

Master's Courses

2019 October (Fall) Admission

2020 April (Spring) Admission

Akita University Graduate School of Engineering Science Master's Courses Application Guidelines

[For Special Entrance Examination for International Students]

Admission Schedule

Event	Date
Prior Screening of Applicants' Qualifications (certain applicants only)	July 16, 2019 - July 22, 2019
Application Period	August 5, 2019 - August 9, 2019
Examination Date	August 28, 2019
Announcement of Results	September 13, 2019

April 2019

Akita University

Admission Policy

The Graduate School of Engineering Science, Akita University welcomes applications from candidates who meet the following criteria.

The Graduate School of Engineering Science aims to educate people who can systematically master a body of highly specialized knowledge and technology from first principles and will make a positive contribution to the energization of local communities and the sustainable development of the country as a whole with flexibility, an international perspective, and a strong sense of ethics.

We are looking for new students who are motivated to create and craft new inventions based on expertise in science and engineering, who are driven to contribute to the development of local communities and the resolution of their numerous issues, and who will aim to use their scientific learning to help find solutions to the problems confronting all of humankind. We are actively looking to attract students from different backgrounds and with different aims. To this end, we have established a framework for flexible learning to allow working people to accommodate their studies into their working lives, and an international environment that welcomes students from countries around the world.

For the Master's Degree Program, we look to admit candidates who aspire to use their expertise to find solutions to the issues confronting local communities and our global society.

For more details on the admission policies of individual departments, see page 15 of these guidelines.

Confidentiality of Applicant Information

The personal information of applicants from submitted documents and from entrance examinations is used by Akita University solely for the following purposes:

- In matters related to selecting successful applicants (including related matters such as statistical processing)
- In the case of students who have completed enrollment procedures, post-admission enrollment management, academic guidance, matters related to student support and matters related to the collection of tuition fees.

Special Entrance Examination for International Students

1. Number to be Admitted

Department (Major)	Fall	Spring
Life Science	a few	a few
Materials Science	a few	a few
Mathematical Science and Electrical-Electronic-Computer Engineering	a few	a few
Systems Design Engineering	a few	a few
Cooperative Major in Life Cycle Design Engineering	a few	a few

2. Application Qualifications

Applicants seeking admission in October 2019 (fall admission) must meet all of requirements (1) to (4) below.

- (1) Persons whose resident status is designated as “college student” under the Immigration Control and Refugee Recognition Act, or who are able to obtain this status at time of entry to the University (resident status will be “college student” upon entry into the University).
- (2) Persons who do not hold Japanese nationality.
- (3) Persons who have sufficient Japanese language ability to pursue academic studies.
- (4) Persons who meet one of the following conditions:
 - 1) Persons who have completed 16 years of academic education outside of Japan or will complete it by September 30, 2019.
 - 2) Persons who have completed 16 years of formal education in foreign countries by taking a correspondence course through a non-Japanese school while residing in Japan or will complete it by September 30, 2019.
 - 3) Persons who have completed or will have completed 15 years of academic education outside of Japan, and are recognized by the graduate school to have

received all the required credits with an excellent academic record.

- 4) Persons who have earned a degree from a program established by a foreign educational institution in Japan that has been designated by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) to be equivalent to an undergraduate program of a foreign university.
- 5) Persons recognized, based on individual screening, by the graduate school, as having an academic ability equal to or surpassing that of students who have graduated from a Japanese university, and who will be at least 22 years of age by September 30, 2019.

- Notes:
- i) Persons who do not hold Japanese nationality but who have graduated from a Japanese university (including persons expected to graduate in September 2019) are not eligible to apply as an international student.
 - ii) Prior eligibility screening of persons wishing to apply under Application Qualification 3) will be conducted. Please submit to the Application for Prior Screening form (included in these Guidelines), Certificate of (prospective) Graduation/Completion from Highest Educational Institution, and Academic Record Transcript or any other materials related to research which may serve as a reference during the screening process to the Admissions Office during the period from July 16 to no later than July 22, 2019. Applicants will be personally informed of results of screening by August 2, 2019.
 - iii) Application Qualification 5) includes persons who have graduated from a junior college or higher technical school, or who have completed programs at other educational institutions.
 - iv) Prior eligibility screening of persons wishing to apply under Application Qualification 5) will be conducted. Please submit to the Application for Prior Screening form (included in these Guidelines), Certificate of (prospective) Graduation/Completion from Highest Educational Institution, and Certificate of Employment or any other materials related to research or employment history which may serve as a reference during the screening process to the Admissions Office during the period from July 16 to no later than July 22, 2019. Applicants will be personally informed of results of screening by August 2, 2019.

Applicants seeking admission in April 2020 (spring admission) must meet all of requirements (1) to (4) below.

- (1) Persons whose resident status is designated as “college student” under the Immigration Control and Refugee Recognition Act, or who are able to obtain this status at time of entry to the University (resident status will be “college student” upon entry into the University).
- (2) Persons who do not hold Japanese nationality.
- (3) Persons who have sufficient Japanese language ability to pursue academic studies.
- (4) Persons who meet one of the following conditions:
 - 1) Persons who have completed 16 years of academic education outside of Japan or will complete it by March 31, 2020.
 - 2) Persons who have completed 16 years of formal education in foreign countries by taking a correspondence course through a non-Japanese school while residing in Japan or will complete it by March 31, 2020.
 - 3) Persons who have completed or will have complete 15 years of academic education outside of Japan, and are recognized by the graduate school to have received all the required credits with an excellent academic record.
 - 4) Persons who have earned a degree from a program established by a foreign educational institution established in Japan that has been designated by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) to be equivalent to an undergraduate program of a foreign university.
 - 5) Persons recognized, based on individual screening, by the graduate school, as having an academic ability equal to or surpassing that of students who have graduated from a Japanese university, and who will be at least 22 years of age by March 31, 2020.

- Notes: i) Persons who do not hold Japanese nationality but who have graduated from a Japanese university (including persons expected to graduate in March 2020) are not eligible to apply as an international student.
- ii) Prior eligibility screening of persons wishing to apply under Application Qualification 3) will be conducted. Please submit to the Application for Prior Screening form (included in these Guidelines), Certificate of (prospective) Graduation/Completion from Highest Educational Institution, and Academic

Record Transcript or any other materials related to research which may serve as a reference during the screening process to the Admissions Office during the period from July 16 to no later than July 22, 2019. Applicants will be personally informed of results of screening by August 2, 2019.

- iii) Application Qualification 5) includes persons who have graduated from a junior college or higher technical school, or who have completed programs at other educational institutions.
- iv) Prior eligibility screening of persons wishing to apply under Application Qualification 5) will be conducted. Please submit to the Application for Prior Screening form (included in these Guidelines), Certificate of (prospective) Graduation/Completion from Highest Educational Institution, and Certificate of Employment or any other materials related to research or employment history which may serve as a reference during the screening process to the Admissions Office during the period from July 16 to no later than July 22, 2019. Applicants will be personally informed of results of screening by August 2, 2019.

3. Application Period and Mailing Address

(1) Application Period:

From August 5, 2019 to no later than August 9, 2019.

Note 1) If brought in person or by proxy, application documents will be accepted at the Admissions Office between 9:00 a.m. and 4:00 p.m., except on Saturdays, Sundays, and national holidays.

Note 2) If mailed, application documents must be sent by **registered mail** and **“Application to Master’s Course, Special Entrance Examination for International Students, Graduate School of Engineering Science”** written in red on the front side of the envelope. The documents must reach the Admissions Office no later than 4:00 p.m. on August 9, 2019. Special care should be taken to allow sufficient time for international delivery.

(2) Mailing address:

Admissions Office
Akita University
1-1, Tegata Gakuen-machi
Akita-shi 010-8502 Japan
Tel: +81-18-889-2313

4. Application Procedures

(1) Documents to be submitted

Documents for Submission	Points to Note
Application for Admission Examination Admission Slip Photo ID card	Complete the required fields on the designated Application for Admission form (included in these Guidelines). A frontal-view photograph of the applicant's face, without a hat, 4.5 cm x 3.5 cm in size and taken within three months prior to this application must be pasted in the designated area.
Certificate of Graduation or Prospective Graduation	Must be prepared by the president of the school or the dean of the faculty attended.
Academic Record Transcript	Must be prepared by the president of the school or the dean of the faculty attended and sealed in an envelope.
Evaluation Fee Payment (Proof of Evaluation Fee Payment Form)	There is an evaluation fee of 30,000 yen. The name of the applicant and other required information must be entered on the money transfer form provided by the university. The fee should be transferred via Japan Post Bank or Post Office window on or after July 19, 2019, prior to application in principle (any cost for the transfer is to be paid by the applicant). Please do not use an ATM to transfer the fee. "Proof of Postal Money Transfer" received at the time of the transfer must be pasted on the Proof of Evaluation Fee Payment Form. Please write name, the department (major) you are applying to, etc. on the form. Once application procedures are fully completed, the evaluation fee will not be returned for any reason. However, if the application is not made after the fee has been paid, a refund will be made. To receive the refund, you should contact the Bursar Section of the Accounting Division (Tel: +81-18-889-2234) between August 19 and August 23, 2019.
Return Envelope for Sending Examination Admission Slip, etc.	Write Contact Address (address, name, postal code) on the envelope enclosed with these guidelines, and affix 362 yen in postage stamps.
Other	Please submit either a certificate of residence (<i>Juminhyo</i>) indicating your resident status, issued by the mayor of your residing municipality, or a copy of your passport.

Label Slip	Please fill in your details on the designated Label Slip (included in these Guidelines).
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Note: Applicants who are permitted to apply on the basis of the requirements (3) of the Application Qualifications are exempt from submitting a graduation or completion certificate and Academic Record Transcripts.

Note: Applicants who are permitted to apply on the basis of the requirements (5) of the Application Qualifications are exempt from submitting a graduation or completion certificate, but must submit sealed Academic Record Transcripts issued by the most recent school attended.

(2) Important notices for submitting documents

- i) Applications will not be accepted unless all documents mentioned above are fully and accurately completed. Please ensure all required documents are in order.
- ii) Once submitted, documents will not be returned to applicants for any reason.
- iii) Applicants are not allowed to change departments or courses after submission of application.
- iv) If the Contact Address entered in the application form changes after submission, the Admissions Office must be promptly notified of such change.
- v) When preparing the designated forms, a word processing software may be used.

5. Evaluation of Applicants

(1) Screening for admission will be determined by the combined results of an academic ability test (interview) and a document review.

(2) Date of examination: August 28, 2019

(3) Place of examination:

Graduate School of Engineering Science, Akita University
1-1, Tegata Gakuen-machi Akita-shi 010-8502 Japan

We will send you an examination admission slip notifying you of the place and time of your interview.

If you have not received your examination admission slip by August 23, please contact the Admissions Office immediately.

6. Academic Ability Test (Interview)

2019 October (Fall) Admission

Date, etc.		August 28, 2019
Major/Course (Field)		Academic Ability Test (Interview)
Life Science	Life Science Course	Interview (includes oral examination and Japanese conversational proficiency test)
Materials Science	Applied Chemistry Course	Interview (includes oral examination and Japanese conversational proficiency test)
	Materials Science and Engineering Course	Interview (includes oral examination and Japanese conversational proficiency test)
Mathematical Science and Electrical-Electronic-Computer Engineering	Mathematical Science Course	Interview (includes oral examination testing fundamental and specialist knowledge of mathematical science)
	Electrical and Electronic Engineering Course	Interview (includes oral examination and Japanese conversational proficiency test)
	Human-Centered Computing Course	Interview (includes oral examination testing English ability, fundamental and specialist knowledge of computing)
Systems Design Engineering	Mechanical Engineering Course	Interview (includes oral examination and Japanese conversational proficiency test)

Systems Design Engineering	Creative Engineering Course	Interview (includes oral examination and Japanese conversational proficiency test)
	Civil and Environmental Engineering Course	Interview (oral examination testing specialized foundation knowledge)
Cooperative Major in Life Cycle Design Engineering	(Materials Science and Engineering)	Interview (includes oral examination and Japanese conversational proficiency test)
	(Mathematical Science)	Interview (includes oral examination testing fundamental and specialist knowledge of mathematical science)
	(Electrical and Electronic Engineering)	Interview (includes oral examination and Japanese conversational proficiency test)
	(Human-Centered Computing)	Interview (includes oral examination testing English ability and fundamental and specialist knowledge of computing)
	(Mechanical Engineering)	Interview (includes test of Japanese conversational proficiency and fundamental and specialist knowledge)
	(Creative Engineering)	Interview (includes oral examination and Japanese conversational proficiency test)

2020 April (Spring) Admission

Date, etc.		August 28, 2019
Major/Course (Field)		Academic Ability Test (Interview)
Life Science	Life Science Course	Interview (includes oral examination and Japanese conversational proficiency test)
Materials Science	Applied Chemistry Course	Interview (includes oral examination and Japanese conversational proficiency test)
	Materials Science and Engineering Course	Interview (includes oral examination and Japanese conversational proficiency test)
Mathematical Science and Electrical-Electronic-Computer Engineering	Mathematical Science Course	Interview (includes oral examination testing fundamental and specialist knowledge of mathematical science)
	Electrical and Electronic Engineering Course	Interview (includes oral examination and Japanese conversational proficiency test)
	Human-Centered Computing Course	Interview (includes oral examination testing English ability, fundamental and specialist knowledge of computing)
Systems Design Engineering	Mechanical Engineering Course	Interview (includes oral examination and Japanese conversational proficiency test)

Systems Design Engineering	Civil and Environmental Engineering Course	Interview (oral examination testing specialized foundation knowledge)
Cooperative Major in Life Cycle Design Engineering	(Materials Science and Engineering)	Interview (includes oral examination and Japanese conversational proficiency test)
	(Mathematical Science)	Interview (includes oral examination testing fundamental and specialist knowledge of mathematical science)
	(Electrical and Electronic Engineering)	Interview (includes oral examination and Japanese conversational proficiency test)
	(Human-Centered Computing)	Interview (includes oral examination testing English ability and fundamental and specialist knowledge of computing)
	(Mechanical Engineering)	Interview (includes test of Japanese conversational proficiency and fundamental and specialist knowledge)

7. Prior Consultation for Applicants with Disabilities

Applicants with physical or mental disabilities such as health issues, injury, or developmental disabilities who may require special consideration during either the application process or the course of study itself should contact the Admissions Office no later than July 22, 2019 before application, submitting the designated form with all required fields completed together with a medical certificate prepared by a doctor. If special consideration is required during the examination process, for example if the

applicant makes use on an everyday basis of a hearing aid, crutches, wheelchair, or similar device, or if such needs arise following application due to accident or other contingency, please contact the Admissions Office immediately.

Depending on the severity of the disability, special arrangements may be required in advance. If you are unsure whether to apply to Akita University given your condition, please contact the Admissions Office. Please inform the Admissions Office if special arrangements are no longer required due to selection of an alternate institution or other reason.

Please note that details of prior consultation will in no way influence judgment when determining acceptance to the graduate school.

Contact: Admissions Office, Akita University

Tel: +81-18-889-2313

E-mail: nyushi@jim-u.ac.jp

8. Acceptance Notification

Results are tentatively scheduled to be posted on the notice board in front of the entrance to the No. 1 Building of the Faculty of Engineering Science at **4:00 p.m. on September 13, 2019**. Additionally, a Letter of Acceptance will be sent to successful applicants.

Please note that we are unable to respond to telephone inquiries.

9. Admission Procedures

Students admitted in October 2019 (fall admission)

Since we will mail enrollment documents to successful applicants, please pay the entrance fee during the entrance procedure below and submit the application procedure documents.

(1) Admission Procedure Period

September 17 (Tuesday) - September 24 (Tuesday) of 2019 (must arrive)

(2) School Fees

i) Admission fee: 282,000 yen (subject to change)

ii) Tuition: 267,900 yen for the second semester (535,800 yen for the full academic year) (subject to change)

Note 1) Admission fee paid will be not refunded for any reason.

Note 2) The above school fees are projected amounts and are subject to change before or during the course of study. Revised admission fee will apply to all new students if the revision takes place before the end of the Admission Procedure Period. If the tuition is revised at the time of admission or during the course of study, the new tuition takes effect at the time of revision.

Note 3) If a candidate cancels his/her admission before September 30, 2019 after completion of the Admission Procedures due to unavoidable circumstances, the tuition paid will be refunded upon request only after designated procedures are completed.

(3) Other information

- 1) Those with an excellent academic standing yet who have difficulty paying the admission fee due to financial circumstances and those who demonstrate other financial needs may be eligible upon screening to apply for financial aid. Those accepted will be either exempt from paying all or half of the admission fee, or may be allowed to pay the fee at a later date.
- 2) Those with an excellent academic standing yet who have difficulty paying the tuition due to financial circumstances and those who demonstrate other financial needs may be eligible upon screening to apply for financial aid. Those accepted will be either exempt from paying all, half or a third of the tuition, or may be allowed to pay the fee at a later date.
- 3) If the applicant is employed as a teaching assistant (TA), a stipend will be paid.

Students admitted in April 2020 (spring admission)

Since we will mail enrollment documents to successful applicants, please pay the entrance fee during the entrance procedure below and submit the application procedure documents. Regarding payment of tuition fees, we will notify you again in late February 2020.

(1) Admission Procedure Period

September 17 (Tuesday) - September 30 (Monday), 2019 (must arrive)

(2) School Fees

- i) Admission fee: 282,000 yen (subject to change)
- ii) Tuition: 267,900 yen for the first semester (535,800 yen for the full academic year)
(subject to change)

Note 1) Admission fee paid will be not refunded for any reason.

Note 2) The above school fees are projected amounts and are subject to change before or during the course of study. Revised admission fee will apply to all new students if the revision takes place before the end of the Admission Procedure Period. If the tuition is revised at the time of admission or during the course of study, the new tuition takes effect at the time of revision.

Note 3) If a candidate cancels his/her admission before March 31, 2020 after completion of the Admission Procedures due to unavoidable circumstances, the tuition paid will be refunded upon request only after designated procedures are completed.

(3) Other information

1) Those with an excellent academic standing yet who have difficulty paying the admission fee due to financial circumstances and those who demonstrate other financial needs may be eligible upon screening to apply for financial aid. Those accepted will be either exempt from paying all or half of the admission fee, or may be allowed to pay the fee at a later date.

2) Those with an excellent academic standing yet who have difficulty paying the tuition due to financial circumstances and those who demonstrate other financial needs may be eligible upon screening to apply for financial aid. Those accepted will be either exempt from paying all, half or a third of the tuition, or may be allowed to pay the fee at a later date.

3) If the applicant is employed as a teaching assistant (TA), a stipend will be paid.

10. Other Matters

(1) Please be sure to bring your examination admission slip with you on the day of examination

(2) Please direct any inquiries related to the admission process to:

Admissions Office, Akita University

1-1, Tegata Gakuen-machi

Akita-shi 010-8502 Japan

Tel: +81-18-889-2313

(3) Japanese will be the main language used in the courses.

Graduate School Outline

1. Organization

The Graduate School of Engineering Science consists of a two-year Master's Degree Program and a three-year Doctor's Degree Program.

The Master's Degree Program consists of 5 departments (9 courses), the Doctor's Degree Program consists of 1 department (4 fields). The 4 departments in the Master's Degree Program are related to the 4 departments in the undergraduate program.

[Master's Degree Program]

Department (Major)	Course
Life Science	Life Science
Materials Science	Applied Chemistry
	Materials Science and Engineering
Mathematical Science and Electrical-Electronic-Computer Engineering	Mathematical Science
	Electrical and Electronic Engineering
	Human-Centered Computing
Systems Design Engineering	Mechanical Engineering
	Creative Engineering
	Civil and Environmental Engineering
Cooperative Major in Life Cycle Design Engineering	

Mechanical Engineering Course and Creative Engineering Course will be integrated in April 2020, and Systems Design Engineering Department will be two courses of Mechanical Engineering Course and Civil and Environmental Engineering Course.

[Doctor's Degree Program]

Department	Field
Integrated Engineering Science	Life Science
	Materials Science
	Mathematical Science and Electrical-Electronic-Computer Engineering
	Systems Design Engineering

2. Admission Policy for Majors

《Department of Life Science》

The department seeks applicants with a keen interest in life sciences and a determination to help solve the medical, food, and environmental issues required to achieve a sustainable society, and those with the desire to acquire a broad specialist knowledge and outstanding research capabilities in the life science field and thereby conduct research and development that will contribute to the solving of critical issues in the life science field.

A strong sense of ethics and responsibility and the desire to find and implement solutions to regional or international problems, either individually or as part of a group, are also required.

1) Life Science Course

Applicants considered include persons with a keen interest in scientific fields related to life sciences and the various fields of biological science, and a desire to utilize their high level of knowledge of life sciences, intellectual capacity, and research capability in occupational fields in future. Applicants should be both locally- and internationally-minded, observe ethical principles as an engineer and researcher, and possess a desire to improve their practical and communication skills.

《Department of Materials Science》

In line with its mission of fostering scientists with a sound understanding of material design from the molecular/atomic level as well as production techniques, and the capability to conduct research and development in order to generate new functional materials and new chemical processes, the department seeks applicants with the following attributes:

1) Applied Chemistry Course

Applicants considered include persons with a desire to pursue academic study and research into fields such as the development, recycling, and regeneration of new functional materials, effective use of chemical energy sources, and utilization of biological functions, and who aim to become researchers or engineers with the ability to conduct environmentally friendly manufacturing and to develop new technologies, as well as those seeking to hone their practical problem-solving ability in order to advance regional and international society. Applicants should also have a fundamental understanding of physics and chemistry.

2) Materials Science and Engineering Course

Applicants considered include persons with a desire to pursue academic study and research of the functional materials that support the earth's environment and the foundations of society, such as metals, semiconductors, and ceramics, and those who hold the aim of becoming researchers or engineers capable of pursuing advanced technical development in these materials.

《Department of Mathematical Science and Electrical-Electronic-Computer Engineering》

The department seeks applicants with a desire to contribute to the advancement of basic industries, find solutions to energy problems, and achieve harmony between humans and computers by identifying new problems in a range of societal fields and proactively using their acquired specialist knowledge and skills to solve them, as well as persons who aspire to attain specialized knowledge, skills, and insight in mathematics, theoretical physics, and computer science.

In addition, prospective students should possess a desire to acquire the skills for dealing with unanticipated problems by fulfilling their responsibilities and exercising leadership based on recognition of the importance of teamwork.

1) Mathematical Science Course

Applicants considered for this course include persons who possess an understanding of the fundamentals of mathematical science and have a desire to proactively acquire knowledge and skills in advanced specialist fields, those who have an interest in mathematical science and would like to study a certain topic related to the field, and those who aim to use specialist knowledge and skills related to mathematical science to contribute to society.

2) Electrical and Electronic Engineering Course

Applicants should have a desire to attain specialist knowledge in advanced technologies, including electrical energy, photonic and electronic devices, electronics, information communications, and systems control, and aspire to contribute to society as a future researcher or engineer by solving global problems or generating new findings and technologies.

3) Human-Centered Computing Course

Applicants considered include persons with a desire to generate new technologies and value to support an aging society through the realization of harmony between humans and computers, those with a desire to utilize ICT to solve regional societal issues such as healthcare, welfare, the environment, and disaster prevention and mitigation. A desire to develop the cross-cultural understanding and language ability necessary to play a leading role in global society and solve social issues with high ethical standards are also attributes that will be considered.

《Department of Systems Design Engineering》

2019 October (Fall) Admission

The Department of Systems Design Engineering seeks applicants aiming to become researchers and engineers equipped with specialized knowledge in the fields of mechanical engineering, space engineering, and civil and environmental engineering, as well as knowledge across the fields of system design, and who are able to actively contribute to manufacturing based on their understanding of the needs of regional and international society. Graduates will be expected to acquire knowledge and approaches to fields such as manufacturing in order to achieve a sustainable society, creative manufacturing, construction and maintenance of urban and regional infrastructure with a focus on environmental protection and disaster mitigation, as well as the ability to communicate this information to the world.

1) Mechanical Engineering Course

Applicants considered include persons with a desire to further their specialist knowledge in control engineering and the four kinds of dynamics that form the basics of mechanical engineering, possess problem-identification and problem-solving ability essential for technological innovation as well as the communication skills required of an engineer, and who will be able to contribute from a global perspective to the formation of a sustainable society through the realization of harmony between humans, the environment, and machines.

2) Creative Engineering Course

Applicants considered include persons with a desire to acquire a high level of fundamental knowledge and to proactively engage in research in such areas as mechanical engineering, space engineering, control engineering, and thermofluid engineering, those wishing to acquire fundamental skills in project management with

a view to playing a leadership role in future project implementation, and those with a desire to engage in creative manufacturing from a global perspective.

3) Civil and Environmental Engineering Course

Applicants considered include persons with a desire to acquire specialized knowledge in such areas as structural engineering, hydraulic engineering, geotechnics, urban and traffic engineering, and concrete engineering, and to identify and solve problems in cooperation with others, as well as those possessing a willingness to tackle the challenge of forming the infrastructure for a sustainable society with a strong sense of purpose by applying appropriate technologies based on a sound understanding of regional characteristics and conditions, both within Japan and overseas.

2020 April (Spring) Admission

The Department of Systems Design Engineering seeks applicants aiming to become researchers and engineers equipped with specialized knowledge in the fields of mechanical engineering, and civil and environmental engineering, as well as knowledge across the fields of system design, and who are able to actively contribute to manufacturing based on their understanding of the needs of regional and international society. Graduates will be expected to acquire knowledge and approaches to fields such as manufacturing in order to achieve a sustainable society, creative manufacturing, construction and maintenance of urban and regional infrastructure with a focus on environmental protection and disaster mitigation, as well as the ability to communicate this information to the world.

1) Mechanical Engineering Course

Basic mechanical engineering consists of four kinds of dynamics-material, thermal, fluid, and mechanical-plus control engineering. Those who have sufficient knowledge of basic mechanical engineering, capability of project management, communication skills as an engineer, and eagerness and capability to contribute on establishment of sustainable society are welcomed.

2) Civil and Environmental Engineering Course

Applicants considered include persons with a desire to acquire specialized knowledge in such areas as structural engineering, hydraulic engineering, geotechnics, urban and traffic engineering, and concrete engineering, and to identify and solve problems in cooperation with others, as well as those possessing a willingness to tackle

the challenge of forming the infrastructure for a sustainable society with a strong sense of purpose by applying appropriate technologies based on a sound understanding of regional characteristics and conditions, both within Japan and overseas.

《Cooperative Major in Life Cycle Design Engineering》

Applicants considered include persons with a desire to actively engage in study and research related to areas such as the formation of a material-cycle society, and the revitalization of local communities in environmentally conscious ways, as well as those with an interest in and desire to learn about a broad range of engineering fields in order to achieve flexible responses to a range of issues in an interdisciplinary area. Applicants should possess a strong sense of ethics and be able to approach problem-solving from an international perspective.

3. Master's Degree Program Department Outline (as of April 2019)

《Department of Life Science》

The results of research in the life sciences have led to breakthroughs that brought about many new advances in science and technology, as these fields can be seen as carving out the future of human society. This department therefore seeks to develop scientists able to unravel the elaborate workings of life phenomena; human resources who will play core and leading roles in their future professions taking advantage of their high level of knowledge, insight, and research skills in life science; and human resources who, with their grounding in science, will lead research and development in crossdisciplinary and academic fields related to medicine, pharmacology, engineering, agriculture, and other areas, and be active in many different fields related to life science including medicine, pharmaceuticals, food production, and development of bioenergy resources.

1) Life Science Course

This course consists of the Biomolecular Chemistry field, covering areas including structural biology, protein chemistry, analytical chemistry, supramolecular chemistry, organic chemistry, electrochemistry, and computational chemistry, and the Molecular Cell Biology field covering areas such as biochemistry, molecular biology, cell biology, and disease biology. In addition to helping students systematically acquire fundamental knowledge in both fields, the course fosters engineers and scientists capable of independently pursuing research and development based on a high level of specialized expertise.

Course	Life Science		
Field of Instruction and Research	Quality	Faculty Member	Instruction Subject
Chemistry and Chemical Biology	Structural and functional analyses of industrially and/or medically important proteins; Total synthesis of biologically active natural products; Development of nanotechnology oriented bioelectrochemical devices; Exploiting sensing techniques for biomolecules and biological calls.	Prof. Masafumi Odaka	Advanced Biological Inorganic Chemistry
		Associate Prof. Yoshiaki Amatatsu	Advanced Theoretical Life Science I, II
		Prof. Kenshu Fujiwara	Synthetic Medicinal Chemistry I, II
		Associate Prof. Uichi Akiba	Advanced Bio-Electronic Chemistry I, II
		Lecturer Hirotohi Matsumura	Advanced Analytical Spectroscopy I, II
		Associate Prof. Yoshihiko Kondo	Advanced Structural Organic Chemistry I, II
Molecular Cell Biology	Characterization of Disease Oriented Genes and Proteins, and Study of Physiological Functions of Molecular Chaperones in Protein Folding; Studies on immune responses and molecular physiology in the immune cells.	Prof. Hiroshi Kubota	Frontier in Cell Biology
		Prof. Masaki Hikida	Molecular Cell Physiology
		Prof. Hideki Wakui	Advanced Biology of Disease

《Department of Materials Science》

Today, as energy problems, environmental degradation, resource depletion, and other global issues become increasingly severe, demands are heightening for technology development toward the promotion of green innovation and highly efficient infrastructure systems. The role to be played by materials science, based on applied chemistry and on materials science and engineering, is becoming more important than ever before. Responding to these needs of society, it is essential that we bring together scientific knowledge across the basic fields of physics, chemistry, and mathematics, pursuing the limits of the potential in materials while aiming to create new materials and functions. This department develops engineers, scientists, and educators equipped with a strong sense of ethics, who are able to deal with various issues relating to materials science facing modern society. The department consists of the Applied Chemistry Course and the Materials Science and Engineering Course, playing a closely interrelated role in the education and research of the Graduate School.

1) Applied Chemistry Course

With chemistry-related knowledge as a foundation, the necessary curriculum is provided for linking material design and synthesis from the atomic and molecular level to creation of original materials. Human resources are fostered who can exercise agility in creating environmentally harmonious materials, such as through the development of new functional materials, effective use of chemical energy in recycling and regeneration, and advanced use of biological functions, and in conducting research and development on leading-edge technologies.

2) Materials Science and Engineering Course

Based on materials science and materials engineering, the necessary curriculum is provided for gaining practical experience in creating new materials and new functions, with the main focus on metals, semiconductors, and ceramics. In this way, human resources are fostered who are able to clarify the expression mechanisms of material properties based on simulations and on organizational and structural analysis from the nanoscale to the macro scale, and to contribute to developing technologies for producing and manufacturing next-generation functional materials in harmony with human society.

Course	Applied Chemistry		
Field of Instruction and Research	Quality	Faculty Member	Instruction Subject
Chemistry of Organic Materials	Synthesis and Properties of Organic Functional Materials	Prof. Mitsutoshi Jikei	Advanced Molecular Science and Technology
		Associate Prof. Kazuya Matsumoto	Functional Polymer Chemistry I, II
Applied Physical Chemistry	Design and Application of Environmental Advanced Materials from the Viewpoint of Physical Chemistry	Prof. Kenji Murakami	Advanced Surface Chemistry I, II
Inorganic Materials Chemistry	Synthesis and Characterization of Inorganic Advanced Materials such as Porous Material, Catalytic Materials and Ceramics	Prof. Sumio Kato	Advanced Inorganic Materials Chemistry
		Lecturer Masataka Ogasawara	Advanced Characterization of Inorganic Materials
Functional Surface Chemistry	Surface Processes for Environments and for a Production of Value-added Materials with Specific Functions	Prof. Takayoshi Shindo	Advanced Organic Resources Chemistry I, II
		Lecturer Yukihiro Inoue	Chemistry of Polymer Functionalities
Applied Analytical Chemistry	Solution, Spectrum and Nuclear Chemistry for Analytical Chemistry and Its Application for Environmental Science	Prof. Yoshihiro Iwata (Faculty of Education and Human Studies)	Advanced Analytical Chemistry I, II
Organometallic Chemistry	Development of Transition Metal Complex Catalysts Utilized for Organic Syntheses and Bio-inspired Methods of Molecular Transformation	Associate Prof. Hidetake Seino (Faculty of Education and Human Studies)	Advanced Organometallic Chemistry
Chemical reaction Engineering	Design, Optimization, Prediction and Sophistication of Chemical Processes by Means of Advanced Numerical Analysis Based on a Methodology of Systematic Fusion of Chemical Reaction Engineering, Transport Phenomena and Chemical Thermodynamics		Advanced Transport Phenomena I, II
Chemical Engineering	Design and Development of Chemical Processes	Associate Prof. Hiroshi Takahashi	Process Design Engineering
Energy Chemical Engineering	Process Design of Heterogeneous Reaction for Efficient Utilization of Energy and Resources	Prof. Katsuyasu Sugawara ②	Advanced Energy Chemical Engineering I, II
		Associate Prof. Hirokazu Okawa	Advanced Electrochemistry
		Lecturer Takahiro Kato	Energy Chemical Engineering I, II
Bioprocess Engineering	Bioprocess design and development by integrating biological and biochemical technologies, and creation and application of new functional biomaterials	Prof. Takeshi Gotoh	Nanobiotechnology
Supramolecular and Material Chemistry	Education and research for design of macrocyclic and acyclic compounds having molecular recognition capability and its functionality of molecular assembly	Lecturer Manabu Yamada	Molecular Recognition Chemistry

② This professor will retire by the mandatory retirement regulation in March 2021.

Course	Materials Science and Engineering		
Field of Instruction and Research	Quality	Faculty Member	Instruction Subject
Physical Properties of Materials	Research and Education on the Structural Analysis of Materials and the Development of Structural and Functional Materials by Microstructure Control	Prof. Kaichi Saito	Diffraction Physics I, II
Photoscience of Solids	Optical Spectroscopy of Condensed Matter and Molecules	Prof. Nobuhiro Kodama ②①	Material Photoscience I, II
Computation of Materials	Research and Education of Materials Computation Based on Molecular Orbital Method and Molecular Dynamics Method	Associate Prof. Yoshiyuki Sato	Materials Computation for Molecules I, II
Ceramic Materials	Physical, Mechanical and Electrical Properties of Ceramics and Their Application to Energy Generation and Use	Associate Prof. Akihiro Nino	Physical and Mechanical Properties of Ceramics Materials I, II
Energy Chemistry of Materials	Research and Education on the Development of Functional Chemical Materials for Energy Transformation/Storage and Industrial Electrolytic Processing	Prof. Masami Taguchi ②①	Advanced Energy Chemistry of Materials I, II
Surface and Interface Engineering	Processing and Evaluation for Appearance of Chemical Function at Surface and Interface of Materials	Prof. Motoi Hara ②①	Surface and Interface Engineering I, II
Mechanics of Materials	Evaluation of Structure and Mechanical Properties and Material Design for Plastic Base, Metal Base and Ceramic Base Composites	Prof. Ken-ichi Ohguchi	Mechanics of Composite Materials I, II
Fabrication Engineering of Inorganic Materials	Fabrication Processes, Microstructural Control and Evaluation of Inorganic Materials via Powder Processes	Prof. Shigeo Hayashi	Design of Inorganic Materials I, II
Physical Properties of Solids	Research and Education on the Atomic Structure and Physical Properties of Metals and Alloys	Lecturer Yeong-Gi So	Physical properties of Solid I, II
Microstructure Design of Materials	Education and Research on Numerical Simulation for Structure Formation	Associate Prof. Yukinobu Natsume	Microstructure Design of Materials I, II
Surface Modification	Modifying Process for the Functional Surface of Materials	Associate Prof. Michihisa Fukumoto	Surface Modification I, II
Thin Film Materials	Fabrication and Evaluation of Thin Film Materials for Electronic Device Application	Prof. Satoru Yoshimura	Physical Properties of Thin Film Materials
Molecular Electronics	Education for Understanding into the Basic Concepts Involved in the Field of Molecular Electronics, and Research on Phenomenon Concerning about Electron and Photon in Molecular Structure and Their Assembly, by Understanding of the Electrical Conduction in Single-Molecule Circuits, and by Introducing to the Experimental Techniques and Theoretical Concepts.	Lecturer Yutaka Tsujiuchi	Molecular Electronics I, II
Magnetic Materials	Development of Nano Magnetic Materials and Thin Films	Lecturer Takashi Hasegawa	Applied Magnetics I, II
Material Science with Quantum Beams	Research and Education on the Development of Phosphor Materials for Radiation Measurements	Specially-Appointed Lecturer Naoki Kawano	Material Science with Quantum Beams I, II
Electrochemistry of Materials	Education and Research on the Electrode Materials in Electrochemical System	Lecturer Hiroki Takahashi	Materials for Electrochemistry I, II
Foundry Engineering	Education and Research on Fusion and Solidification Processing for Highly Functional Materials	Lecturer Ikuzo Goto	Fusion and Solidification Processing I, II

②① These professors will retire by the mandatory retirement regulation in March 2020.

② This professor will retire by the mandatory retirement regulation in March 2021.

《Department of Mathematical Science and Electrical-Electronic-Computer Engineering》

The human resources to be developed in this department include those who will contribute to the advance of basic industries, solutions to energy problems, and harmony between humans and computers, driving revolutions in technology development, as well as educators and others equipped with highly specialized knowledge, skills, and insight in mathematics, theoretical physics, and computer science, and with advanced knowledge in the field of mathematical science.

Also to be fostered are human resources able to develop technologies for solving regional issues faced by Akita Prefecture with its advanced state of aging, and to communicate these to the world. In addition, they will acquire the skills for exercising leadership based on recognition of the importance of teamwork, and for dealing with unanticipated problems. That is, human resources will be fostered who, with their overview of the enormous specialized knowledge in the fields of mathematical science, electrical and electronic engineering, and computer engineering, are able to create new technologies and value for a highly aging society.

1) Mathematical Science Course

Education and research are carried out concerning advanced mathematical concepts and structures, and for clarifying and investigating the mathematical structures of physical and other phenomena. In this course whose main features include a focus on a systematic curriculum and qualifying examinations, students study advanced mathematics and related areas in order to acquire the ability to solve problems by logical thinking and from a mathematical science perspective.

2) Electrical and Electronic Engineering Course

Along with studies for systematically understanding knowledge in a wide range of specialized fields including electrical energy and equipment, electronics, photonic and electronic devices, and information communications and systems control, students engage in research for creating new applications and technologies by focusing on a particular field or integrating these fields. Through this experience, human resources are developed with creative thinking and flexible application skills.

3) Human-Centered Computing Course

The Human-Centered Computing Course develops human resources who, majoring in computer engineering, are equipped with creative thinking and flexible application skills enabling (i) the use of information and communication technologies (ICT) for supporting healthy longevity and home healthcare of the elderly in regional society, (ii) advancement of technologies and development of application systems related to environmental monitoring, disaster prevention and mitigation, and human sensing, and (iii) use of information networks, ICT, and other tools for realizing a safe and secure society.

Course	Mathematical Science		
Field of Instruction and Research	Quality	Faculty Member	Instruction Subject
Discrete Mathematics	Algebra, Discrete Mathematics, Foundations of Computer Science and their Applications	Prof. Akihiro Yamamura	Advanced Algebra I, II, V, VI
		Lecturer Szilard Fazekas	Advanced Discrete Mathematics I, II
Continuous Mathematics	Analysis, Geometry, Topology and their Applications	Prof. Hajime Kawakami	Advanced Analysis I, II, IV, VI
		Associate Prof. Mahito Kobayashi	Advanced Geometry I, II Advanced Topology III, IV
		Lecturer Yasuharu Nakae	Advanced Topology I, II
Theoretical Physics	Fundamental Theories for Phase Transition and Transport Phenomena in Quantum Many-Body Systems such as Electron Systems in Solids and Quark-Gluon Systems, and their Applications to Novel Phenomena.	Prof. Masaru Onoda	Quantum Many-Body Theory I, II
		Associate Prof. Yasunari Tanuma	Condensed Matter Physics III, IV
		Lecturer Tatsuhiko Misumi	Quantum Many-Body Theory III, IV
High-temperature physical properties of matter	Experimental and theoretical studies on high-temperature properties of molten oxides and applications to design and production process of environmentally friendly amorphous materials	Associate Prof. Toru Sugawara (Cooperative Major in LifeCycle Design Engineering)	High-temperature physical properties of matter

Course	Electrical and Electronic Engineering		
Field of Instruction and Research	Quality	Faculty Member	Instruction Subject
Electric Energy Engineering	Studies on analysis and design of generation, storage, transportation and usage of electrical energy, and materials relating to these.	Prof. Seiji Kumagai	Advanced Materials for Electrical Engineering I, II
		Associate Prof. Mahmudul Kabir	Bio Electromagnetic Engineering I, II
Photonic and Electronic Device Engineering	Studies on physical properties of materials, relating to photonic and electronic devices, such as liquid crystals/semiconductors and design and development of the devices.		Advanced Electron Device Engineering
		Prof. Toru Kurabayashi	Advanced Electromagnetic-Wave Engineering I, II
		Prof. Hitoshi Saito	Advanced Electronic Materials I, II
		Prof. Rumiko Yamaguchi (Cooperative Major in LifeCycle Design Engineering)	Electronic Display Engineering I, II
		Associate Prof. Yuichi Sato	Advanced Semiconductor Device I, II
		Associate Prof. Marenori Kawamura	Optical Device Engineering I, II
		Lecturer Shinichi Yodokawa	Advanced Ultra-High-Frequency Electronics I, II
Intelligent Information Communication Engineering	Studies on information communication system, signal processing and their application to medical care/welfare and measurement system.	Prof. Kazuhiko Imano ㉔	Advanced Electroacoustics I, II
		Prof. Hitoshi Obara ㉔	Digital Signal Processing Engineering I, II
		Associate Prof. Motoshi Tanaka	Advanced Communication Engineering I, II
		Lecturer Makoto Fukuda	Applied Piezoelectric Device Engineering I, II
		Specially-Appointed Lecturer Sho Muroga	Signal Processing for Instrumentation I, II
Control System Engineering	Studies on electrical machines, power electronics, control and design of various systems.	Prof. Katsubumi Tajima (Cooperative Major in LifeCycle Design Engineering)	Electromagnetic Energy Conversion Engineering
		Associate Prof. Takeshi Miura	Advanced Control System Engineering I, II
		Lecturer Yukihiro Yoshida	Advanced Electrical Machinery I, II

㉔ These professors will retire by the mandatory regulation in March 2021.

Course	Human-Centered Computing		
Field of Instruction and Research	Quality	Faculty Member	Instruction Subject
Biomedical and Welfare Engineering	Study on Applied Evaluation and Welfare Support Systems for Elder People, Disabilities by Virtual Reality Technology and Design of Computer and Software Systems.	Prof. Kazutaka Mitobe	Sensory Information Engineering I, II Virtual Reality I, II
		Lecturer Katsuya Fujiwara (Cooperative Major in LifeCycle Design Engineering)	Software System
		Lecturer Sawako Nakajima	Well-being Information Engineering with Spoken and Natural Language Processing I, II
Image Information System Engineering	Analysis and Algorithms of Remote Sensing Data, Image Information Applications and Security Systems	Prof. Yoichi Kageyama	Image Information I, II Remote Sensing
		Associate Prof. Chikako Ishizawa	Engineering I, II Security System I, II
Spatial Informatics	Modelling, Data Management, Analysis, Sharing, Simulation and Human-Centered Design for the Real World and Spatial Information Communication	Prof. Masatoshi Arikawa	Spatial Informatics I, II
Information Network Engineering	Technologies for Improving Performance, Functionalities and Resiliency for Internet and Broadband Communication Networks	Associate Prof. Masashi Hashimoto	Advanced Information Network Engineering I, II
Computer System Engineering	Study on Dependable Computer Systems and Design of Testable Logic Circuits	Associate Prof. Hiroshi Yokoyama (Center for Information Technology and Management)	Advanced Digital Logic Design I, II

《Department of Systems Design Engineering》

2019 October (Fall) Admission

In parallel with rapid advances in science and technology, society is facing problems such as global warming from CO₂ emissions and the need to develop renewable energy sources. Here the role of mechanical engineering is of growing importance, in such areas as improving the technologies needed to enhance the functionality of equipment. Meanwhile, in Japan there have been major advances in the aerospace field of rockets and satellites, and in technologies for recycling of waste materials, while the need for creative engineering capable of creating and nurturing new industries has grown. The aging of society has also created an urgent need for technology advances, not only in the health and welfare area but in creating civil engineering technologies in harmony with the environment and improving the functions of urban and regional systems to build and maintain better communities.

The Department of Systems Design Engineering, through education and research on the design and development of these complex and large-scale systems, aims to nurture researchers, developers, and engineers equipped with fundamental knowledge in the specialized fields of mechanical engineering, creative engineering, and civil and environmental engineering, as well as having knowledge across the fields of system design, and who, with their accurate awareness of regional needs, are able to contribute to local society and to the world. To meet these aims, education and research are carried out in tandem in the following three areas.

1) Mechanical Engineering Course

Basic to mechanical engineering are four kinds of dynamics—material, thermal, fluid, and mechanical—plus control engineering. Education and research in the field of mechanical engineering is intended to deepen the specialized knowledge learned in undergraduate studies and enable it to be applied, as well as to build problem-finding and -solving capabilities and communication skills, so as to contribute from a global perspective to formation of a sustainable society where people, the environment, and machines are in harmony.

2) Creative Engineering Course

Education and research are carried out centering on mechanical engineering, for acquiring a high level of specialized knowledge in such areas as space engineering, control engineering, and thermofluid engineering, while also aimed at developing human resources with project execution skills (project management, problem discovery and solution, communication, and engineering design skills, etc.) and the ability to play a leading role in creative manufacturing and project implementation so as to contribute broadly to society.

3) Civil and Environmental Engineering Course

Research and education are aimed at acquiring advanced specialized knowledge in such areas as structural engineering, hydraulic engineering, geotechnics, urban and traffic engineering, and concrete engineering, and on this foundation to build up individual knowledge and skills for applying these to problem solving, while also fostering communication skills for cooperative problem solving, in order to contribute to formation of safe, reliable, and convenient infrastructure for society.

Course	Mechanical Engineering		
Field of Instruction and Research	Quality	Faculty Member	Instruction Subject
Nano Mechanics	Generation and Evaluation on the Micro/Nano Materials, Solid Mechanics and Measurements for the Mechanical Design, and Analysis on the Surface Structure and its Application	Prof. Yotsugi Shibuya ②	Advanced Solid Mechanics
		Prof. Mikio Muraoka	Micro/Nano Materials
		Prof. Eiki Okuyama	Advanced Sensors Engineering
		Associate Prof. Yoshiyuki Yamamoto	Advanced Applied Electromagnetism
		Associate Prof. Yasuyuki Miyano	Advanced Industrial Technology and Science for System Engineering Design
		Associate Prof. Makoto Yamaguchi	Characterization of Subsurface Structure
		Lecturer Xu Zhao	Advanced Thin-film Material Engineering
			Advanced Course on Functional Surface Engineering
Thermal and Fluid Science	Ice Melting and Water Freezing, Theory and Application for Renewable Energy Convergence, and Basic Study for Rarefied Gas Dynamics and its Application	Prof. Masahide Nakamura ② (Cooperative Major in LifeCycle Design Engineering)	Transfer and Conversion of Heat and Fluid Dynamical Energy
		Prof. Makoto Tago	Advanced Natural Convection Heat Transfer I, II
			Unsteady Fluid Dynamics and Flow Control
		Associate Prof. Yoshimi Komatsu	Computational Thermodynamics and Fluid Dynamics
		Lecturer Wataru Sugiyama	Kinetic Theory of Molecular Gas
Human Mechatronics	Controller Design for Mechatronics Devices, Analysis of a Physical Movement Mechanism, and its Application to Medical and Welfare Engineering	Prof. Akihiro Naganawa	Advanced Control Engineering
		Prof. Takehiro Iwami	Biomedical Engineering
		Associate Prof. Yoshihiro Sasaki	Actuator Engineering I, II
		Lecturer Takeshi Seki	Design of Digital Control System

② These professors will retire by the mandatory regulation in March 2021.

Course	Creative Engineering		
Field of Instruction and Research	Quality	Faculty Member	Instruction Subject
Machine and Space Systems	Dynamic Analysis of Mechanical Systems and its Application to Mechanical Engineering and Sports		Advanced Vibration Engineering
	Theory and practical application of heat transfer and fluid flow, which is applicable to heat exchanger, energy conversion etc.	Prof. Takahiro Adachi	Heat Transfer Enhancement
	To introduce the concepts and mathematical tools required to understand advanced methods employed in current research and the applications for material transport/exchange across functional membranes such as the endothelial surface glycocalyx	Associate Prof. Takeshi Akinaga	Material Transport across Biomembranes
	Methodology of mathematical formulation and controller design of multibody systems consisting of rigid and flexible bodies	Lecturer Hiroshi Hirayama	Advanced course on vibration control
Creative Systems Design	Educations and studies on designs and evaluations covering life cycles of products, businesses and social systems	Prof. Nozomu Mishima (Cooperative Major in LifeCycle Design Engineering)	Lifecycle Design Basics
	Materials Science from Micro to Macro Aspects and Joining of Materials and Estimation of Strength and Fracture Toughness	Associate Prof. Mamoru Takahashi (Cooperative Major in LifeCycle Design Engineering)	Micro Processing
	Education and research on fabrication and visualization of electromagnetic characteristics of nano-structure of solid surface using AFM (Atomic Force Microscope)	Lecturer Yukinori Kinoshita	Measurement system engineering
	Education and research on design and analysis of sustainable energy systems	Lecturer Takaaki Furubayashi	Advanced Theory on Regional Energy Systems
	Education and study on development of measurement system theory		Advanced Engineering of Measurement System

Course	Civil and Environmental Engineering		
Field of Instruction and Research	Quality	Faculty Member	Instruction Subject
Structural Mechanics	Linear and Nonlinear Mechanics and Theory of Structural Design of Steel and Timber Structures	Prof. Humihiko Gotou Lecturer Ryu Noda	Advanced Structural Mechanics Timber Structural Engineering
Hydraulics and Hydraulics Engineering	Measurements and Numerical Modeling of Natural Disaster in rivers and coastal area	Associate Prof. Kazuya Watanabe	Coastal and river Engineering
Soil Mechanics and Geotechnical Engineering	Physicochemical and Mechanical Properties of Soft Soil	Associate Prof. Toshihiro Ogino	Advanced Soil Mechanics
Urban and Traffic Planning	Methods, and Analytical Techniques used in Traffic Engineering and Planning	Prof. Hidekatsu Hamaoka	Advanced Traffic Engineering
	Philosophy, Methods, and Analytical Techniques used in Urban and Traffic Planning with emphasis on the Logic and Assumption on which these are based	Associate Prof. Satoru Hino	Advanced Urban Planning
Concrete Engineering	Design of Construction Materials, Maintenance of Concrete Structures and Structural Analysis for Concrete Structures	Prof. Hidenobu Tokushige Associate Prof. Ryosuke Takahashi	Construction Material Design Advanced Structural Design

2020 April (Spring) Admission

In parallel with rapid advances in science and technology, society is facing problems such as global warming from CO2 emissions and the need to develop renewable energy sources. Here the role of mechanical engineering is of growing importance, in such areas as improving the technologies needed to enhance the functionality of equipment. Meanwhile, in Japan there have been major advances in the aerospace field, and in technologies for recycling of waste materials, while the need for creative engineering capable of creating and nurturing new industries has grown. The aging of society has also created an urgent need for technology advances, not only in the health and welfare area but in creating civil engineering technologies in harmony with the environment and improving the functions of urban and regional systems to build and maintain better communities.

The Department of Systems Design Engineering, through education and research on the design and development of these complex and large-scale systems, aims to nurture researchers, developers, and engineers equipped with fundamental knowledge in the specialized fields of mechanical engineering, creative mechanical engineering, and civil and environmental engineering, as well as having knowledge across the fields of system design, and who, with their accurate awareness of regional needs, are able to contribute to local society and to the world. To meet these aims, education and research are carried out in tandem in the following two areas.

1) Mechanical Engineering Course

Basis of mechanical engineering are four kinds of dynamics -material, thermal, fluid and mechanical-plus control engineering. Education and research in the field of mechanical engineering consists of basic mechanical engineering plus electro-mobility, medical engineering and sustainable mechanical engineering technologies and intend to foster students who can contribute in establishing sustainable society where human, environment and machines are in good harmony.

2) Civil and Environmental Engineering Course

Research and education are aimed at acquiring advanced specialized knowledge in such areas as structural engineering, hydraulic engineering, geotechnics, urban and traffic engineering, and concrete engineering, and on this foundation to build up individual knowledge and skills for applying these to problem solving, while also fostering communication skills for cooperative problem solving, in order to contribute to formation of safe, reliable, and convenient infrastructure for society.

Course	Mechanical Engineering		
Field of Instruction and Research	Quality	Faculty Member	Instruction Subject
Electro-mobility	Generation and Evaluation of Micro/Nano Materials, Solid Mechanics, Analysis on the Surface Structure and its Application, Theory and Practical Application of Heat Transfer and Fluid Flow, Material Exchange across Functional Membranes, Multibody Dynamics, Identification of Nano-structure of solid surface using AFM, and its Application to Electric-driven, Highly Efficient and Low Environmental Impact Technologies of Transportation Machineries	Prof. Yotsugu Shibuya ^②	Advanced Solid Mechanics
		Prof. Mikio Muraoka	Micro/Nano Materials
		Prof. Takahiro Adachi	Heat Transfer Enhancement
		Associate Prof. Makoto Yamaguchi	Characterization of Subsurface Structure
		Associate Prof. Takeshi Akinaga	Material Transport across Biomembranes
		Lecturer Hiroshi Hirayama	Advanced course on vibration control
		Lecturer Yukinori Kinoshita	Measurement system engineering
		Lecturer Xu Zhao	Advanced Thin-film Material Engineering
Medical Engineering	Controller Design for Mechatronics Devices, Analysis of a Physical Movement Mechanism, Effect of Surface Environment on Micro Machining and Bio-material, Material Science from Micro to Macro Aspects, and its Application to Medical and Welfare Engineering	Prof. Akihiro Naganawa	Advanced Control Engineering
		Prof. Takehiro Iwami	Biomedical Engineering
		Associate Prof. Yoshiyuki Yamamoto	Advanced Applied Electromagnetism
		Associate Prof. Mamoru Takahashi (Cooperative Major in LifeCycle Design Engineering)	Micro Processing
		Associate Prof. Yoshihiro Sasaki	Actuator Engineering I, II
		Lecturer Takeshi Seki	Design of Digital Control System
Sustainable Mechanical Engineering	Ice Melting and Water Freezing, Theory and Application of Renewable Energy Conversion, Basic Study for Rarefied Gas Dynamics and its Application, Measurements for the Mechanical Design, Environmental Benign Joining Technologies, Renewable Energy Technologies based on the regional potential and its Application to Sustainable Mechanical Engineering	Prof. Masahide Nakamura ^② (Cooperative Major in LifeCycle Design Engineering)	Transfer and Conversion of Heat and Fluid Dynamical Energy
		Prof. Makoto Tago	Advanced Natural Convection Heat Transfer I, II
		Prof. Eiki Okuyama	Advanced Sensors Engineering
		Prof. Nozomu Mishima (Cooperative Major in LifeCycle Design Engineering)	Lifecycle Design Basics

		Associate Prof. Yoshimi Komatsu	Computational Thermodynamics and Fluid Dynamics
		Associate Prof. Yasuyuki Miyano	Advanced Industrial Technology and Science for System Engineering Design
		Lecturer Wataru Sugiyama	Kinetic Theory for Molecular Gas
		Lecturer Takaaki Furubayashi	Advanced Theory on Regional Energy Systems

② These professors will retire by the mandatory retirement regulation in March 2021.

Course	Civil and Environmental Engineering		
Field of Instruction and Research	Quality	Faculty Member	Instruction Subject
Structural Mechanics	Linear and Nonlinear Mechanics and Theory of Structural Design of Steel and Timber Structures	Prof. Humihiko Gotou Lecturer Ryu Noda	Advanced Structural Mechanics Timber Structural Engineering
Hydraulics and Hydraulics Engineering	Measurements and Numerical Modeling of Natural Disaster in rivers and coastal area	Associate Prof. Kazuya Watanabe	Coastal and river Engineering
Soil Mechanics and Geotechnical Engineering	Physicochemical and Mechanical Properties of Soft Soil	Associate Prof. Toshihiro Ogino	Advanced Soil Mechanics
Urban and Traffic Planning	Methods, and Analytical Techniques used in Traffic Engineering and Planning	Prof. Hidekatsu Hamaoka	Advanced Traffic Engineering
	Philosophy, Methods, and Analytical Techniques used in Urban and Traffic Planning with emphasis on the Logic and Assumption on which these are based	Associate Prof. Satoru Hino	Advanced Urban Planning
Concrete Engineering	Design of Construction Materials, Maintenance of Concrete Structures and Structural Analysis for Concrete Structures	Prof. Hidenobu Tokushige Associate Prof. Ryosuke Takahashi	Construction Material Design Advanced Structural Design

《Cooperative Major in Life Cycle Design Engineering》

In today's industrial society with its ongoing advanced development, numerous issues have emerged that cannot be dealt with adequately in traditional frameworks. Recent years, in particular, have seen growing needs for tackling such issues as reducing environmental impact and forming a material-cycle society. In the light of such needs of society, this major was established as a joint course of the Akita University Graduate School of Engineering Science and the Akita Prefectural University Graduate School of Systems Science and Technology.

“Life cycle design engineering” in the course name is a branch of engineering that seeks to reduce environmental impact throughout the entire life cycle from resource mining and product planning, design, and manufacturing to disposal and recycling. It is therefore closely tied to many other fields of engineering including materials engineering, computer engineering, mechanical engineering, electrical and electronics engineering, civil and architectural engineering, and management engineering.

This major aims to develop human resources with a broad viewpoint and high sense of ethics, who can contribute from an international perspective to formation of a material-cycle society, and to revitalizing local communities in environmentally conscious ways. Toward these objectives, advanced education and research are carried out concerning life cycle design engineering through the close collaboration of the two schools offering this major.

Main Features of the Cooperative Major in Life Cycle Design Engineering, and Matters to Note in Taking Entrance Exam

1. The degree granted carries the names of both Akita University and Akita Prefectural University.
2. Students are resident in both Akita University and Akita Prefectural University, but the official university of residence is that of the main supervisor providing primary research guidance.
3. Because students are enrolled in both Akita University and Akita Prefectural University, they can use the facilities and resources of both universities. (Some facilities and resources may not be available due to circumstances of each university.)
4. When the official university of residence is Akita University, research guidance may be received also from sub-supervisors of Akita Prefectural University.
5. Classes taken are those of the joint graduate school consisting of Akita University and Akita Prefectural University.
6. If the faculty member desired as the main supervisor belongs to Akita University, the student makes application to Akita University and takes the entrance examination given by Akita University. In this case, the official university of residence after admission to the major is Akita University, and payment of tuition and charges as well as application for scholarships, etc., is made as a student of Akita University.

Note that for this major it is not possible to apply to both Akita University and Akita Prefectural University.

Division	Life Cycle Design Strategies		
Field of Instruction and Research	Quality	Faculty Member	Instruction Subject
Life Cycle Design Engineering and Evaluation Studies	Educations and studies on designs and evaluations covering life cycles of products, businesses and social systems	Prof. Nozomu Mishima	Life cycle design engineering basics
Electrical Energy Engineering	Conversion, Storage and Delivery of Electrical Energy		Advanced Life Cycle Design Engineering
Computer and Software Systems	Education and Study on Design of Computer and Software Systems	Lecturer Katsuya Fujiwara	Software System
Earth and environmental system science	Research of mass transfer and chemical reaction on the Earth; Exploitation of unutilized resources; Evaluation of environment and material resources; Development of advanced analytical techniques	Lecturer Mayuko Fukuyama	Earth and Environmental analytical science
Environmental Engineering and Education on Risk	Education and research on cyclical use system of regional resources, learning system of the risk and improvement of water environment.	Akita Prefectural University, Associate Prof. Nobuhiro Kanazawa	Basics in Life Cycle Design
Resources Recycling Technology Life Cycle Assessment	Development of resources recycling technology Development of separation technology for recycling of powder waste Life Cycle Assessment (LCA) of products and services using Process Analysis and Input-Output Analysis	Akita Prefectural University Associate Prof. Ruilu Liang	Life Cycle Assessment Basics in Life Cycle Design

Division	Systems Engineering for Environment		
Field of Instruction and Research	Quality	Faculty Member	Instruction Subject
Thermal and Fluid Dynamical Energy Engineering	Education and research on the transfer and conversion of the heat and fluid dynamical energy such as the renewable energy. Education and research on the evaluation of sensibility and its application to the industrial design	Prof. Masahide Nakamura ②	Transfer and Conversion of Heat and Fluid Dynamical Energy
Electromagnetic Energy Conversion Engineering	Development of new machines and improvement of conventional machines for electromagnetic energy conversion	Prof. Katsubumi Tajima	Electromagnetic energy conversion engineering
Optics device engineering	Education on optics device engineering around visible light field. Education and research on physical property of liquid crystal and low driving voltage of liquid crystal optical and display devices.	Prof. Rumiko Yamaguchi	Electronic Display I, II
Engineering Materials and Manufacturing	Materials Science from Micro to Macro Aspects and Effect of Surface Conditions in Machinin	Associate Prof. Mamoru Takahashi	Micro Processing
Advanced Functional Materials	Research and education on materials design, functional properties and applications of shape memory alloys, damping alloys and superconducting materials	Associate Prof. Xiaoye Lu	Advanced Course of Functional Materials

High-temperature physical properties of matter	Experimental and theoretical studies on high-temperature properties of molten oxides and applications to design and production process of environmentally friendly amorphous materials	Associate Prof. Toru Sugawara	High-temperature physical properties of matter
Electric Discharge Engineering, Plasma Engineering	Education and research on fundamental processes and applications of arc discharge and its resultant plasmas in low vacuum and under atmospheric pressure, biological influences and applications of low temperature plasmas under low pressure and atmospheric pressure	Akita Prefectural University Prof. Masaya Sugimoto	Plasma Engineering
Electromagnetic Compatibility, Communication Engineering	Estimation and suppression method of undesired electromagnetic radiation from printed circuit boards, Analysis of crosstalk between micro-strip lines on a printed circuit board, Estimation of equivalent radiation sources and measurement of near electromagnetic fields on a printed circuit board, Education and research of the electromagnetic compatibility of printed circuit boards in microwave frequency	Akita Prefectural University Associate Prof. Teruo Tobana	Electromagnetic Compatibility
Built Environment, Geographic Information Systems	Evaluation of thermal environment in external built space. Collaboration method of architect and building engineer. Installation, management and cost-benefit-effectiveness of municipal geographic information systems in normal and disaster period. Development of building life-cycle assessment tool reflected family configuration change and repair work.	Akita Prefectural University Associate Prof. Koichi Asano	Advanced Course in Urban Environment

② This professor will retire by the mandatory retirement regulation in March 2021.

4. Requirements for Completion of the Master's Course

A Master's degree is awarded if the student has satisfied the following requirements: have at least two years' residence in the Master's program; acquire a minimum of 30 course credits shown in the chart below; have an acceptable Master's thesis; pass the final comprehensive examination.

Students who demonstrate exceptional achievement may receive the degree with a residence period of as short as 1 year.

Credits Needed for the Completion of the Master's Program (Except the Cooperative Major in Life Cycle Design Engineering)

Courses	Credits Required	Remarks
Common Subjects	3 credits (required)	
Specialized Subjects	13 credits (required)	
Common Subjects and Specialized Subjects	A minimum of 14 credits (elective)	A minimum of 10 credits in the major and a minimum of 2 credits from other majors.
Total	A minimum of 30 credits	

Credits Needed for the Completion of the Master's Program (For the Cooperative Major in Life Cycle Design Engineering)

Courses	Credits Required	Remarks
Specialized Subjects	14 credits (required)	
Common Basic and Ethical Subjects and Specialized Subjects	A minimum of 16 credits (elective)	(1) To earn a minimum of 4 credits in the major courses offered by the supervisor's university. (2) To earn a minimum of 8 credits* in the major / common courses offered by the vice-supervisor's university. * A minimum of 6 credits in the major courses are required. (3) A minimum of 4 credits offered by other departments of both graduate schools can be included in the "Credits Required" for the completion of the Master's Program.
Total	A minimum of 30 credits	