits where either inductance or capacitance is present.
		12th	Transient phenomena in multiple-energy circuits	Understand the transient phenomena in circuits where both inductance and capacitance are present.
		13th	Steady-state phenomena in distributed-element circuits	Understand the basic concepts and circuit properties of transmission lines where resistance, inductance, and capacitance are distributed along lines.
		14th	Transient phenomena in distributed-element circuits	Understand the transient phenomena in distributed-element circuits.
		15th	Summary of weeks 8 to 14	Understand the content from weeks 8 to 14.
		16th	Final exam	Understand the content from weeks 1 to 7 and weeks 9 to 14.

Evaluation Method and Weight (%)

	Examination	Exercise	Total
Subtotal	70	30	100
Basic Proficiency	0	0	0
Specialized Proficiency	70	30	100
Cross Area Proficiency	0	0	0

Akashi College	Year	2022	Course Title	Advanced Heat Transfer

Course Information

Course Code	4025	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 1st
Term	Second Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	KUNIMINE Kanji		

Course Objectives

(1) Can theoretically handle steady and unsteady state heat conduction.
(2) Can theoretically handle convective heat transfer.
(3) Can theoretically handle phase change heat transfer.
(4) Can theoretically handle material transfer.
(5) Can theoretically handle heat exchangers.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Can theoretically handle steady and unsteady state heat conduction sufficiently.	Can theoretically handle steady and unsteady state heat conduction.	Cannot theoretically handle steady and unsteady state heat conduction.
Achievement 2	Can theoretically handle convective heat transfer sufficiently.	Can theoretically handle convective heat transfer.	Cannot theoretically handle convective heat transfer.
Achievement 3	Can theoretically handle phase change heat transfer sufficiently.	Can theoretically handle phase change heat transfer.	Cannot theoretically handle phase change heat transfer.
	Can theoretically handle material transfer sufficiently.	Can theoretically handle material transfer.	Cannot theoretically handle material transfer.
	Can theoretically handle heat exchangers sufficiently.	Can theoretically handle heat exchangers.	Cannot theoretically handle heat exchangers.

Assigned Department Objectives

Teaching Method

Outline	This course focuses on the theoretical handling of heat transfer engineering. It will cover the more advanced issues that the Heat Transfer class in the Regular Course did not.
Style	This course is based on Heat Transfer (year 5, elective) taught in Akashi Kosen Mechanical Engineering Department, and assumes that students have learned the knowledge of the subject.
Notice	This course's content will amount to 90 hours. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. To achieve the goals, students should thoroughly pre-study and review class content for each week. Evaluations will be based on two periodic exams. Students who miss 1/3 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☐ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
2nd Semester	3rd Quarter	1st	Basic theory	Understand the differential equations and their solutions, the basic laws of heat transfer, and the equation for heat conduction.
		2nd	Steady heat state conduction	Can understand the problems of two-dimensional steady heat conduction.
		3rd	Unsteady state heat conduction (1)	Understand the problems of a lumped heat capacity system.
		4th	Unsteady state heat conduction (2)	Understand approximation solutions for unsteady state heat conduction and the thermal conduction problems that accompany phase changes.
		5th	Forced convective heat transfer theory	Understand the governing equation for forced convective heat transfer.
		6th	Approximation solutions for forced convective heat transfer (1)	Understand the laminar heat transfer of the flow across a plate.
		7th	Approximate solutions for forced convective heat transfer (2)	Understand the laminar heat transfer of the flow across a plate.
		8th	Midterm exam	Can solve problems related to weeks 2 to 7.
	4th Quarter	9th	Natural convective heat transfer theory	Understand natural convective heat transfer.
		10th	Phase change heat transfer theory (1)	Understand the film condensation theory.
		11th	Phase change heat transfer theory (2)	Understand the film boiling theory.
		12th	Material transfer	Understand Fick's law, diffusion coefficient, and one-dimensional diffusion phenomena.
		13th	Heat exchangers (1)	Understand an overview of heat exchangers.

		14th	Heat exchangers (2)	Understand logarithmic mean temperature difference.
		15th	Heat exchangers (3)	Understand temperature efficiency ratio.
		16th	Final exam	Can solve problems related to weeks 9 to 15.

Evaluation Method and Weight (%)

	Examination						Total
Subtotal	100	0	0	0	0	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	100	0	0	0	0	0	100
Cross Area Proficiency	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Japanese Language and Communication

Course Information

Course Code	4026	Course Category	General / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 2nd
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials	石黒圭『よくわかる文章表現の技術［新版］Ⅰ、Ⅱ』（明治書院）、適宜日本語に関する資料を配布する。		
Instructor	ZENTOH Masashi		

Course Objectives

(１)日本語の文章表現の特徴と文法・語彙の歴史を学ぶと共に、幅広い知識と教養を身に付け、自らを取り巻く日本語環境を敏感に観察する感性を養うこと
(２)日本語の文章を批判的に検討し、それについて意見を述べることで論理的な思考力と表現力を養い、自らの文章表現力を向上させること
(３)文章表現における様々な規則や文法事項を正確に理解し、実践的な文章表現力を養うこと

(１)が主に学習・教育目標(Ｅ)に、（２）（３）が主に学習・教育目標（Ａ）に関係する。

Rubric

	理想的な到達レベルの目安	標準的な到達レベルの目安	未到達レベルの目安
評価項目1	日本語の表現の特徴と文法・語彙の歴史を十分に理解しており、自らを取り巻く日本語環境を知的関心を持って観察することができる	日本語の表現の特徴と文法・語彙の歴史をおおむね理解し、自らを取り巻く日本語環境を観察することができる	日本語の表現の特徴と文法・語彙の歴史への理解が不十分であり、自らを取り巻く日本語環境に対して関心が薄い
評価項目2	明快で論理的な思考力と表現力を身に付け、自分の思いを十分に文章として表現することができる	論理的な思考力と表現力を身に付け、自分の思いを文章として表現することができる	論理的な思考力と表現力が未熟であり、自分の思いを文章として表現することができない
評価項目3	文章表現における様々な規則や文法事項を正確に理解し、状況にふさわしい実践的な文章表現を行うことができる	文章表現における様々な規則や文法事項をある程度理解し、実践的な文章表現を行うことができる	文章表現における様々な規則や文法事項の理解が不十分であり、実践的な文章表現を行うことができない

Assigned Department Objectives

Teaching Method

Outline	現代社会で用いられているさまざまな文章表現や文書の形式について、テキストの文例を批判し課題を検討することにより、自らを取り巻く日本語表現に敏感になること、そして、日本語に関する基礎的な事項の確認と豊かで正しい日本語表現能力の養成を目指す。また、論理的で分かりやすい文章を書くための実践を豊富に行い、より充実した研究論文執筆を目指す。
Style	毎回担当者によるテキストの課題の発表とそれにもとづく講師及び出席者との質疑応答を行う。また、ほぼ毎回レポート課題を課す。
Notice	本科目は、授業で保証する学習時間と、予習・復習及び課題レポート作成に必要な標準的な自己学習時間の総計が、90時間に相当する学習内容である。履修者全員にテキストの課題の発表を課す。発表時には講師及び出席者との質疑応答を行う。また、ほぼ毎回レポート課題を課す。 合格の対象としない欠席条件(割合)　1/3以上の欠課

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	授業の概要・「訓点の打ち方」（石黒圭『よくわかる文章表現の技術［新版］Ⅰ』）	本講義の目的と授業の進行について理解する。また、「訓点の打ち方」のテーマを理解することができる
		2nd	語順の文法「語順の文法」（石黒圭『よくわかる文章表現の技術［新版］Ⅰ』） 課題についての受講者の発表と質疑応答	「語順の文法」のテーマを理解し、必要な技術（アピールポイントの選定、適切な表現など）を中心としたレジメを作成し、プレゼンテーションすることができる
		3rd	話し言葉と書き言葉（石黒圭『よくわかる文章表現の技術［新版］Ⅰ』） 課題についての受講者の発表と質疑応答	「話し言葉と書き言葉」のテーマを理解し、必要な技術（アピールポイントの選定、適切な表現など）を中心としたレジメを作成し、プレゼンテーションすることができる
		4th	弱い判断の功罪（石黒圭『よくわかる文章表現の技術［新版］Ⅰ』） 課題についての受講者の発表と質疑応答	「弱い判断の功罪」のテーマを理解し、必要な技術（アピールポイントの選定、適切な表現など）を中心としたレジメを作成し、プレゼンテーションすることができる
		5th	事実と意見の書き分け（石黒圭『よくわかる文章表現の技術［新版］Ⅰ』） 課題についての受講者の発表と質疑応答	「事実と意見の書き分け」のテーマを理解し、必要な技術（アピールポイントの選定、適切な表現など）を中心としたレジメを作成し、プレゼンテーションすることができる
		6th	接続詞の使い方（石黒圭『よくわかる文章表現の技術［新版］Ⅰ』） 課題についての受講者の発表と質疑応答	「接続詞の使い方」のテーマを理解し、必要な技術（アピールポイントの選定、適切な表現など）を中心としたレジメを作成し、プレゼンテーションすることができる
		7th	論説文1 課題についての受講者の発表と質疑応答	論説文の構造について理解することができる。 必要な技術（アピールポイントの選定、適切な表現など）を中心としたレジメを作成し、プレゼンテーションすることができる

		8th	論説文2 課題についての受講者の発表と質疑応答	論説文の構造について理解することができる。 必要な技術（アピールポイントの選定、適切な表現など）を中心としたレジメを作成し、プレゼンテーションすることができる
	2nd Quarter	9th	冒頭と結末の呼応（石黒圭『よくわかる文章表現の技術［新版］Ⅱ』） 課題についての受講者の発表と質疑応答	「冒頭と結末の呼応」のテーマを理解し、必要な技術（アピールポイントの選定、適切な表現など）を中心としたレジメを作成し、プレゼンテーションすることができる
		10th	読者への配慮（石黒圭『よくわかる文章表現の技術［新版］Ⅱ』） 課題についての受講者の発表と質疑応答	「読者への配慮」のテーマを理解し、必要な技術（アピールポイントの選定、適切な表現など）を中心としたレジメを作成し、プレゼンテーションすることができる
		11th	手際のよい説明（石黒圭『よくわかる文章表現の技術［新版］Ⅱ』） 課題についての受講者の発表と質疑応答	「手際のよい説明」のテーマを理解し、必要な技術（アピールポイントの選定、適切な表現など）を中心としたレジメを作成し、プレゼンテーションすることができる
		12th	問題提起文の力（石黒圭『よくわかる文章表現の技術［新版］Ⅱ』） 課題についての受講者の発表と質疑応答	「問題的文の力」のテーマを理解し、必要な技術（アピールポイントの選定、適切な表現など）を中心としたレジメを作成し、プレゼンテーションすることができる
		13th	譲歩による説得（石黒圭『よくわかる文章表現の技術［新版］Ⅱ』） 課題についての受講者の発表と質疑応答	「譲歩による説得」のテーマを理解し、必要な技術（アピールポイントの選定、適切な表現など）を中心としたレジメを作成し、プレゼンテーションすることができる
		14th	要約の方法（石黒圭『よくわかる文章表現の技術［新版］Ⅱ』） 課題についての受講者の発表と質疑応答	「要約の方法」のテーマを理解し、必要な技術（アピールポイントの選定、適切な表現など）を中心としたレジメを作成し、プレゼンテーションすることができる
		15th	手紙の書き方 課題についての受講者の発表と質疑応答	手紙の書き方を理解することができる。必要な技術（アピールポイントの選定、適切な表現など）を中心としたレジメを作成し、プレゼンテーションすることができる
		16th	期末試験	

Evaluation Method and Weight (%)

	試験	発表	相互評価	態度	ポートフォリオ	その他	Total
Subtotal	50	50	0	0	0	0	100
基礎的能力	50	50	0	0	0	0	100
専門的能力	0	0	0	0	0	0	0
分野横断的能力	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Environmental Science

Course Information

Course Code	4027	Course Category	General / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 2nd
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	WATANABE Moriyoshi,HIRAISHI Toshihiro		

Course Objectives

(1) Understand the formation of the global environment and the basic knowledge of the natural ecosystem, and acquire the ability to examine and explain the relationships between life, the natural environment, and environmental issues from a multifaceted perspective.
(2) Examine the relationship between the environment and people, think about problems with environmental issues, and acquire the ability to identify what actions are needed as engineers and members of the general public.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Understand the formation of the global environment and the basic knowledge of the natural ecosystem, and can examine and explain the relationships between life, the natural environment, and environmental issues from a multifaceted perspective.	Understand the formation of the global environment and the basic knowledge of the natural ecosystem, and can explain the relationships between life, the natural environment, and environmental issues.	Do not understand the formation of the global environment and the basic knowledge of the natural ecosystem, and cannot explain the relationships between life, the natural environment, and environmental issues.

Assigned Department Objectives

Teaching Method

Outline	(1) Lectures on biological and global environments, and an outline of ecosystems, and methods for preserving them. (8 weeks taught by Watabe) (2) Lectures on environmental issues from history, material cycles, and regional disparities. (7 weeks taught by Hiraishi)
Style	Lectures will be held using slides and videos and with materials distributed as appropriate. The course is open to students from any department. Classes will be taught as simply as possible. Before taking the course, students should carefully read through the materials distributed in advance to fully understand the content, and summarize the main points and questions.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. The levels of achievement will be evaluated by faculty members in the following methods. The minimum score for a pass will be 60% in total. The weight for each faculty member's evaluation will be "1" for Hiraishi and "1" for Watabe.

Characteristics of Class / Division in Learning

☐ Active Learning	☑ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	The formation of the global environment and the history of pollution (Watanabe)	Can explain the process in which the current global environment was formed, and the relationship between pollution and health that has occurred in the past.
		2nd	Global environmental issues (Watanabe)	Can explain the current state of environmental issues and the measures to be taken on a global scale.
		3rd	Ecosystem basics (Watanabe)	Can explain the concept of ecosystems, and about individuals and populations.
		4th	Ecosystem structures, energy flow, and material cycles (Watanabe)	Can explain ecosystem structures, energy flow, and material cycles.
		5th	Various ecosystems (Watanabe)	Can explain the functions, roles and present states of forest, urban, and agricultural ecosystems.
		6th	Ecosystem conservation techniques (Watanabe)	Can explain technical classification (conservation, restoration, and creation) to protect the environment including ecosystems using concrete examples.
		7th	Summary	Test the level of comprehension for the content from weeks 1 to 7.
		8th	Biodiversity and the biodiversity crisis (Watanabe)	Give an explanation of the exam. Can explain the current state and crisis of biodiversity.
	2nd Quarter	9th	Report assignment briefing Environmental issues and history	Set up and implement solutions to environmental issues in one's life. Learn about the causes and history of modern environmental issues.

		10th	Life and society in the Edo period	Learn about life and society before today's environmental issues arose.
		11th	Watch the "An Inconvenient Truth" and think about it.	Learn about climate change issues.
		12th	Watch the "An Inconvenient Truth" and think about it.	Learn about climate change issues and recognize the challenges.
		13th	"Ancient Futures: Learning from Ladakh"	Think about the time gap in the problems due to geographic inequalities.
		14th	"Ancient Futures: Learning from Ladakh"	Think about the time gap in the problems due to geographic inequalities.
		15th	Return and amend report assignments	Add opinions to the faculty's comments sent via Teams about the assignment in week 9.
		16th	About SDGs	Understand SDGs.

Evaluation Method and Weight (%)

	Examination(Watanabe)	Exercise(Watanabe)	Report(Hiraishi)	Behavior	Portfolio	Other	Total
Subtotal	30	20	50	0	0	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	30	20	50	0	0	0	100
Cross Area Proficiency	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Cross-Cultural Understanding

Course Information

Course Code	4028	Course Category	General / Elective
Class Format	Seminar	Credits	School Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 2nd
Term	Year-round	Classes per Week	2
Textbook and/or Teaching Materials	Exploring Landscapes of Culture & Communication (Shohakusha), Power-Up Practice for the TOEIC Listening and Reading Test (Eihosha)		
Instructor	HERBERT John C.		

Course Objectives

(1) 英語の読解力および表現力の向上(学習教育目標E)
(2) 異文化への理解を深める(学習教育目標B)
(3) 知識を広げ、深く思考する習慣を身につける(学習教育目標A)
課題(e-learningを含む）を確実に行い、期限までに完成させること。
授業では、積極的に発言および討論する姿勢が要求される。
理由なく授業を欠席および遅刻して課題や発表ができない場合は再評価を認めない。

Rubric

	理想的な到達レベルの目安	標準的な到達レベルの目安	未到達レベルの目安
評価項目1	英語の内容を読み取り、英文を書く練習を通して英文読解力や作文力をつけるとともに必要な語彙力を十分につけることができる。	英語の内容を読み取り、英文を書く練習を通して英文読解力や作文力をつけるとともに必要な語彙力をつけることができる。	英語の内容を読み取り、英文を書く練習を通して英文読解力や作文力をつけるとともに必要な語彙力をつけることができない。
評価項目2	異文化について十分な知識を身につけ理解を十分に深めことができる。	異文化について知識を身につけ理解を深めることができる。	異文化について知識を身につけ理解を深めることができない。
評価項目3	異文化についての知識をもとに、文化の違いについて自分の意見をうまく表現することができる。	異文化についての知識をもとに、文化の違いについて自分の意見を表現することができる。	異文化についての知識をもとに、文化の違いについて自分の意見を表現することができない。

Assigned Department Objectives

Teaching Method

Outline	グローバル化の時代の技術者にとって、英語を実践的に使いこなす能力は不可欠である。また、異文化間コミュニケーションをよりスムーズに行うためには、英語の運用能力だけでなく、様々な文化の規範や価値観を知り、それらを理解する姿勢が要求される。授業では、今日の多言語・多文化主義を踏まえた異文化間コミュニケーションについて理解を深めながら、英語の運用能力を高めることを目的とする。また、リーダーシップについて、どのように身につけ、発揮するかにいても学ぶ。適宜、実際の異文化交流を行う。
Style	英文を読んで、その内容の理解を確認する演習問題を解く。読解した内容について、英語で考えを発表する。CDを用いてリスニング力をつける。既習事項を参考に英作文の練習をする。適宜、課題を課す。
Notice	課題(e-learningを含む）を確実に行い、期限までに完成すること。授業では、積極的に発言および討論する姿勢が要求される。 合格の対象としない欠席条件(割合) 1/4以上の欠課

Characteristics of Class / Division in Learning

☑ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Essentialism (1) Finding a Job (1) 授業の概要説明、The Essentialist View of Culture	本質主義について学び、文化および文化間の相互関係について理解を深める。
		2nd	Essentialism (2) Finding a Job (2) Characteristics of Japanese People	日本人の特徴について理解を深める。
		3rd	Non-essentialism (1) Dining Out (1) The Non-essentialist View of Culture	非本質主義の概要を学ぶ。
		4th	Non-essentialism (2) Dining Out (2) The Cultures in One	共存する二つの文化について理解を深める。
		5th	Socialization (1) Business Meeting (1) When do we acquire culture?	「社会化」について理解を深める。
		6th	Socialization (2) Business Meeting (2) Different Ways of Greeting People	人間の成長過程での社会化について理解を深める。
		7th	Cultural Identity (1) Travel (1-1) What are the main sources of your identity?	人や社会は複雑な存在である」という非本質主義の見方を理解する。
		8th	Cultural Identity (2) Travel (1-2) Small Cultures	スモールカルチャーについて理解を深める。学ぶ。
	2nd Quarter	9th	Cultural Hybridity (1) Entertainment (1-1) Social Change	文化の混交を理解する。
		10th	Cultural Hybridity (2) Entertainment (1-2) What kind of seasonal events do you celebrate?	ハローウィーンについて学習する。
		11th	Stereotypes (1) The Office (1) Why do we stereotype?	固定観念及びその種類について学ぶ。
		12th	Stereotypes (2) The Office (2) The Nature of Stereotyping	ステレオタイプを持つことの本質について学ぶ。
		13th	Representation (1) Shopping (1) Culture is a set of beliefs and practices shared in a group.	文化表象について学ぶ。

		14th	Representation (2) Shopping (2) Representation in the Media	メディア表象について学ぶ。
		15th	まとめ Review and Further Practice (1) 前期のまとめ	前期で学習したことを復習しまとめる。
		16th	期末試験	これまでの学習で理解したことをきちんと成果として表現することができる。
2nd Semester	3rd Quarter	1st	Time and Culture (1) Entertainment (2-1) Analyse cultural viewpoints regarding time	文化同士の時間認識の相違を学ぶ。
		2nd	Time and Culture (2) Entertainment (2-2) Business time	ビジネスタイムについて学ぶ。
		3rd	Discourse (1) Sales and Marketing (1) The word discourse has many meaning in English.	「言説」と文化について学ぶ。
		4th	Discourse (2) Sales and Marketing (2) History of Madness	狂気の歴史について学ぶ。
		5th	Collectivism and Individualism (1) Technical Areas (1) Proverbs	「集団主義と個人主義」について学ぶ。
		6th	Collectivism and Individualism (2) Technical Areas (2) Collectivism and Individualism in the Workplace	職場での集団主義と個人主義について学ぶ。
		7th	Masculine and Feminine Culture (1) Health (1) In a masculine culture success is the most important value.	男性文化と女性文化について学ぶ。
		8th	Masculine and Feminine Culture (2) Health (2) What roles are men and women expected to play in your society?	主夫について学ぶ。
	4th Quarter	9th	High-context and Low-context Culture (1) Finance (1) One example of a high-context form of art is haiku.	ハイコンテクスト文化とローコンテクスト文化について学ぶ。
		10th	High-context and Low-context Culture (2) Finance (2) Saying No	「ノー」と言うことについて学ぶ。
		11th	Power-distance (1) Travel (2-1) There are cultures that prefer a strict social hierarchy and those that prefer a more flexible social structure.	上下関係が言語や行動にどのように表れるかを学ぶ。
		12th	Power-distance (2) Travel (2-2) An Exchange Student's Experience in Japan	ある留学生の日本での体験を学ぶ。
		13th	Globalization and Cultural Identity (1) Corporate Development (1) Imagine what life was like before globalization.	グローバル化がもたらす文化や文化アイデンティティへの影響を学ぶ。
		14th	Globalization and Cultural Identity (2) Corporate Development (2) Cultural Supermarket	文化のスーパーマーケットについて学ぶ。
		15th	まとめ Review and Further Practice (2) 後期のまとめ	後期で学習したことを復習しまとめる。
		16th	期末試験	これまでの学習で理解したことをきちんと成果として表現することができる。

Evaluation Method and Weight (%)

	試験	発表	相互評価	態度	ポートフォリオ	課題・発表	Total
Subtotal	60	0	0	0	0	40	100
基礎的能力	60	0	0	0	0	40	100
専門的能力	0	0	0	0	0	0	0
分野横断的能力	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Engineering Presentation Ⅱ

Course Information

Course Code	4029	Course Category	Specialized / Compulsory
Class Format	Seminar	Credits	School Credit: 1
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 2nd
Term	Second Semester	Classes per Week	後期:2
Textbook and/or Teaching Materials			
Instructor	HIRAISHI Toshihiro,ONISHI Shosaku		

Course Objectives

(1) Acquire knowledge in a wide range of engineering-related fields through presentations of one's Research Studies presented in a way that students from different specialties can understand .

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Can present one's own Research Studies in a way that students from different specialties can fully understand and actively discuss it with them.	Can present one's own Research Studies in a way that students from different specialties can understand and discuss it with them.	Cannot present one's own Research Studies in a way that students from different specialties can understand and discuss it with them.

Assigned Department Objectives

Teaching Method

Outline	This course will have lectures and exercises on fundamental approaches to written presentations, graphical presentations, oral presentations, etc. in order to enhance students' abilities to express technical matters. Teaching staff will offer their impressions and critiques to raise the levels of the content.
Style	In the first half, students will use slides and give presentations on introductions for their Research Studies, its purposes, and their research plans, followed by a question-and-answer session. In the latter half of the second semester, they will submit synopses of their Research Studies and give presentations using slides.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. Emphasis will be on presenting and discussing the summaries and slides that students have prepared by themselves within the determined time. Students are expected to be able to evaluate other students' presentations. Students who miss 1/5 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☑ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
2nd Semester	3rd Quarter	1st	Theme 3 (Introduction to the Research Studies): Creating slides (Part 1, Hiraishi) Theme 3 is to present the introduction to the Research Studies in 10 minutes so that students from different specialties can understand. After briefing on the assignment, prepare for the presentation.	Can explain what to be careful in communicating the background, research purposes, and research methods of one's own Research Studies to students from different specialties.
		2nd	Theme 3 (Introduction to the Research Studies): Creating slides (Part 2, Hiraishi) Same as above	Can make materials to communicate the background, purposes, and research method of one's own Research Studies to students from different specialties.
		3rd	Presentation of Theme 3 (Part 1, Hiraishi and Onishi) An 8-minute presentation (a bell will ring at 7 minutes) and a 10-minute Q&A with everyone. Students will score each other's presentations.	Can communicate the background, purposes, and research method of one's own Research Studies to students from different specialties. Can also ask questions about the presentations.
		4th	Presentations (Part 2, Hiraishi and Onishi) Same as above	Can communicate the background, purposes, and research method of one's own Research Studies to students from different specialties. Can also ask questions about the presentations.
		5th	Presentations (Part 3: Hiraishi and Onishi) Same as above	Can communicate the background, purposes, and research method of one's own Research Studies to students from different specialties. Can also ask questions about the presentations.
		6th	Presentations (Part 4: Hiraishi and Onishi) Same as above	Can communicate the background, purposes, and research method of one's own Research Studies to students from different specialties. Can also ask questions about the presentations.
		7th	Presentations (Part 5: Hiraishi and Onishi) Same as above	Can communicate the background, purposes, and research method of one's own Research Studies to students from different specialties. Can also ask questions about the presentations.
		8th	Presentations (Part 6: Hiraishi and Onishi) Same as above	Can communicate the background, purposes, and research method of one's own Research Studies to students from different specialties. Can also ask questions about the presentations.

	4th Quarter	9th	Theme 4 (Special research report): Report and slides preparation (Part 1: Onishi) Prepare one's own Research Studies for the review presentation.	Can prepare slides and materials for Research Studies review presentation.
		10th	Each student should present Theme 4 within 10 minutes and join in a 5-minute discussion with everyone.	Can communicate the background, purposes, research method, experiment results, and discussion of one's own Research Studies. Can also ask questions about the presentations.
		11th	Presentations (Part 2: Onishi and Hiraishi) Same as above	Can communicate the background, purposes, research method, experiment results, and discussion of one's own Research Studies. Can also ask questions about the presentations.
		12th	Presentations (Part 3: Onishi and Hiraishi) Same as above	Can communicate the background, purposes, research method, experiment results, and discussion of one's own Research Studies. Can also ask questions about the presentations.
		13th	Presentations (Part 4: Onishi and Hiraishi) Same as above	Can communicate the background, purposes, research method, experiment results, and discussion of one's own Research Studies. Can also ask questions about the presentations.
		14th	Presentations (Part 5: Onishi and Hiraishi) Same as above	Can communicate the background, purposes, research method, experiment results, and discussion of one's own Research Studies. Can also ask questions about the presentations.
		15th	Presentations (Part 6: Onishi and Hiraishi) Same as above	Can communicate the background, purposes, research method, experiment results, and discussion of one's own Research Studies. Can also ask questions about the presentations.
		16th	No final exam	

Evaluation Method and Weight (%)

	Presentation	Mutual Evaluations between students	Number of questions			Others	Total
Subtotal	60	30	10	0	0	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	60	30	10	0	0	0	100
Cross Area Proficiency	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Research Studies

Course Information

Course Code	4030	Course Category	Specialized / Compulsory
Class Format	Seminar	Credits	School Credit: 8
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 2nd
Term	Year-round	Classes per Week	8
Textbook and/or Teaching Materials			
Instructor			

Course Objectives

(1) Can integrate and deepen expertise, and examine it theoretically, systematically, practically, and creatively from a wide perspective toward solving problems.
(2) Can engage in learning and research independently and continuously.
(3) Can write technical documents in English by creating an English abstract of the annual research report.
(4) Can improve presentation skills by giving one at the research review presentation.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Can integrate and deepen expertise, and examine and apply it theoretically, systematically, practically, and creatively from a wide perspective toward solving problems.	Can integrate and deepen expertise, and examine it theoretically, systematically, practically, and creatively from a wide perspective toward solving problems.	Cannot integrate and deepen expertise, and examine it theoretically, systematically, practically, and creatively from a wide perspective toward solving problems..
Achievement 2	Can actively engage in learning and research independently and continuously.	Can engage in learning and research independently and continuously.	Cannot engage in learning and research independently and continuously.
Achievement 3	Can write technical documents in English and papers for international conferences by creating an English abstract of the annual research report.	Can write technical documents in English by creating an English abstract of the annual research report.	Cannot write technical documents in English by creating an English abstract of the annual research report.
	Can improve and apply presentation skills by giving one at the review presentation.	Can improve presentation skills by giving one at the review presentation.	Cannot improve presentation skills by giving one at the review presentation.

Assigned Department Objectives

Teaching Method

Outline	The aim of this course is to develop practical skills for problem solving by integrating engineering knowledge that the students have learned so far and applying it to individual research assignments of their own choice. They will also learn practical techniques for engineering research. Research subjects, unlike exercise questions, do not have answers from the beginning. Learn the fun of studying unknown areas while repeating the trial and error.
Style	Students will be assigned to each laboratory and receive research guidance from the supervisors.
Notice	This course's content will amount to 360 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. Students should proceed with research voluntarily and proactively based on their knowledge they have gained from previous study. Specifically, each research process should be carried out voluntarily and based on self-judgment, as much as possible, to explore the issues given and think about approach methods until they arrive at an answer.

Characteristics of Class / Division in Learning

☑ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Individual research	Carry out separately under each supervisor's instruction.
		2nd	Same as above	Same as above
		3rd	Same as above	Same as above
		4th	Same as above	Same as above
		5th	Same as above	Same as above
		6th	Same as above	Same as above
		7th	Same as above	Same as above
		8th	Same as above	Same as above
	2nd Quarter	9th	Same as above	Same as above
		10th	Same as above	Same as above
		11th	Same as above	Same as above
		12th	Same as above	Same as above
		13th	Same as above	Same as above
		14th	Same as above	Same as above
		15th	Same as above	Same as above

		16th	No final exam	
2nd Semester	3rd Quarter	1st	Same as above	Same as above
		2nd	Same as above	Same as above
		3rd	Same as above	Same as above
		4th	Same as above	Same as above
		5th	Same as above	Same as above
		6th	Same as above	Same as above
		7th	Same as above	Same as above
		8th	Same as above	Same as above
	4th Quarter	9th	Same as above	Same as above
		10th	Same as above	Same as above
		11th	Same as above	Same as above
		12th	Same as above	Same as above
		13th	Same as above	Same as above
		14th	Same as above	Same as above
		15th	Review presentation	Can present one's research results and answer questions, etc.
		16th	No final exam	

Evaluation Method and Weight (%)

	Research paper	Research activities	Annual research report	Research publication	Total
Subtotal	40	20	20	20	100
Basic Proficiency	0	0	0	0	0
Specialized Proficiency	40	20	20	20	100
Cross Area Proficiency	0	0	0	0	0

Akashi College	Year	2022	Course Title	Mechatro-system

Course Information

Course Code	4031	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 2nd
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials	適宜資料を配布する。		
Instructor	SEKIMORI Daisuke		

Course Objectives

(1)センサ・アクチュエータの基礎知識や動作原理が理解でき、コンピュータによる制御ができる。
(2)センサ・アクチュエータの融合方法が理解でき、基本的なシステムが実現できる。
(3)プログラミングによってシステム全体の知能化が実現できる。

Rubric

	理想的な到達レベルの目安	標準的な到達レベルの目安	未到達レベルの目安
評価項目1	センサ・アクチュエータの基礎知識や動作原理が理解でき、コンピュータによる制御が的確にできる。	センサ・アクチュエータの基礎知識や動作原理が理解でき、コンピュータによる制御ができる。	センサ・アクチュエータの基礎知識や動作原理が理解でき、コンピュータによる制御ができない。
評価項目2	センサ・アクチュエータの融合方法が理解でき、基本的なシステムが的確に実現できる。	センサ・アクチュエータの融合方法が理解でき、基本的なシステムが実現できる。	センサ・アクチュエータの融合方法が理解でき、基本的なシステムが実現できない。
評価項目3	プログラミングによってシステム全体の知能化が的確に実現できる。	プログラミングによってシステム全体の知能化が実現できる。	プログラミングによってシステム全体の知能化が実現できない。

Assigned Department Objectives

Teaching Method

Outline	本授業では、メカトロニクスに必要な機械、電気、電子、情報工学の基礎知識を総合的に講義し、さらに実機を用いた演習を行う。授業の内容としては、自律移動ロボットを題材にして、そのサブシステムである、(1)センサ、(2)アクチュエータ、(3)制御システムを中心に取り上げ、実際の仕組みや具体的な制御方法について基礎から段階的に解説する。そして、最後にこれらを統合する考え方ついて説明する。
Style	配布資料に沿った講義を行う。また、ロボット教材を用いた演習も行う。
Notice	本科目は、授業で保証する学習時間と、予習・復習及び課題レポート作成に必要な標準的な自己学習時間の総計が、90時間に相当する学習内容である。 合格の対象としない欠席条件(割合) 1/3以上の欠課

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	移動ロボットの概要	移動ロボットのハードウェア、ソフトウエア、インターフェイスなどの基本構成について理解できる。さらに、実機の移動ロボットをサンプルプログラムにて動作させることができる。
		2nd	マイコンの制御	ロボットシステム全体の制御を行なうマイコンの機能と基本構成について理解できる。また、マイコンのプログラム言語を用いた具体的な制御方法について理解できる。
		3rd	センサの原理と制御方法	ロボットのセンサとして広く用いられている、光センサ、力覚センサ、視覚センサ、ロータリエンコーダ等の原理と制御方法について理解できる。
		4th	赤外線近接センサの制御	赤外線近接センサの制御演習を通して、制御回路やインターフェイス回路について理解でき、実際の赤外線近接センサを用いて、物体の検出方法が修得できる。
		5th	ロータリエンコーダの制御	ロータリエンコーダの制御演習を通して、制御回路等について理解でき、実際のロータリエンコーダを用いて、モータの回転角度、角速度等の測定方法が修得できる。
		6th	アクチュエータの原理と制御方法	ロボットのアクチュエータの主流であるステッピングモータ、DCモータ等を取り上げ、その原理と制御方法について理解できる。
		7th	DCモータの制御(1)	DCモータの制御演習を通して、制御回路やインターフェイス回路について理解でき、実際のDCモータを用いて、モータの正逆転、PWM方式などの駆動方法が修得できる。
		8th	DCモータの制御(2)	DCモータの制御演習を通して、PI制御理論について理解でき、実際のDCモータを用いて、モータの速度制御方法が修得できる。
	2nd Quarter	9th	DCモータの制御(3)	同上
		10th	移動ロボットの位置制御(1)	移動ロボットの機構および運動学について理解できる。また、フィードフォワードとフィードバックを用いた位置制御方法について理解できる。

		11th	移動ロボットの位置制御(2)	移動ロボットの位置制御演習を通して、フィードフォワードとフィードバックによる位置精度を測定し、その結果について考察することができる。
		12th	移動ロボットの位置推定	移動ロボットの実用的な位置推定方法であるデッドレコニングについて理解でき、実際の移動ロボットを用いた位置推定方法が修得できる。
		13th	障害物回避(1)	移動ロボットに搭載された赤外線近接センサを用いて、障害物を検出・回避しながら、移動ロボットを目的地へ誘導する方法が修得できる。
		14th	障害物回避(2)	同上
		15th	障害物回避(3)	同上
		16th	期末試験	

Evaluation Method and Weight (%)

	試験	発表	相互評価	態度	ポートフォリオ	その他	演習課題	Total
Subtotal	50	0	0	0	0	0	50	100
基礎的能力	0	0	0	0	0	0	0	0
専門的能力	50	0	0	0	0	0	50	100
分野横断的能力	0	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Computational Mechanics

Course Information

Course Code	4032	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 2nd
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	KUNIMINE Kanji		

Course Objectives

(1) Understand the basics of differential methods.
(2) Can determine numerical solutions for two-dimensional steady-state problems.
(3) Can determine numerical solutions for one-dimensional unsteady-state problems.
(4) Can determine numerical solutions for moving boundary problems.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Fully understand the basics of differential methods.	Understand the basics of differential methods.	Do not understand the basics of differential methods.
Achievement 2	Can fully determine numerical solutions for two-dimensional steady-state problems.	Can determine numerical solutions for two-dimensional steady-state problems.	Cannot determine numerical solutions for two-dimensional steady-state problems.
Achievement 3	Can fully determine numerical solutions for one-dimensional unsteady-state problems.	Can determine numerical solutions for one-dimensional unsteady-state problems.	Cannot determine numerical solutions for one-dimensional unsteady-state problems.
	Can fully determine numerical solutions for moving boundary problems.	Can determine numerical solutions for moving boundary problems.	Cannot determine numerical solutions for moving boundary problems.

Assigned Department Objectives

Teaching Method

Outline	Computational mechanics is designed to find governing equations that represent physical phenomena with the assistance of computers. In this course, students will be guided through the basic formula of heat conduction problems. The course will explain the basic theory and specific ways to calculate differential methods, which are typica numerical solutions. It will also explain how to apply them to moving boundary problems, such as coagulation.
Style	The course assumes students have a basic knowledge of Heat Transfer (selected for year 5) at the Mechanical Engineering Department and Advanced Heat Transfer from the school's advance courses, as the study contents are based on them. Students will also work on exercise assignments to meet the Course Objectives and Aims at the information center.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. In order to achieve the goals, students are advised to thoroughly pre-study and review each week's class. The evaluation will be based on four assignments and two quizzes. Students who miss 1/3 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☐ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Heat conduction equations	Can derive a thermal conduction equation of a cylindrical coordinate system.
		2nd	Basics of the difference method	Can derive the differential formula for the derivatives of the first and second floors graphically and mathematically.
		3rd	Quiz on two-dimensional steady-state problems	Understand the differential formula for two-dimensional steady-state problems and how to solve them. Can do a quiz on content from Week 2.
		4th	Exercise (1)	Can create a program for two-dimensional steady-state problems.
		5th	Exercise (2)	Can determine numerical solutions using the program created in Week 4.
		6th	One-dimensional unsteady-state problems (1)	Understand the solution by the forward differential method and its algorithm.
		7th	One-dimensional unsteady-state problems (2)	Can understand the solution by reverse differential method and its algorithm.
		8th	Exercise (3)	Can create programs for one-dimensional unsteady-state problems.
	2nd Quarter	9th	Exercise (4)	Can determine numerical solutions using the program created in Week 8.

		10th	Moving boundary problem	Understand the basic equations and initial and boundary conditions, and can find an approximate solution for heat conduction problems with phase changes.
		11th	Quiz on the handling moving boundary surfaces (1)	Understand the fixed temperature point method as a typical example of handling boundary surfaces that may move over time. Can do a quiz on content from Week 10.
		12th	Handling moving boundary surfaces (2)	Understand the algorithm of a fixed temperature point method.
		13th	Exercise (5)	Can create a program using a fixed temperature point method.
		14th	Exercise (6)	Can create a program using a fixed temperature point method.
		15th	Exercise (7)	Can determine numerical solutions using the program created in Weeks 13 and 14.
		16th	No final exam	0

Evaluation Method and Weight (%)

	Report	Short Tests					Total
Subtotal	70	30	0	0	0	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	70	30	0	0	0	0	100
Cross Area Proficiency	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Energy Technology II

Course Information

Course Code	4033	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 2nd
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	TANAKA Seiichi		

Course Objectives

The course objectives are as follows:
(1) Can recognize future problems and discuss measures for energy conversion technologies that support livelihoods.
(2) Understand and can explain the principles of structural and energy conversion of thermal engines and fluid machinery.
(3) Understand the basic issues of each thermo-fluid machine and plan, conduct, and evaluate performance tests.
To achieve these goals, students will need to do the following self-study:
(a) Solve each week's exercise questions and research the relevant topics to enhance understanding.
(b) Describe the appropriate experimental results and considerations by citing various literature to prepare experimental reports for performance evaluation tests of internal combustion engines.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Can accurately recognize future problems and discuss measures for energy conversion technologies that support livelihoods.	Can recognize future problems and discuss measures for energy conversion technologies that support livelihoods.	Cannot recognize future problems and discuss measures for energy conversion technologies that support livelihoods.
Achievement 2	Accurately understand and logically explain the principles of structural and energy conversion of thermal engines and fluid machinery.	Understand and explain the principles of structural and energy conversion of thermal engines and fluid machinery.	Do not understand and cannot explain the principles of structural and energy conversion of thermal engines and fluid machinery.
Achievement 3	Accurately understand the basic issues of each thermo-fluid machine and can properly plan, conduct, and evaluate performance tests.	Understand the basic issues of each thermo-fluid machine and can plan, conduct, and evaluate performance tests.	Do not understand the basic issues of each thermo-fluid machine and cannot plan, conduct, and evaluate performance tests.

Assigned Department Objectives

Teaching Method

Outline	Students will understand the system of thermal and fluid energy conversion technologies and will practically learn the approaches to performance calculation and experimental evaluation that designing requires. More specifically, they will understand the structures and principles of thermal engines and fluid machinery in practical use and learn the approaches to performance evaluations. To do these things, students will actually plan and implement performance evaluations through labs.
Style	Classes will be focused around lectures that use slides and notetaking. There will be assignment exercises for each unit and two labs. In order to achieve the goals, students should ensure their understanding by following the questions and answers and work in class as well as the exercises assigned in each class. If a student is having difficulty following, they should go back to the basics. If they don't understand, they should ask questions to faculty member and learn from their peers.
Notice	This course is a practical application course for the subjects covered in Thermodynamics, Fluid Mechanics, and Heat Transfer. Therefore, keep the textbooks for those subjects at hand and review them. However, this does not mean that students who have not taken those courses are unable to take this course. In these cases, students should come and discuss it with the faculty as much as possible. Students need to submit a lab report as part of a prerequisite for earning the credit. They will be evaluated based on the results of the planned experiment. Other detailed evaluation criteria will be explained during the first class. This course's content will amount to 90 hours in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. Students who miss 1/3 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☐ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Energy conversion	Understand and explain types of energy conversions, especially thermal engine classification.
		2nd	Cycle and thermal efficiency of thermal engines (1)	Understand an air theory cycle hypothesis and calculate the thermal efficiency of a cycle for a typical thermal engine.
		3rd	Cycle and thermal efficiency of thermal engines (2)	Can calculate the thermal efficiency of a cycle for a typical thermal engine and explain the difference between the thermal efficiency required in an air theory cycle, after comparing their thermal efficiencies.

		4th	Analysis and measurement of thermal engine performance (1)	Understand and can apply information such as the indicated power and diagram factors and net power and mechanical efficiency that are required to evaluate a thermal engine's performance.
		5th	Analysis and measurement of thermal engine performance (2)	Understand and can apply information such as the methods of measuring power and thermal accounting that are required to evaluate a thermal engine's performance.
		6th	Performance evaluation of thermal engines (Lab 1)	Can plan a comprehensive performance evaluation experiment for an internal combustion engine that is in line with objectives presented by members of the class in order to gain a hands-on understanding of the items learned up to week 5.
		7th	Performance evaluation of thermal engines (Lab 1)	Can conduct the performance evaluation experiment for an internal combustion engine that was planned the previous week, and compile it into a report. (Report assignment)
		8th	Energy conversion in fluid machinery	Can introduce fluid machinery such as pumps, water vehicles, windmills, etc., and understand and explain their principles and structure.
	2nd Quarter	9th	Performance and efficiency of turbo machines (1)	Understand and can apply the turbo machines types and their general theory.
		10th	Performance and efficiency of turbo machines (2)	Understand and can explain the operation and the specific phenomena of fluid machinery.
		11th	Analysis and measurement of fluid machinery performance	Understand and can apply information such as the specific speed, performance curve, and similarity laws that are required to evaluate a thermal engine's performance.
		12th	Performance evaluation of fluid machinery (Lab 2)	Can plan a pump performance evaluation experiment that is in line with objectives presented by members of the class in order to gain a hands-on understanding of the items learned up to week 11.
		13th	Performance evaluation of fluid machinery (Lab 2)	Can conduct the performance evaluation experiment for an internal combustion engine that was planned the previous week, and compile it into a report. (Report assignment)
		14th	Principles and power generation systems of fuel cells (1)	Understand and can explain the principles and types of fuel cells and their systems.
		15th	Principles and power generation systems of fuel cells (2)	Understand fuel cells' thermal and material balance and can calculate the theoretical efficiency of real ones. (Report assignment)
		16th	Final exam	

Evaluation Method and Weight (%)

	Exercise	Report	Final exam	Total
Subtotal	20	40	40	100
Basic Proficiency	0	0	0	0
Specialized Proficiency	20	40	40	100
Cross Area Proficiency	0	0	0	0

Akashi College	Year	2022	Course Title	Strength and Fracture of Materials

Course Information

Course Code	4034	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 2nd
Term	Second Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	SAKAIDA Akiyoshi		

Course Objectives

1) Learn the appropriate application of fracture mechanic methodology for material strength assessment (Learning and educational goals [D and F]).
(2) Understand the statistical properties of material strength and learn about reliability engineering handling (Learning and education goal [D]).
(3) Understand the effects of various factors on material strength and acquire the ability to explain them to others (Learning and educational goal [H]).

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Can specifically explain the appropriate application of fracture mechanic methodology for material strength assessment.	Can explain the appropriate application of fracture mechanic methodology for material strength assessment.	Cannot explain the appropriate application of fracture mechanic methodology for material strength assessment.
Achievement 2	Understand the statistical properties of material strength and can specifically explain reliability engineering handling.	Understand the statistical properties of material strength and can explain reliability engineering handling.	Understand the statistical properties of material strength and can explain reliability engineering handling.
Achievement 3	Can specifically explain the effects of various factors on material strength.	Can explain the effects of various factors on material strength.	Cannot explain the effects of various factors on material strength.

Assigned Department Objectives

Teaching Method

Outline	Strength and fracture of materials is a field that deals with the mechanical behavior of materials, such as deformation and destruction, which occur when external forces are applied to solid materials. It is related to other fields, including engineering materials like metal structure, the strength of materials and continuum mechanics, and reliability engineering. The aim of this course is to understand the effects of microscopic structures and various factors on various strength properties, and to learn about material selection and strength design methods for various machinery and structures.
Style	Classes will be held in a lecture style.
Notice	While it is preferable if students have completed Engineering Materials and Strength of Materials offered at Akashi Kosen Mechanical Engineering Department and other related subjects, classes will be taught from the basics as much as possible. This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. Students who miss 1/3 or more of classes will not be eligible for a passing grade

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
2nd Semester	3rd Quarter	1st	Introduction to strength and fracture of materials Learn about basic concepts and contents of strength and fracture of materials and the items necessary to study it.	Can explain the basic concepts and topics of strength and fracture of materials.
		2nd	Deformation, strength, and fracture under static loads (1) Learn about the static strength and sliding and plastic deformation of metal materials.	Can explain the static strength and sliding and plastic deformation of metal materials.
		3rd	Deformation, strength, and fracture under static loads (2) Learn how to strengthen metal materials and how they work.	Can explain how to strengthen metal materials and how they work.
		4th	Deformation, strength, and fracture under static loads (3) Learn about types of fractures in metal materials and fracture mechanisms.	Can explain types of fractures in metal materials and fracture mechanisms.
		5th	An overview of fracture mechanics (1) Learn about the basics of mechanics of elasticity, stress fields at crack tips, and the stress intensity factor.	Can explain the basics of mechanics of elasticity, stress fields at crack tips, and the stress intensity factor.
		6th	An overview of fracture mechanics (2) Learn about the crack tip's plastic zone and the energy release rate.	Can explain the crack tip's plastic zone and the energy release rate.
		7th	An overview of fracture mechanics (3) Learn about plane strain fracture toughness.	Can explain plane strain fracture toughness.

		8th	Fatigue (1) Learn about the basics of fatigue.	Can explain the basics of fatigue.
	4th Quarter	9th	Fatigue (2) Learn about various fatigue test methods and fatigue characteristics.	Can explain various fatigue test methods and fatigue characteristics.
		10th	Fatigue (3) Learn about the characteristics of fatigue crack propagation.	Can explain the characteristics of fatigue crack propagation.
		11th	High temperature strength and environmental strength Learn about creep deformation, creep fracture, and corrosion.	Can explain creep deformation, creep fracture and corrosion.
		12th	Statistical properties of material strength (1) Learn about the fundamental topics such as probability distribution that become necessary upon considering the statistical properties of material strength.	Can explain the fundamental topics such as probability distribution that become necessary upon considering the statistical properties of material strength.
		13th	Statistical properties of material strength (2) Learn about various types of probability paper and their uses.	Can explain various types of probability paper and their uses.
		14th	Statistical properties of material strength (3) Learn about the statistical properties of the static strength for metal materials, etc.	Can explain the statistical properties of the static strength for metal materials, etc.
		15th	Statistical properties of material strength (4) Learn about the statistical properties of the fatigue strength for metal materials, etc.	Can explain the statistical properties of the fatigue strength for metal materials, etc.
		16th	Final exam	

Evaluation Method and Weight (%)

	Examination	Report	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	80	20	0	0	0	0	100
Basic Proficiency	40	20	0	0	0	0	60
Specialized Proficiency	40	0	0	0	0	0	40
Cross Area Proficiency	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Optoelectronics Devices

Course Information

Course Code	4035	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 2nd
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	SUYAMA Taikei		

Course Objectives

1) Can explain the basics of quantum mechanics and semiconductors, and the interaction between optical waves and electrons as the basis for optical devices.
2) Understand the operating principles and characteristics of various light emitting devices, photosensitive devices, and solid-state display devices and can explain the important properties systematically.
3) Can construct an experimental system for the given lab assignment, using knowledge and technology from one's field of specialty.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Understand and can apply the basic characteristics of light, quantum mechanics, and semiconductors.	Understand the basic characteristics of light, quantum mechanics, and semiconductors.	Do not understand the basic characteristics of light, quantum mechanics, and semiconductors.
Achievement 2	Understand the interaction between light waves and electrons and can solve problems.	Understand the interaction between light waves and electrons.	Do not understand the interaction between light waves and electrons.
Achievement 3	Understand the basic principles and applications of optical devices such as optical waveguides, LEDs, and lasers.	Understand the basic principles of optical devices such as optical waveguides, LEDs, and lasers.	Do not understand the basic principles of optical devices such as optical waveguides, LEDs, and lasers.
	Understand and can explain in detail photosensitive and display devices, optical fibers, optical communication, optical measurement and medical applications, optical power applications, etc.	Understand photosensitive and display devices, optical fibers, optical communication, optical measurement and medical applications, optical power applications, etc.	Do not understand photosensitive and display devices, optical fibers, optical communication, optical measurement and medical applications, optical power applications, etc.

Assigned Department Objectives

Teaching Method

Outline	Optical electronics is the fusion of optical technology, quantum electronics engineering, and electronics engineering. It has helped diversify and improve the performance of electronic engineering functions and has a wide range of content. Optical devices make up the core devices within this, and this technology has advanced significantly. In this course, the first half will focus on the basics and theory of optical devices. The second half will explain various optical devices used for optical information transmission, optical recording, and image information technology using the latest information.
Style	Students who miss 1/3 or more of classes will not be eligible for a passing grade The overall evaluation will be based 80% on periodic exams and 20% on report assignments. The minimum score for a pass will be 60%. The periodic exam will assess students' level of understanding of the class content. There will be only one exercise and it will assess whether Course Objective 2) has been achieved.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. It is recommended that students have mastered subjects related to electronic properties. Students who miss 1/3 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☐ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Optical electronics and optical devices Optical electronics is a technology whose characteristic has three sides: Telecommunications engineering, imaging engineering, and light energy. Based on this, describe the form of optical devices, which make up the core of this field.	Optical electronics and optical devices Understand the form of optical electronics.
		2nd	Fundamental properties of light Review the basic properties of light (refraction, reflection, interference, diffraction, polarization, etc.) that have been learned so far in physics, etc.	Understand the fundamental properties of light.

		3rd	Basics of quantum mechanics Describe the background of quantum mechanics development, the dual nature of particles and waves of matter, the wave equation of the Schrödinger equation, and wave functions, which make up the theoretical background of quantum mechanics required to understand the interaction between optical waves and electrons.	Understand the basics of quantum mechanics.
		4th	Optical properties of semiconductors Materials absorb and emit light. This is mainly due to interactions between electrons in substances. Think phenomenologically about light absorption and emission in semiconductors.	Understand light absorption and emission in semiconductors.
		5th	Electrical properties of semiconductors Describe the electrical properties of semiconductors, which form the basis of optical devices.	Understand the electrical properties of semiconductors.
		6th	Quantum theory of the interaction between light waves and electrons Think about a method of quantum mechanical representation of the interaction between light and electrons. Derive the polarization factor of a material (the real part that indicates the accumulation of energy and the imaginary part that represents absorption and stimulated emission) by the second-order system approximation using a density matrix.	Understand the quantum theory of the interaction between light waves and electrons.
		7th	Quantum theory of the interaction between light waves and electrons (electron transition and stimulated emission) Derive the rate equation representing the percentage of temporal changes in photon and electron density based on the analysis of the light wave amplification process from the previous week. Think about the polarization of the multi-level system, based on this.	Understand electronic transitions and stimulated emission.
		8th	Exercise	Exercise
	2nd Quarter	9th	Photoelectric waveguides Using mainly light approximation for the analysis of photoelectric waveguide, describe topics such as an optical waveguide's basic properties (total reflection, waveguide mode, equivalent refractive index, containment coefficient, power matching of light propagation, light gathering and emission), power matching of light propagation and bending loss, power matching conditions for light propagation, mode matching conditions, and bluster angle and bending loss.	Photoelectric waveguides Using mainly light approximation for the analysis of photoelectric waveguide, understand topics such as an optical waveguide's basic properties (total reflection, waveguide mode, equivalent refractive index, containment coefficient, power matching of light propagation, light gathering and emission), power matching of light propagation and bending loss, power matching conditions for light propagation, mode matching conditions, and bluster angle and bending loss.
		10th	Periodic structures and light concentration and projection Explain periodic structures and photonic crystals. Understand light concentration and projection.	Understand periodic structures, light concentration and projection, periodic structures and photonic crystals, and light concentration and projection.
		11th	Light emitting diodes Describe the structure, production methods, and materials of light emitting diodes (LEDs), one of the important light emitting devices. Explain its light emitting characteristics and features and think about its current problems.	Understand the principles of light emitting diodes.
		12th	Semiconductor lasers Explain the properties of semiconductor lasers as a light sources and determine an oscillation threshold, optical output, oscillation wavelength, amplification gain, and so on. Describe the structure, type, emission characteristics, etc. of semiconductor lasers (LD).	Understand the principles of semiconductor lasers.
		13th	Photosensitive and display devices Describe the structure, properties, and features of photosensitive devices such as photodetectors, photodiodes, solar cells, etc. Describe display devices with a focus on LCDs.	Understand the structure, properties, and features of photodetectors, photodiodes, solar cells, etc.
		14th	Optical fiber lines and optical components Describe optical fiber and device bonding, optical circuit elements, optical polarizers, etc.	Understand optical fiber and device bonding, optical circuit elements, optical polarizers, etc.
		15th	Applications of optical devices Describe topics with a focus on optical communications, optical measurement and medical applications, optical power generation, etc.	Understand the applications of optical devices.
		16th	Final exam	Final exam

Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Exercise	Total
Subtotal	80	0	0	0	0	20	100
Basic Proficiency	80	0	0	0	0	20	100

Specialized Proficiency	0	0	0	0	0	0	0
Cross Area Proficiency	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Algorithms

Course Information

Course Code	4036	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 2nd
Term	Second Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	HAMADA Yukihiro		

Course Objectives

[1] Can explain the basic knowledge of algorithms and the basic data structure (D).
[2] Can formulate real problems on graphs (F).
Understand the algorithms listed below and their time complexities (H).
[3] Algorithms that constitute a minimum spanning tree
[4] Algorithms to explore graphs
[5] Algorithms for solving shortest path problem
[6] Algorithms for solving maximum flow problems
[7] Algorithms for string pattern matching

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Can accurately explain computational complexity, orders, lists, stacks, queues, graphs, and trees.	Can explain computational complexity, orders, lists, stacks, queues, graphs, and trees.	Cannot explain computational complexity, orders, lists, stacks, queues, graphs, and trees.
Achievement 2	Can accurately formulate a problem for determining the meeting dates of various committees.	Can formulate a problem for determining the meeting dates of various committees.	Cannot formulate a problem for determining the meeting dates of various committees.
Achievement 3	Can accurately explain Kruskal's and Prim's algorithms and their time complexities.	Can explain Kruskal's and Prim's algorithms and their time complexities.	Cannot explain Kruskal's and Prim's algorithms and their time complexities.
	Can accurately explain depth-first search and breadth-first search algorithms and their time complexities.	Can explain depth-first search and breadth-first search algorithms and their time complexities.	Cannot explain depth-first search and breadth-first search algorithms and their time complexities.
	Can accurately explain Dijkstra's, Bellman-Ford, and Floyd's algorithms and their time complexities.	Can explain Dijkstra's, Bellman-Ford, and Floyd's algorithms and their time complexities.	Cannot explain Dijkstra's, Bellman-Ford, and Floyd's algorithms and their time complexities.
	Can accurately explain the Ford-Fulkerson, Edmonds-Karp, and Push-relabel algorithms and their time complexities.	Can explain the Ford-Fulkerson, Edmonds-Karp, and Push-relabel algorithms and their time complexities.	Cannot explain the Ford-Fulkerson, Edmonds-Karp, and Push-relabel algorithms and their time complexities.
	Can accurately explain the Knuth-Morris-Pratt and Boyer-Moore algorithms and their time complexities.	Can explain the Knuth-Morris-Pratt and Boyer-Moore algorithms and their time complexities.	Cannot explain the Knuth-Morris-Pratt and Boyer-Moore algorithms and their time complexities.

Assigned Department Objectives

Teaching Method

Outline	This course will study graph algorithms and string pattern matching algorithms. Graphs are defined as binomial sets of vertex and edge sets, and are often used to represent the "relationships" or "connections" between "things" in real-world problems. It is possible to formulate a real problem as a graph problem and get the solution for it by solving it on a graph. Strings are one of the most important kinds of data handled by computers. Students will learn about algorithms for efficiently finding specified strings in string data, such as documents or source files.
Style	Classes will be held in a lecture style.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. It is recommended for students to have mastered programming in C language before taking this course. Students who miss 1/3 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☑ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
2nd Semester	3rd Quarter	1st	Basic knowledge of algorithms	Can explain algorithms, computational complexity, and orders.
		2nd	Basic data structure	Can explain lists, stacks, queues, and heaps.
		3rd	How to formulate real-world problems as graph problems	Can explain graphs and trees. Can formulate a problem for determining the meeting dates of various committees as a problem on a graph.
		4th	Algorithms that constitute a minimum spanning tree algorithm 1/2	Can explain Kruskal's algorithm, set operation algorithms and their time complexities.

		5th	Algorithms that constitute a minimum spanning tree 2/2	Can explain Prim's algorithm and its time complexity.
		6th	Algorithms to explore graphs	Can explain depth-first search and breadth-first search algorithms and their time complexities.
		7th	Algorithms for solving shortest path problems 1/2	Can explain Dijkstra's algorithm for finding the shortest path from a single vertex and its time complexity.
		8th	Midterm exam The exam's scope will be content from weeks 1 to 6.	
	4th Quarter	9th	Algorithms for solving shortest path problems 2/2	Can explain the Bellman-Ford algorithm for the shortest path from a single vertex and the Floyd algorithm for the shortest path between all vertices. Can also explain their time complexities.
		10th	Algorithms for solving maximum flow problems 1/2	Can explain the Ford-Fulkerson and Edmonds-Karp algorithms and their time complexities.
		11th	Algorithms for solving maximum flow problems 2/2	Can explain the Push-relabel algorithm and its time complexity.
		12th	Algorithms for string pattern matching 1/3	Can explain the Knuth-Morris-Pratt algorithm and its time complexity.
		13th	Algorithms for string pattern matching 2/3	Can explain the Boyer-Moore algorithm (acceleration idea 1) and its time complexity.
		14th	Algorithms for string pattern matching 3/3	Can explain the Boyer-Moore algorithm (acceleration idea 2) and its time complexity.
		15th	From algorithm theory to engineering	Can explain "algorithm engineering," which bridges the gap between algorithm theory and reality.
		16th	Final exam	

Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	100	0	0	0	0	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	100	0	0	0	0	0	100
Cross Area Proficiency	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Advanced Electronic Circuit

Course Information

Course Code	4037	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 2nd
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	INOUE Kazunari		

Course Objectives

This course will teach VLSI devices, circuit design and simulation in lecture and exercise formats. The objective is to correctly understand the CMOS logic circuit, apply it to computer and control circuits, learn the features of various memory LSIs, and understand the roadmap for electronic circuit technology. Furthermore, the aim is to understand the challenges and measures that have been taken in the specialized electronic circuits field in recent years, such as low power consumption and reliability technologies.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Fully understand circuit design and operation verification techniques.	Understand circuit design and operation verification techniques.	Do not understand circuit design and operation verification techniques.
Achievement 2	Fully understand technologies for low power consumption and high speed.	Understand technologies for low power consumption and high speed.	Do not understand technologies for low power consumption and high speed.
Achievement 3	Fully understand high-density memory circuit technologies such as SRAM, DRAM, and Flash.	Understand high-density memory circuit technologies such as SRAM, DRAM, and Flash.	Do not understand high-density memory circuit technologies such as SRAM, DRAM, and Flash.

Assigned Department Objectives

Teaching Method

Outline	VLSI devices have achieved remarkable development in three key areas: higher speed, lower power consumption, and higher integration. The course will lecture on circuit and architecture technologies regarding high-performance design techniques for achieving them. In this course, lessons will be conducted in a lecture style format. Students will be introduced to the high-performance design electronic circuits of recent years by faculty members with practical experience in memory and application processor design.
Style	Classes will be taught in lecture and exercise formats for the following numbers 1) to 3). There will be no exams, and evaluation will be based on the submitted assignment. 1) Understand circuit design and operational verification technologies. 2) Understand technologies for low power consumption and high speed. 3) Understand high-density memory circuit technologies such as SRAM, DRAM, and Flash.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. Students who miss 1/3 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☑ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Lecture overview and trends toward higher performance VLSI Explain the lecture overview for Advanced Electronic Circuits.	Lecture overview and trends toward higher performance VLSI Understand the lecture overview for Advanced Electronic Circuits.
		2nd	nMOS/pMOS transistors and CMOS inverters Explain nMOS/pMOS transistor and CMOS inverter operation.	nMOS/pMOS transistors and CMOS inverters Understand nMOS/pMOS transistor and CMOS inverter operation.
		3rd	CMOS logic circuits Explain the various CMOS logic circuits.	CMOS logic circuits Understand CMOS logic circuits.
		4th	Combinational circuits using CMOS Explain the combinational circuits that are composed of CMOS logic circuits.	Combinational circuits using CMOS Understand the combinational circuits that are composed of CMOS logic circuits.
		5th	CMOS-based sequential circuits Explain the sequential circuits that are composed of CMOS logic circuits.	CMOS-based sequential circuits Understand the sequential circuits that are composed of CMOS logic circuits.
		6th	LSI manufacturing process Explain topics such as silicon substrates, gate oxide film formation, and ion injection.	LSI manufacturing process Understand topics such as silicon substrates, gate oxide film formation, and ion injection.
		7th	VLSI design Explain functional design, hardware description language and verification in LSI design.	VLSI design Understand functional design, hardware description language and verification in LSI design.
		8th	Volatile memory circuits Explain SRAM and DRAM circuit configuration and operation.	Volatile memory circuits Understand SRAM and DRAM circuit configuration and operation.

	2nd Quarter	9th	Non-volatile memory circuits Explain non-volatile memory circuit configuration and operation.	Non-volatile memory circuits Understand non-volatile memory circuit configuration and operation.
		10th	Circuit design exercises using SPICE 1 Explain circuit inputs using SPICE.	Circuit design exercises using SPICE 1 Understand circuit inputs using SPICE.
		11th	Circuit design exercises using SPICE 2 Explain circuit inputs and operation verification using SPICE.	Circuit design exercises using SPICE 2 Understand circuit inputs and operation verification using SPICE .
		12th	Circuit design using SPICE; Assignment submission 1 Solve the problems regarding circuit inputs and operation verification using SPICE.	Circuit design using SPICE; Assignment submission 1 Solve the problems regarding circuit inputs and operation verification using SPICE.
		13th	Circuit design using SPICE; Assignment submission 2 Solve and submit the problems regarding circuit inputs and operation verification using SPICE.	Circuit design using SPICE; Assignment submission 2 Solve the problems regarding circuit inputs and operation verification using SPICE.
		14th	Testing and reliability design Explain coverage and design for testability.	Testing and reliability design Understand coverage and design for testability.
		15th	Summary and future trends Explain topics such as more than Moore, IoT sensor nodes, and other future development trends in VLSI technology.	Summary and future trends Understand topics such as more than Moore, IoT sensor nodes and other future development trends in VLSI technology.
		16th	No final exam	

Evaluation Method and Weight (%)

	Assignments						Total
Subtotal	100	0	0	0	0	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	100	0	0	0	0	0	100
Cross Area Proficiency	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Mathematical Informatics

Course Information

Course Code	4038	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 2nd
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	TSUCHIDA Shuhei		

Course Objectives

[1] Learn and can explain the basic knowledge of statistical analysis.
[2] Understand and can configure the nearest neighbor rules.
[3] Understand and can configure the naive Bayes.
[4] Understand and can configure decision trees.
[5] Understand and can configure regression methods. .
[6] Understand and can configure other algorithms such as SVM.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Learn and can fully explain the basic knowledge of statistical analysis.	Learn and can explain the basic knowledge of statistical analysis.	Do not learn and cannot explain the basic knowledge of statistical analysis.
Achievement 2	Understand and can fully configure the nearest neighbor rule.	Understand and can configure the nearest neighbor rule.	Do not understand and cannot configure the nearest neighbor rule.
Achievement 3	Understand and can fully configure the naive Bayes.	Understand and can configure the naive Bayes.	Do not understand and cannot configure the naive Bayes.
	Understand and can fully configure decision trees.	Understand and can configure decision trees.	Do not understand and cannot configure decision trees.
	Understand and can fully configure regression methods.	Understand and can configure regression methods.	Do not understand and cannot configure regression methods.
	Understand and can fully configure other algorithms such as SVM.	Understand and can configure other algorithms such as SVM.	Do not understand and cannot configure other algorithms such as SVM.

Assigned Department Objectives

Teaching Method

Outline	Mathematical informatics is a study that solves various phenomena in the world, especially those related to information engineering, by regarding them as mathematical models. Students will learn about the application of statistical analysis called machine learning and data mining with the goal of configuring algorithms to find laws and patterns in data. After learning the basics of statistical analysis, they will take practical algorithms and learn their overviews and how to apply them using R language.
Style	Classes will use handouts to provide presentation-style explanations and exercises that use computers. Since the exercises will be the assignment subjects that will be covered in the final report for evaluation, it is important for students to solve the exercises conducted during class for a better understanding. English introduction plans: Technical terms
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. To achieve these goals, students are required to self-study outside of classes: (1) Pre-study and review lecture content. (2) Work on the six assignments given in class. Evaluation method: Six assignment reports (100%) Evaluation criteria: The following should be learned to achieve the Course Objectives and Aims: [1] Can implement basic processing of statistical analysis in R language. [2] Can implement programs using the nearest neighbor rule in R language. [3] Can implement programs that apply the naive Bayes in R language. [4] Can implement a program that uses decision trees in R language. [5] Can implement programs that apply the regression method in R language. [6] Can implement other programs that apply algorithms such as SVM in R language. Students who miss 1/3 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☑ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st	Introduction to machine learning	Can explain the evolution of machine learning and the introduction of future learning.
		2nd	Statistical analysis review 1	Can explain what has been learned about the basic statistics used in statistical analysis, such as mean, dispersion, and deviation.
		3rd	Statistical analysis review 2	Can handle basic statistics for statistical analysis such as mean, dispersion, and deviation in R language.

		4th	Nearest neighbor algorithms 1	Can explain what has been explained about nearest neighbor algorithms.
		5th	Nearest neighbor algorithms 2	Can verify a nearest neighbor algorithm in R language.
		6th	Naive Bayes algorithm 1	Can explain what has been explained about the naive Bayes algorithm.
		7th	Naive Bayes algorithm 2	Can verify a naive Bayes algorithm in R language.
		8th	Decision tree algorithms 1	Can explain what has been explained about decision tree algorithms.
	2nd Quarter	9th	Decision tree algorithms 2	Can verify a decision tree algorithms in R language.
		10th	Regression methods 1	Can explain what has been explained about regression methods.
		11th	Regression methods 2	Can verify a regression algorithm in R language.
		12th	Pattern recognition algorithm SVM	Can explain what has been explained about the pattern recognition algorithm SVM.
		13th	Correlation rules	Can explain what has been explained about correlation rules.
		14th	k-means clustering	Can explain what has been explained about k-means clustering.
		15th	Methods for evaluating a model's performance	Can explain what has been explained about methods for evaluating a model's performance.
		16th	No final exam	

Evaluation Method and Weight (%)

	Report	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	100	0	0	0	0	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	100	0	0	0	0	0	100
Cross Area Proficiency	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Digital Circuit Design

Course Information

Course Code	4039	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 2nd
Term	First Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	INOUE Kazunari		

Course Objectives

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1			
Achievement 2			
Achievement 3			

Assigned Department Objectives

Teaching Method

Outline	
Style	
Notice	

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
1st Semester	1st Quarter	1st		
		2nd		
		3rd		
		4th		
		5th		
		6th		
		7th		
		8th		
	2nd Quarter	9th		
		10th		
		11th		
		12th		
		13th		
		14th		
		15th		
		16th		

Evaluation Method and Weight (%)

	Examination	Presentation	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	0	0	0	0	0	0	0
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	0	0	0	0	0	0	0
Cross Area Proficiency	0	0	0	0	0	0	0

Akashi College	Year	2022	Course Title	Optimization Design

Course Information

Course Code	4040	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 2nd
Term	Second Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	SHI Fenghui		

Course Objectives

(1) Understand and learn about the knowledge and methods for optimization and optimal design.
(2) Understand and can calculate basic mathematical formulas for linear and nonlinear programming optimization techniques.
(3) Understand the concepts and mathematical expressions of multi-objective optimization.
(4) Can explain and practice the principles of optimal design for genetic algorithms.
(5) Can create the optimal design for a helical gear reducer as an example of optimal design, and apply the optimization.

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Understand and fully learn about the knowledge and methods for optimization and optimal design	Understand and learn about the knowledge and methods for optimization and optimal design	Do not understand and learn about the knowledge and methods for optimization and optimal design
Achievement 2	Understand and can fully calculate the basic mathematical formulas for linear and nonlinear programming optimization techniques.	Understand and can calculate basic mathematical formulas for linear and nonlinear programming optimization techniques.	Do not understand and cannot calculate basic mathematical formulas for linear and nonlinear programming optimization techniques.
Achievement 3	Fully understand the concepts and mathematical expressions of multi-objective optimization	Understand the concepts and mathematical expressions of multi-objective optimization	Do not understand the concepts and mathematical expressions of multi-objective optimization
	Fully understand the idea of genetic algorithms and mathematical expressions	Fully understand the idea of genetic algorithms and mathematical expressions	Fully understand the idea of genetic algorithms and mathematical expressions
	Can program and calculate the optimal design for a helical gear reducer	Can program and calculate the optimal design for a helical gear reducer	Can program and calculate the optimal design for a helical gear reducer

Assigned Department Objectives

Teaching Method

Outline	Optimization (which covers a wide range of fields) and optimal design (which covers design fields) are being actively used in a variety of fields in response to the demand for higher performance in mechanical systems. As computers continue to develop, the importance of optimization and optimal design is expected to increase in the future. In this course, students will learn about the concepts and processes of optimization and optimization design and optimization techniques. They will also learn specific examples of optimal design for various machine systems. Quizzes will be carried out to ensure knowledge.
Style	Classes will be held in a lecture style. There will be assignments as appropriate.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. Students who miss 1/3 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☑ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
2nd Semester	3rd Quarter	1st	Course guidance	Explain the course content in accordance with the syllabus
		2nd	Optimization concepts and terminology	Explain concepts, terminology, and techniques of optimization through examples of optimal design, and optimization and optimal design problems.
		3rd	Optimization methods using Optimization Toolbox (Matlab) Learn the basic operations of Matlab/Simulink and Optimization Toolbox for calculating optimization.	How to use MATLAB/Simulink and Optimization Toolbox
		4th	Linear programming optimization (1)	An outline of linear programming optimization problems and formulation methods.
		5th	Linear programming optimization (2)	Simplex method and examples of its application.
		6th	Linear programming optimization (3)	Example applications of linear programming methods. Linear programming optimization using Matlab's Optimization Toolbox.

		7th	Nonlinear programming optimization (1)	An overview of non-linear optimization problems and optimization techniques. Explain application examples of nonlinear programming in engineering and unconstrained optimization techniques.
		8th	Nonlinear programming optimization (2)	Learn about modeling, formulation, preprocessing, optimization calculation programs, and examination of optimization results.
	4th Quarter	9th	Nonlinear programming optimization (3)	Genetic algorithms (GA) Learn an overview for genetic algorithms and the contents of an optimal solution search program. Take design examples and compare them with other optimization techniques. Explain constrained optimization techniques and learn SUMT, linear minimization techniques, and Powell's conjugate direction method.
		10th	Multi-objective optimization Report 1: Multi-objective optimization of new bus routes (1)	Learn about the weighted method for the multi-objective optimization method. Take application examples to learn how to do multi-objective optimization in the exercise.
		11th	Report 1: Multi-objective optimization of new bus routes (2)	Plan a new bus route to maximize customer satisfaction and profit for the bus operator using multi-objective optimization. Multi-objective optimization using Matlab's Optimization Toolbox.
		12th	Report 2: Optimal designs for helical gear reducers (1)	Use the gear design knowledge learned in Engineering Design and Design and Drawing, and create the optimal design for a helical gear reducer.
		13th	Report 2: Optimal designs for helical gear reducers (2)	Formulate methods for objective functions, design variables, and constraints.
		14th	Report 2: Optimal designs for helical gear reducers (3)	Promote Matlab programming creation (M-files). Study the optimization results, compare them with the computation results done in this course, and recognize the importance of optimal design.
		15th	Summary and evaluation	Summarize and review the content learned on this course.
		16th	Final exam	

Evaluation Method and Weight (%)

	Examination	Exercise&Report	Total
Subtotal	40	60	100
Basic Proficiency	30	30	60
Specialized Proficiency	10	20	30
Cross Area Proficiency	0	10	10

Akashi College	Year	2022	Course Title	Micromachine

Course Information

Course Code	4041	Course Category	Specialized / Elective
Class Format	Lecture	Credits	Academic Credit: 2
Department	Mechanical and Electronic System Engineering	Student Grade	Adv. 2nd
Term	Second Semester	Classes per Week	2
Textbook and/or Teaching Materials			
Instructor	MATSUZUKA Naoki		

Course Objectives

(1) Understand the characteristics of anisotropic materials and can calculate the physical property values of crystal orientation. (H)
(2) Understand and can explain the principles of typical semiconductor micromachining techniques. (D)
(3) Can explain micromachines from their structure to the fabrication process. (F)
(4) Understand and can explain detection principles of sensors and driving principles of actuators. (D)
(5) Learn about sensor and actuator design techniques. (F) and (H)

Rubric

	Ideal Level	Standard Level	Unacceptable Level
Achievement 1	Fully understand the characteristics of anisotropic material and can accurately calculate the physical property values of crystal orientation.	Understand the characteristics of anisotropic materials and can calculate the physical property values of crystal orientation.	Do not understand the characteristics of anisotropic materials and cannot calculate the physical property values of crystal orientation.
Achievement 2	Fully understand and can accurately explain the principles of typical semiconductor micromachining techniques.	Understand and can explain the principles of typical semiconductor micromachining techniques.	Do not understand and cannot explain the principles of typical semiconductor micromachining techniques.
Achievement 3	Can explain micromachines in detail from their structure to the fabrication process.	Can explain micromachines from their structure to the fabrication process.	Cannot explain micromachines detail from their structure to the fabrication process.
	Fully understand and can accurately explain detection principles of sensors and driving principles of actuators.	Understand and can explain detection principles of sensors and driving principles of actuators.	Do not understand and cannot explain detection principles of sensors and driving principles of actuators.
	Can accurately apply sensor and actuator design techniques.	Can apply sensor and actuator design techniques.	Cannot apply sensor and actuator design techniques.

Assigned Department Objectives

Teaching Method

Outline	Micromachines or micro electro mechanical systems (MEMS) are devices that integrate micro structures, sensors, actuators, and electronic circuits using semiconductor micromachining technology. They are applied in a wide range of fields. The first half of this course will explain typical semiconductor micromachining techniques and micromachine fabrication methods. The second half will explain the principles of sensors used in micromachines, driving principles of actuators, typical sensors, and actuator design techniques.
Style	Classes will be held in a lecture-style format and will be taught with handouts.
Notice	This course's content will amount to 90 hours of study in total. These hours include the learning time guaranteed in classes and the standard self-study time required for pre-study / review, and completing assignment reports. It is recommended that students have a basic knowledge of engineering materials, strength of materials, and electronic circuits. However, this course is open to all students as the necessary knowledge will be explained in class. Students who miss 1/3 or more of classes will not be eligible for a passing grade.

Characteristics of Class / Division in Learning

☐ Active Learning	☐ Aided by ICT	☐ Applicable to Remote Class	☐ Instructor Professionally Experienced

Course Plan

			Theme	Goals
2nd Semester	3rd Quarter	1st	An overview of micromachines	Understand micromachine development history and scaling laws.
		2nd	Physical properties of single-crystal silicon (1)	Understand the crystal structure, manufacturing methods and anisotropic properties of single-crystal silicon.
		3rd	Physical properties of single-crystal silicon (2)	Understand the calculation method for the physical properties in arbitrary crystal orientation of single-crystal silicon.
		4th	Photolithography	Understand the principles of photolithography.
		5th	Film deposition (1)	Understand the sputter, vapor deposition, and chemical vapor deposition methods.
		6th	Film deposition (2)	Understand thermal oxidation and impurity diffusion.
		7th	Etching (1)	Understand liquid-based isotropic and anisotropic etching of single-crystal silicon.
		8th	Etching (2)	Understand gas-based dry-etching.
	4th Quarter	9th	Micromachine fabrication technology	Understand micromachine fabrication processes using semiconductor micromachining techniques.

		10th	Sensor design technology (1)	Understand typical micro-sensors and sensing principles.
		11th	Sensor design technology (2)	Understand how to design piezoresistive pressure sensors.
		12th	Sensor design technology (3)	Design a piezoresistive pressure sensor.
		13th	Actuator design technology (1)	Understand typical micro actuators and their driving principles.
		14th	Actuator design technology (2)	Understand how to design an electrostatic drive actuator.
		15th	Actuator design technology (3)	Design a electrostatic drive actuator.
		16th	Final exam	

Evaluation Method and Weight (%)

	Examination	Assignments	Mutual Evaluations between students	Behavior	Portfolio	Other	Total
Subtotal	60	40	0	0	0	0	100
Basic Proficiency	0	0	0	0	0	0	0
Specialized Proficiency	60	40	0	0	0	0	100
Cross Area Proficiency	0	0	0	0	0	0	0