Learning Outcomes of the University of Aizu

1. Introduction

The objective of this document is to inform students, faculty, and staff of the University's Learning Outcomes.

The School of Computer Science and Engineering at the University of Aizu offers courses necessary to achieve the Learning Outcomes, which are based on the profile of professionals to be fostered, its diploma policy, and its curriculum policy. Concrete objectives and goals for each course are set in their syllabi, and classes are conducted to achieve those goals.

Students are expected to study with a sense of purpose, based on a proper understanding of the educational intent of each Learning Outcomes and the educational intent stated in the syllabi of each course.

2. Profile of Professionals

The School of Computer Science and Engineering at the University of Aizu has established the following profile of professionals as its educational and research objective.

We will foster professionals with the following characteristics, who can contribute to the realization of the University's founding philosophy "to Advance Knowledge for Humanity."

- Richness of creativity and high ethical standards
- Broad educational refinement and scientific thinking skills
- The ability to learn independently and continuously
- Rich humanity and the ability to understand diverse values, traditions, and institutions
- Well-developed communication skills and the ability to work as part of a team

Based on this profile of professionals, we have established the diploma policy shown in the next section, which defines the knowledge and skills that students should have upon program completion.

(D1) A University of Aizu (UoA) graduate is strong-willed, mature, comfortable in their own skin, and has a magnanimous character.
(D2) A UoA graduate is creative and always acts with ethical integrity.
(D3) A UoA graduate is an independent and tenacious thinker.
(D4) A UoA graduate can respect different cultural paradigms.
(D5) A UoA graduate has completed a well-rounded education.

(D6) A UoA graduate is scientifically literate and can render and appraise judgment based on scientific facts and methods.
(D7) A UoA graduate possesses a robust skill set in computer science and engineering.
(D8) A UoA graduate can foster collegiality.
(D9) A UoA graduate is skilled at making presentations and effectively conveying ideas to others, with abundant presentation experience under their belt.
(D10) A UoA graduate is proficient in English and feels at home in a multi-national, interoperative environment.
(D11) A UoA graduate can apply their computer science and engineering knowledge and make a positive impact on the industrial sector at local, domestic, and global levels.
(D12) A UoA graduate has the finesse to bring out the best of their abilities as an independent computer scientist/engineer.

The Learning Outcomes in the next section have been set as specific goals for learning to acquire the knowledge and skills specified in the diploma policy above.

3. Learning Outcomes

The School of Computer Science and Engineering provides the education to achieve the following Learning Outcomes (A) to (F) through a four-year program. D1 to D12 indicate correspondence with the diploma policy in the previous section.

(A) Graduates are aware of their professional and ethical responsibilities as an engineer, and are able to analyze societal requirements, and set, solve, and evaluate technical problems using information science technologies in society. (D2, D11, D12)
(B) Graduates are able to respond to changes in social environment and technology, and are able to learn spontaneously throughout life. (D1, D3, D5)
(C) Graduates are able to apply their professional knowledge of mathematics, natural science, and information technology, as well as the scientific thinking skills such as logical thinking and objective judgment developed through the acquisition of said knowledge, towards problem solving. (D6, D7)
(D) Graduates are able to view human society from a global perspective and think about the coexistence of nature and human beings, as well as the happiness, health, and welfare of humankind. (D4, D5)
(E) Graduates are able to effectively express their thoughts and judgments in writing, orally, and through information media, both inside and outside the country, and to communicate them to others, as well as to understand the information and opinions expressed by others. (D8, D9)
(F) Graduates are able to determine and carry out the actions they and others, including those

from other disciplines, should take and plan and manage work under given constraints in collaborative projects. (D8, D10)

4. Compliance with Requirements as a Leading Educational Program

The School of Computer Science and Engineering curriculum is designed according to the Computer Science Curricula 2013 (CS2013), the leading computer science and engineering curriculum recommended by the IEEE and ACM. CS2013's Core Tier-1 and 80% or more of the Core Tier-2 topics are covered by the Strongly Recommended Courses (see below).

The curriculum of the School of Computer Science and Engineering also satisfies the following "field-specific requirements" stipulated in the Accreditation Standards for Professional Engineer Education of the Japan Accreditation Board for Engineering Education (JABEE) for educational programs related to "Computer Science."

(1) Knowledge and applied skills in mathematics required for computer science
(2) Ability to apply algorithms and computational complexity, the concepts of programming languages, and the theories of computer science to the computer-based models and design of systems
(3) Ability to apply design and development principles to the architecture of software systems with various types of complexity
(4) Knowledge of at least three of the following areas: computer architecture, information management, networks and communications, operating systems, parallel and distributed processing, intelligent systems
(5) Deep knowledge and skills regarding the use of one or more programming languages

5. Structure of Curriculum and Course Categories

Courses in the School of Computer Science and Engineering are classified into the following five types. Courses in the School of Computer Science and Engineering are composed of the following five types of courses to stipulate requirements for academic promotion and graduation.

A) Strongly Recommended Courses: Fundamental courses recommended to all students regardless of their field of specialization
B) Field Recommended Courses: Courses that are recommended to all students in a field
C) Other Courses: Courses that do not belong to A or B but are designed to help students acquire the knowledge and skills that expand upon the content of those courses
D) Optional Courses: Courses that do not count towards the number of credits required for graduation, such as courses required only for teaching training or SCCP courses
E) Required Courses: Only Graduation Theses is a required course.

The curriculum of the School of Computer Science and Engineering does not include **required courses** (except for Graduation Thesis). This aims to support students in taking courses flexibly

according to their individual skills and needs, considering the gaps in students' knowledge and skills in computer science and engineering at the time of admission. Courses that should be taken by all students are designated as ”strongly recommended” courses. The curriculum is designed so that students who follow the standard course plan can take all of the strongly recommended courses. The curriculum is also designed so that the core of a professional’s knowledge and skills acquired in the strongly recommended courses are expanded upon in the courses students take subsequently, such as field recommended course and other courses.

On the other hand, courses are grouped into “course categories” according to their contents. Learning Outcomes are intended to cultivate the necessary knowledge and skills by having students select multiple courses in the same category, or by mastering fundamental courses, advanced courses, and courses for graduation thesis in stages. The six course categories are as follows.

General Education Courses: These courses are designed to foster members of society with a rich sense of humanity and sophistication. They focus on education of fundamental ways of thinking and approaches toward learning in general, including science, nurturing of human qualities, fundamentals for understanding society and elements necessary for specialized education. They are classified as A and C in the types of courses.

Foreign Language Courses: These courses are designed to acquire English language skills for international communication (speaking, listening, writing, and reading), aiming at providing practical English education in computer science fields. They are classified as A and C in the types of courses.

Specialized Fundamental Courses: These courses are designed to learn fundamentals in computer science and engineering, and are classified as A, B, C, and D in the types of courses.

- Mathematics / Natural Science
- Computer Fundamentals

  These courses are designed to help students acquire the ability to skillfully use computers, learn how they are structured, and understand the bigger picture of computers. Furthermore, course contents stimulate intellectual interest in future study and research by encouraging students to experience how computers can be utilized in society and daily life. Education on information ethics and information security, which should be understood when using computers, is also provided.
- Programming Languages

  These courses are designed to allow students to acquire the knowledge and skills in programming, which is indispensable for understanding and using computers. They range from introductory courses for beginners to courses that

polish students' skills through exercises in more advanced programming languages.

- Foundations of Computer Science and Engineering
  These courses are designed to allow students to learn the fundamentals of computer technology and software.

Advanced Courses: These courses are designed to allow students to gain knowledge and skills essential for computer experts and the confidence and awareness as computer scientists and/or engineers. They are classified as B, C, and D in the types of courses.

Practical Projects: These courses are designed to allow students to retain computer development knowledge through exercises. They are classified as B in the types of courses. In addition, students will also develop the ability to apply basic knowledge towards solving problems, the practical ability to plan and implement projects, the self-initiative to think and act on their own, and the collaborative ability to work with others.

Graduation Thesis: This is the only required undergraduate course (course type E). This full-year course represents the culmination of university life. Only a handful of students are assigned to each graduation thesis supervisor, allowing them to receive in-depth instruction. Students are expected to conduct research on their own initiative and write their theses in English.

Students are expected to understand the intent of each course in the curriculum properly and to take courses in a well-planned manner. In addition, students should study with an awareness that they must make a self-help effort to learn any prerequisite knowledge and skills that they lack before taking each course.

6. Specific Content of the Learning Outcomes and Their Corresponding Courses

The following is the specific content of the Learning Outcomes of the School of Computer Science and Engineering (A) through (F), and the courses offered to achieve each outcome.

(A) Graduates are aware of their professional and ethical responsibilities as an engineer, and are able to analyze societal requirements, and set, solve, and evaluate technical problems using information science technologies in society.

(A-1) Courses to develop rich creativity and high ethical standards

- Computer Fundamentals (16 credits from the following 11 courses are required)
  LI01 Computer Literacy (1st year, 1st quarter, 4 credits, strongly recommended)
  LI03 Introduction to Computer Science and Engineering (1st year, 1st quarter, 2 credits, strongly recommended)
  LI08 Information Ethics (1st year, 1st quarter, 2 credits, strongly recommended)

LI04 Intro. Computer Systems (1st year, 3rd quarter, 2 credits, strongly recommended)
LI06 Information Security (1st year, 3rd quarter, 2 credits, strongly recommended)
LI13 CSE Exercise I (2nd year, 1st semester, 3 credits)
LI12 Creativity Studio (2nd-4th year, 2nd quarter intensive, 2 credits)
LI14 CSE Exercise II (2nd year, 2nd semester, 3 credits)
LI11 Intro. to Computer Networking (2nd year, 3rd quarter, 2 credits, strongly recommended)
LI10 Introduction to Multimedia Systems (2nd year, 4th quarter, 2 credits, strongly recommended)
LI09 Fundamentals of System Development and Project Management (4th-year, 2nd quarter, 2 credits)

- Programming Languages (12 credits from the following 6 courses are required)
  PL01 Introduction to Programming (1st year, 2nd quarter, 4 credits, strongly recommended)
  PL02 C Programming (1st year, 3rd quarter, 4 credits, strongly recommended)
  PL03 JAVA Programming I (2nd year, 1st quarter, 4 credits, strongly recommended)
  PL06 JAVA Programming II (3rd year, 1st quarter, 3 credits)
  PL04 C++ Programming (3rd year, 3rd quarter, 3 credits)
  PL05 Computer Languages (4th year, 1st quarter, 3 credits)

- Foundations of Computer Science and Engineering (21 credits from the following 12 courses are required)
  FU01 Algorithms and Data Structures I (1st year, 4th quarter, 4 credits, strongly recommended)
  FU03 Discrete Systems (2nd year, 2nd quarter, 3 credits, strongly recommended)
  FU04 Logic Circuit Design (2nd year, 3rd quarter, 4 credits, strongly recommended)
  FU15 Introduction to Data Management (2nd year, 3rd quarter, 3 credits, strongly recommended)
  FU06 Operating Systems (2nd year, 4th quarter, 4 credits, strongly recommended)
  FU08 Automata and Languages (2nd year, 4th quarter, 3 credits, strongly recommended)
  FU05 Computer Architecture (3rd year, 1st quarter, 4 credits, strongly recommended)
  FU14 Intro. to Software Engineering (3rd year, 1st quarter, 3 credits, strongly recommended)
  FU09 Algorithms and Data Structures II (3rd year, 2nd quarter, 3 credits)
  FU02 Information Theory and Data Compression (3rd year, 3rd quarter, 3 credits)
  FU11 Numerical Analysis (3rd year, 4th quarter, 3 credits)
  FU10 Language Processing Systems (4th year, 1st quarter, 3 credits)

(A-2) Courses to develop the finesse to bring out the best of their abilities as an independent

computer scientist/engineer

- Advanced Courses (32 credits from the following 30 courses are required)
  Computer Systems (5 courses)
  Computer Network Systems (5 courses)
  Applications (9 courses)
  Software Engineering (6 courses)
  Others (5 courses)

(A-3) Courses for students to acquire the practical skills to apply their computer science and engineering knowledge and make a positive impact on the industrial sector at local, domestic, and global levels

- Practical Projects (3 credits from the following 4 courses are required)
  IE01 Integrated Exercise for Systems I (3rd year, 1st semester, 3 credits)
  IE02 Integrated Exercise for Systems II (3rd year, 2nd semester, 3 credits)
  IE03 Integrated Exercise for Software I (3rd year, 1st semester, 3 credits)
  IE04 Integrated Exercise for Software II (3rd year, 2nd semester, 3 credits)

- Graduation Thesis (4th year, full-year, 8 credits, required)

(B) Graduates are able to respond to changes in social environment and technology, and are able to learn spontaneously throughout life.

- Humanities and Social Sciences (8 credits from the following 19 courses are required)
  HS20 Academic Skills 1 (1st-2nd year, 1st quarter, 2 credits, strongly recommended)
  HS10 Economics (1st-2nd year, 2nd quarter, 2 credits)
  HS11 Sociology (1st-2nd year, 2nd quarter, 2 credits)
  HS12 Constitution of Japan (1st-2nd year, 2nd quarter, 2 credits)
  HS16 Health Science (1st-2nd year, 2nd quarter, 2 credits)
  HS17 History of Science and Technology (1st -2nd year, 2nd quarter, 2 credits)
  HS25 Business Strategy (1st-2nd year, 2nd quarter, 2 credits)
  HS24 Business Communication (1st-2nd year, 1st semester, 2 credits)
  HS04 Linguistics (1st-2nd year, 2nd quarter intensive, 2 credits)
  HS05 Literature (1st-2nd year, 2nd quarter intensive, 2 credits)
  HS07 Gender and Sexuality (1st-2nd year, 2nd quarter intensive, 2 credits)
  HS13 International Relations (1st-2nd year, 2nd quarter intensive, 2 credits)
  HS01 Philosophy (1st-2nd year, 3rd quarter, 2 credits)
  HS02 Logic (1st-2nd year, 3rd quarter, 2 credits)

HS03 Psychology (1st-2nd year, 3rd quarter, 2 credits)
HS06 Art (1st-2nd year, 3rd quarter, 2 credits)
HS09 Jurisprudence (1st-2nd year, 3rd quarter, 2 credits)
HS19 Culture and History of Aizu (1st-2nd year, 3rd quarter, 2 credits)
HS22 Sociology of Local Community (1st-2nd year, 3rd quarter, 2 credits)
HS23 Economic Development (1st-2nd year, 3rd quarter, 2 credits)
HS26 Venture Business Management (1st-2nd year, 3rd quarter, 2 credits)
HS21 Academic Skills 2 (1st-2nd year, 4th quarter, 2 credits, strongly recommended)

- Health and Sports Sciences (2 credits from the following 4 courses are required)
  SS01 Health and Sports Sciences Practicum 1 (1st year, 1st semester, 1 credit, strongly recommended)
  SS02 Health and Sports Sciences Practicum 2 (1st year, 2nd semester, 1 credit, strongly recommended)
  SS03 Health and Sports Sciences Practicum 3 (1st-4th year, 1st semester, 1 credit)
  SS04 Health and Sports Sciences Practicum 4 (1st-4th year, 2nd/4th quarter intensive, 1 credit)

- Graduation Thesis (4th year, full-year, 8 credits, required)

(C) Graduates are able to apply their professional knowledge of mathematics, natural science, and information technology, as well as the scientific thinking skills such as logical thinking and objective judgment developed through the acquisition of said knowledge, towards problem solving.

- Mathematics (10 credits from the following 11 courses are required)
  MA01 Linear Algebra I (1st year, 1st-2nd quarter, 2 credits, strongly recommended)
  MA03 Calculus I (1st year, 1st-2nd quarter, 2 credits, strongly recommended)
  MA02 Linear Algebra II (1st year, 3rd-4th quarter, 2 credits, strongly recommended)
  MA04 Calculus II (1st year, 3rd-4th quarter, 2 credits, strongly recommended)
  MA07 Probability and Statistics (2nd year, 1st quarter, 2 credits, strongly recommended)
  MA05 Fourier Analysis (2nd year, 2nd quarter, 2 credits)
  MA06 Complex Analysis (2nd year, 4th quarter, 2 credits)
  MA09 Mathematical Logic (3rd year, 1st quarter, 2 credits)
  MA08 Applied Algebra (3rd year, 2nd quarter, 2 credits)
  MA10 Introduction to Topology (3rd year, 3rd quarter, 2 credits)
  MA11 Applied Geo. and Top. (3rd year, 3rd quarter, 2 credits)

- Natural Science (4 credits from the following 5 courses are required)
  NS01 Dynamics (1st year, 2nd quarter, 2 credits, strongly recommended)
  NS02 Electromagnetics (1st year, 4th quarter, 2 credits, strongly recommended)
  NS03 Quantum Mechanics (2nd year, 1st quarter, 2 credits)
  NS05 Thermodynamics and Statistics Mechanics (2nd year, 2nd quarter, 2 credits)
  NS04 Semiconductor Devices (2nd year, 3rd quarter, 2 credits)

- Computer Fundamentals (16 credits from the following 11 courses are required)
  LI01 Computer Literacy (1st year, 1st quarter, 4 credits, strongly recommended)
  LI03 Introduction to Computer Science and Engineering (1st year, 1st quarter, 2 credits, strongly recommended)
  LI08 Information Ethics (1st year, 1st quarter, 2 credits, strongly recommended)
  LI04 Intro. Computer Systems (1st year, 3rd quarter, 2 credits, strongly recommended)
  LI06 Information Security (1st year, 3rd quarter, 2 credits, strongly recommended)
  LI13 CSE Exercise I (2nd year, 1st semester, 3 credits)
  LI12 Creativity Studio (2nd-4th year, 2nd quarter intensive, 2 credits)
  LI14 CSE Exercise II (2nd year, 2nd semester, 3 credits)
  LI11 Intro. to Computer Networking (2nd year, 3rd quarter, 2 credits, strongly recommended)
  LI10 Introduction to Multimedia Systems (2nd year, 4th quarter, 2 credits, strongly recommended)
  LI09 Fundamentals of System Development and Project Management (4th year, 2nd quarter, 2 credits)

- Programming Languages (12 credits from the following 6 courses are required)
  PL01 Introduction to Programming (1st year, 2nd quarter, 4 credits, strongly recommended)
  PL02 C Programming (1st year, 3rd quarter, 4 credits, strongly recommended)
  PL03 JAVA Programming I (2nd year, 1st quarter, 4 credits, strongly recommended)
  PL06 JAVA Programming II (3rd year, 1st quarter, 3 credits)
  PL04 C++ Programming (3rd year, 3rd quarter, 3 credits)
  PL05 Computer Languages (4th year, 1st quarter, 3 credits)

- Foundations of Computer Science and Engineering (21 credits from the following 12 courses are required)
  FU01 Algorithms and Data Structures I (1st year, 4th quarter, 4 credits, strongly recommended)
  FU03 Discrete Systems (2nd year, 2nd quarter, 3 credits, strongly recommended)
  FU04 Logic Circuit Design (2nd year, 3rd quarter, 4 credits, strongly recommended)

FU15 Introduction to Data Management (2nd year, 3rd quarter, 3 credits, strongly recommended)
FU06 Operating Systems (2nd year, 4th quarter, 4 credits, strongly recommended)
FU08 Automata and Languages (2nd year, 4th quarter, 3 credits, strongly recommended)
FU05 Computer Architecture (3rd year, 1st quarter, 4 credits, strongly recommended)
FU14 Intro. to Software Engineering (3rd year, 1st quarter, 3 credits, strongly recommended)
FU09 Algorithms and Data Structures II (3rd year, 2nd quarter, 3 credits)
FU02 Information Theory and Data Compression (3rd year, 3rd quarter, 3 credits)
FU11 Numerical Analysis (3rd year, 4th quarter, 3 credits)
FU10 Language Processing Systems (4th year, 1st quarter, 3 credits)

- Graduation Thesis (4th year, full-year, 8 credits, required)

(D) Graduates are able to view human society from a global perspective and think about the coexistence of nature and human beings, as well as the happiness, health, and welfare of humankind.

- Humanities and Social Sciences (8 credits from the following 19 courses are required)

HS20 Academic Skills 1 (1st-2nd year, 1st quarter, 2 credits, strongly recommended)
HS10 Economics (1st-2nd year, 2nd quarter, 2 credits)
HS11 Sociology (1st-2nd year, 2nd quarter, 2 credits)
HS12 Constitution of Japan (1st-2nd year, 2nd quarter, 2 credits)
HS16 Health Science (1st-2nd year, 2nd quarter, 2 credits)
HS17 History of Science and Technology (1st-2nd year, 2nd quarter, 2 credits)
HS25 Business Strategy (1st-2nd year, 2nd quarter, 2 credits)
HS24 Business Communication (1st-2nd year, 1st semester, 2 credits)
HS04 Linguistics (1st-2nd year, 2nd quarter intensive, 2 credits)
HS05 Literature (1st-2nd year, 2nd quarter intensive, 2 credits)
HS07 Gender and Sexuality (1st-2nd year, 2nd quarter intensive, 2 credits)
HS13 International Relations (1st-2nd year, 2nd quarter intensive, 2 credits)
HS01 Philosophy (1st-2nd year, 3rd quarter, 2 credits)
HS02 Logic (1st-2nd year, 3rd quarter, 2 credits)
HS03 Psychology (1st-2nd year, 3rd quarter, 2 credits)
HS06 Art (1st-2nd year, 3rd quarter, 2 credits)
HS09 Jurisprudence (1st-2nd year, 3rd quarter, 2 credits)
HS19 Culture and History of Aizu (1st-2nd year, 3rd quarter, 2 credits)
HS22 Sociology of Local Community (1st-2nd year, 3rd quarter, 2 credits)

HS23 Economic Development (1st-2nd year, 3rd quarter, 2 credits)
HS26 Venture Business Management (1st-2nd year, 3rd quarter, 2 credits)
HS21 Academic Skills 2 (1st-2nd year, 4th quarter, 2 credits, strongly recommended)

- Foreign Language Courses (15 credits from the following 13 courses are required)
  EN01 Introductory English 1 (1st year, 1st quarter, 1 credit, strongly recommended)
  EN02 Introductory English 2 (1st year, 2nd quarter, 1 credit, strongly recommended)
  EN03 Bridge 1 to Intermediate English (1st year, 3rd quarter, 2 credits, strongly recommended)
  EN04 Bridge 2 to Intermediate English (1st year, 4th quarter, 2 credits, strongly recommended)
  EN05 Intermediate English 1 (2nd year, 1st quarter, 2 credits, strongly recommended)
  EN06 Intermediate English 2 (2nd year, 2nd quarter, 2 credits, strongly recommended)
  EN07 Advanced English (2nd year, 3rd quarter, 2 credits, strongly recommended)
  EN08 Thesis Writing and Presentation (4th year, 2nd semester, 1 credit, strongly recommended)
  EG01 Global Experience Gateway (1st-3rd year, 4th quarter intensive, 2 credits)
  EE01 English Excellence (Credit recognition, 1 credit)
  EL01 Elective English 1 (3rd-4th year, 1st-4th quarter, 2 credits)
  EL02 Elective English 2 (3rd-4th year, 1st-4th quarter, 2 credits)
  EL03 Elective English 3 (3rd-4th year, 1st-4th quarter, 2 credits)

(E) Graduates are able to effectively express their thoughts and judgments in writing, orally, and through information media, both inside and outside the country, and to communicate them to others, as well as to understand the information and opinions expressed by others.

- Humanities and Social Sciences (8 credits from the following 19 courses are required)
  HS20 Academic Skills 1 (1st-2nd year, 1st quarter, 2 credits, strongly recommended)
  HS10 Economics (1st-2nd year, 2nd quarter, 2 credits)
  HS11 Sociology (1st-2nd year, 2nd quarter, 2 credits)
  HS12 Constitution of Japan (1st-2nd year, 2nd quarter, 2 credits)
  HS16 Health Science (1st-2nd year, 2nd quarter, 2 credits)
  HS17 History of Science and Technology (1st-2nd year, 2nd quarter, 2 credits)
  HS25 Business Strategy (1st-2nd year, 2nd quarter, 2 credits)
  HS24 Business Communication (1st-2nd year, 1st semester, 2 credits)
  HS04 Linguistics (1st-2nd year, 2nd quarter intensive, 2 credits)
  HS05 Literature (1st-2nd year, 2nd quarter intensive, 2 credits)
  HS07 Gender and Sexuality (1st-2nd year, 2nd quarter intensive, 2 credits)
  HS13 International Relations (1st-2nd year, 2nd quarter intensive, 2 credits)

HS01 Philosophy (1st-2nd year, 3rd quarter, 2 credits)
HS02 Logic (1st-2nd year, 3rd quarter, 2 credits)
HS03 Psychology (1st-2nd year, 3rd quarter, 2 credits)
HS06 Art (1st-2nd year, 3rd quarter, 2 credits)
HS09 Jurisprudence (1st-2nd year, 3rd quarter, 2 credits)
HS19 Culture and History of Aizu (1st-2nd year, 3rd quarter, 2 credits)
HS22 Sociology of Local Community (1st-2nd year, 3rd quarter, 2 credits)
HS23 Economic Development (1st-2nd year, 3rd quarter, 2 credits)
HS26 Venture Business Management (1st-2nd year, 3rd quarter, 2 credits)
HS21 Academic Skills 2 (1st-2nd year, 4th quarter, 2 credits, strongly recommended)

- Foreign Language Courses (15 credits from the following 13 courses are required)
  EN01 Introductory English 1 (1st year, 1st quarter, 1 credit, strongly recommended)
  EN02 Introductory English 2 (1st year, 2nd quarter, 1 credit, strongly recommended)
  EN03 Bridge 1 to Intermediate English (1st year, 3rd quarter, 2 credits, strongly recommended)
  EN04 Bridge 2 to Intermediate English (1st year, 4th quarter, 2 credits, strongly recommended)
  EN05 Intermediate English 1 (2nd year, 1st quarter, 2 credits, strongly recommended)
  EN06 Intermediate English 2 (2nd year, 2nd quarter, 2 credits, strongly recommended)
  EN07 Advanced English (2nd year, 3rd quarter, 2 credits, strongly recommended)
  EN08 Thesis Writing and Presentation (4th year, 2nd semester, 1 credit, strongly recommended)
  EG01 Global Experience Gateway (1st-3rd year, 4th quarter intensive, 2 credits)
  EE01 English Excellence (Credit recognition, 1 credit)
  EL01 Elective English 1 (3rd-4th year, 1st-4th quarter, 2 credits)
  EL02 Elective English 2 (3rd-4th year, 1st-4th quarter, 2 credits)
  EL03 Elective English 3 (3rd-4th year, 1st-4th quarter, 2 credits)

- Graduation Thesis (4th year, full-year, 8 credits, required)

(F) Graduates are able to determine and carry out the actions they and others, including those from other disciplines, should take and plan and manage work under given constraints in collaborative projects.

- Practical Projects (3 credits from the following 4 courses are required)
  IE01 Integrated Exercise for Systems I (3rd year, 1st semester, 3 credits)
  IE02 Integrated Exercise for Systems II (3rd year, 2nd semester, 3 credits)
  IE03 Integrated Exercise for Software I (3rd year, 1st semester, 3 credits)

IE04 Integrated Exercise for Software II (3rd year, 2nd semester, 3 credits)

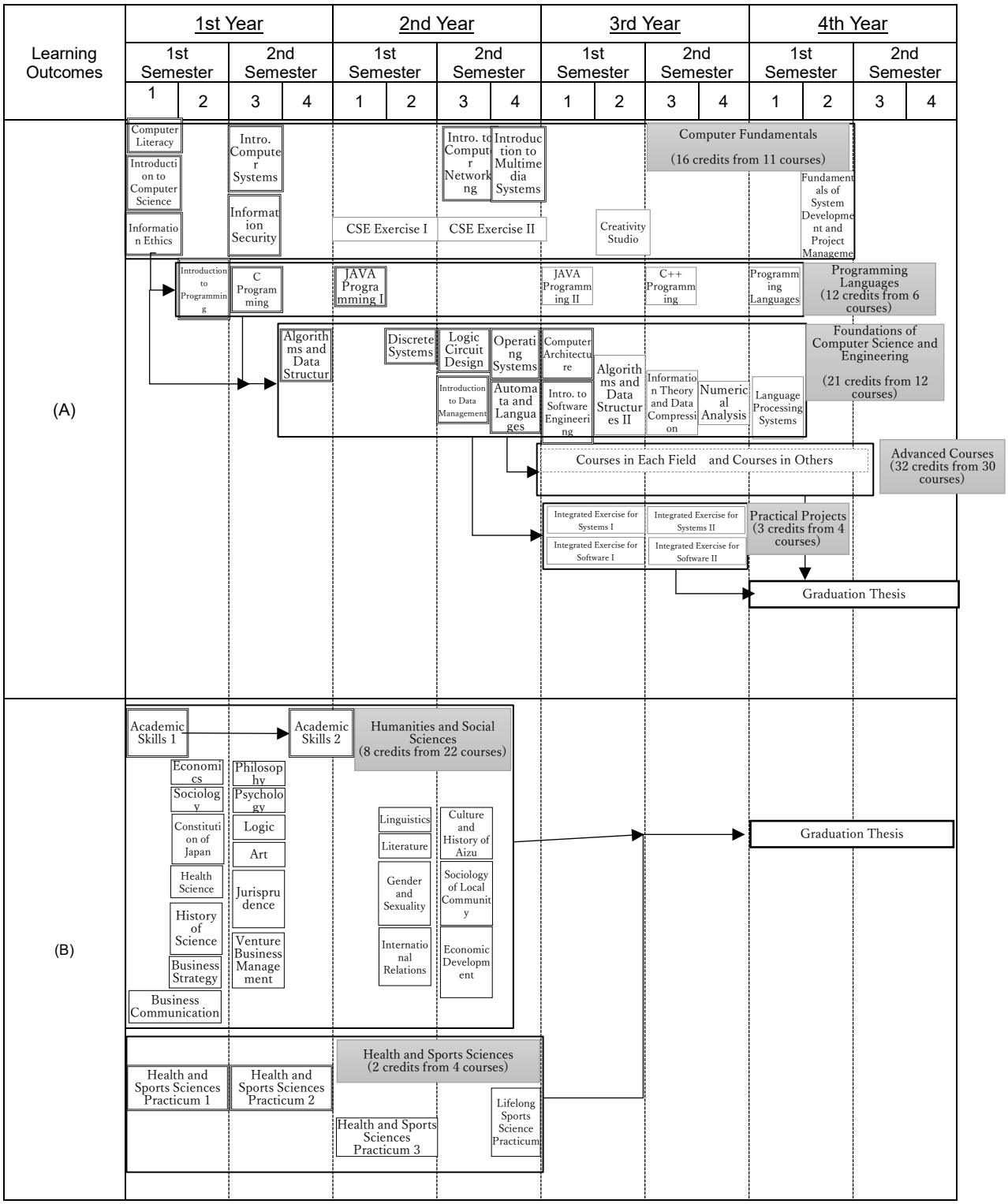
- Foreign Language Courses (15 credits from the following 13 courses are required)
  EN01 Introductory English 1 (1st year, 1st quarter, 1 credit, strongly recommended)
  EN02 Introductory English 2 (1st year, 2nd quarter, 1 credit, strongly recommended)
  EN03 Bridge 1 to Intermediate English (1st year, 3rd quarter, 2 credits, strongly recommended)
  EN04 Bridge 2 to Intermediate English (1st year, 4th quarter, 2 credits, strongly recommended)
  EN05 Intermediate English 1 (2nd year, 1st quarter, 2 credits, strongly recommended)
  EN06 Intermediate English 2 (2nd year, 2nd quarter, 2 credits, strongly recommended)
  EN07 Advanced English (2nd year, 3rd quarter, 2 credits, strongly recommended)
  EN08 Thesis Writing and Presentation (4th year, 2nd semester, 1 credit, strongly recommended)
  EG01 Global Experience Gateway (1st-3rd year, 4th quarter intensive, 2 credits)
  EE01 English Excellence (Credit recognition, 1 credit)
  EL01 Elective English 1 (3rd-4th year, 1st-4th quarter, 2 credits)
  EL02 Elective English 2 (3rd-4th year, 1st-4th quarter, 2 credits)
  EL03 Elective English 3 (3rd-4th year, 1st-4th quarter, 2 credits)

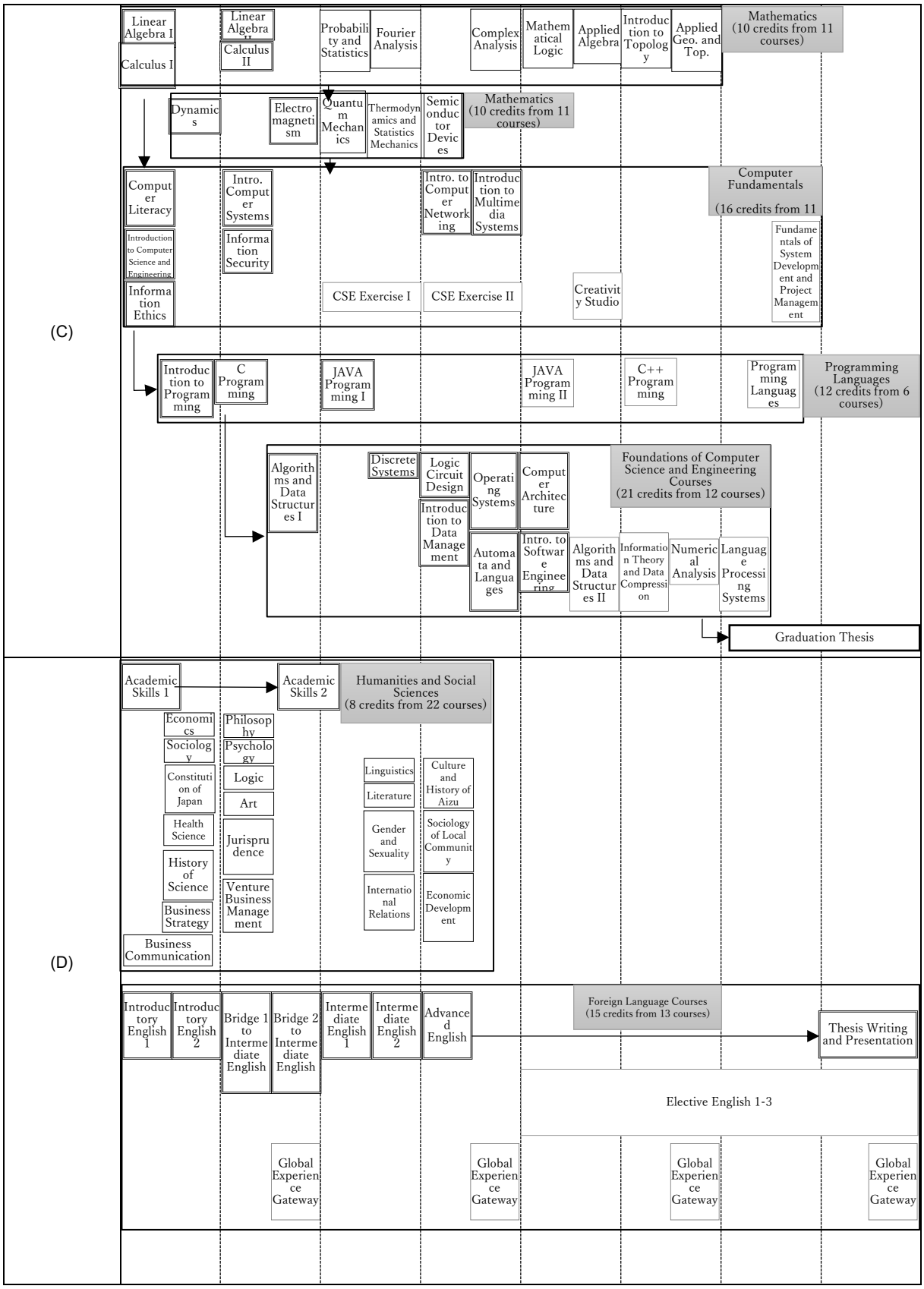
- Health and Sports Sciences (2 credits from the following 4 courses are required)
  SS01 Health and Sports Sciences Practicum 1 (1st year, 1st semester, 1 credit, strongly recommended)
  SS02 Health and Sports Sciences Practicum 2 (1st year, 2nd semester, 1 credit, strongly recommended)
  SS03 Health and Sports Sciences Practicum 3 (1st-4th year, 1st semester, 1 credit)
  SS04 Health and Sports Sciences Practicum 4 (1st-4th year, 2nd/4th quarter intensive, 1 credit)

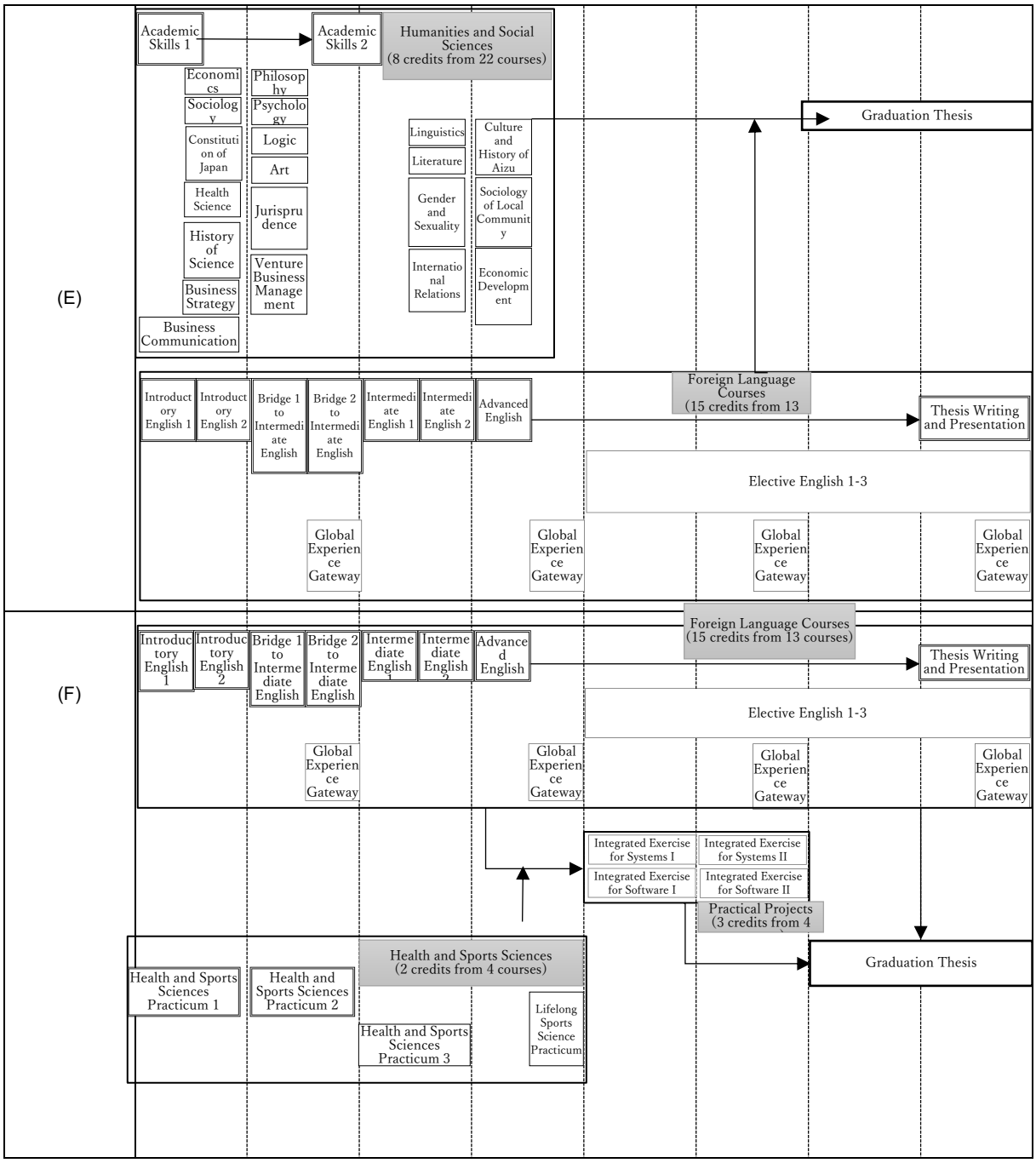
- Graduation Thesis (4th year, full-year, 8 credits, required)

7. Flow of Courses to Achieve the Learning Outcomes

The following diagram shows the relationship between courses in the School of Computer Science and Engineering curriculum and the Learning Outcomes (A) through (F).




(C)
Linear Algebra I
Calculus I
Linear Algebra II
Calculus II
Probability and Statistics
Fourier Analysis
Complex Analysis
Mathematical Logic
Applied Algebra
Introduction to Topology
Applied Geo. and Top.
Mathematics (10 credits from 11 courses)
Dynamics
Electromagnetism
Quantum Mechanics
Thermodynamics and Statistics Mechanics
Semiconductor Devices
Mathematics (10 credits from 11 courses)
Computer Literacy
Introduction to Computer Science and Engineering
Information Ethics
Intro. Computer Systems
Information Security
Intro. to Computer Networking
Introduction to Multimedia Systems
CSE Exercise I
CSE Exercise II
Creativity Studio
Computer Fundamentals (16 credits from 11
Fundamentals of System Development and Project Management
Introduction to Programming
C Programming
JAVA Programming I
JAVA Programming II
C++ Programming
Programming Languages
Programming Languages (12 credits from 6 courses)
Algorithms and Data Structures I
Discrete Systems
Logic Circuit Design
Operating Systems
Computer Architecture
Introduction to Data Management
Automata and Languages
Intro. to Software Engineering
Algorithms and Data Structures II
Information Theory and Data Compression
Numerical Analysis
Language Processing Systems
Foundations of Computer Science and Engineering Courses (21 credits from 12 courses)
Graduation Thesis
(D)
Academic Skills 1
Academic Skills 2
Humanities and Social Sciences (8 credits from 22 courses)
Economics
Sociology
Constitution of Japan
Health Science
History of Science
Business Strategy
Business Communication
Philosophy
Psychology
Logic
Art
Jurisprudence
Venture Business Management
Linguistics
Literature
Gender and Sexuality
International Relations
Culture and History of Aizu
Sociology of Local Community
Economic Development
Introductory English 1
Introductory English 2
Bridge 1 to Intermediate English
Bridge 2 to Intermediate English
Intermediate English 1
Intermediate English 2
Advanced English
Foreign Language Courses (15 credits from 13 courses)
Thesis Writing and Presentation
Elective English 1-3
Global Experience Gateway
Global Experience Gateway
Global Experience Gateway
Global Experience Gateway


(E)
Academic Skills 1
Academic Skills 2
Humanities and Social Sciences (8 credits from 22 courses)
Economics
Sociology
Constitution of Japan
Health Science
History of Science
Business Strategy
Business Communication
Philosophy
Psychology
Logic
Art
Jurisprudence
Venture Business Management
Linguistics
Literature
Gender and Sexuality
International Relations
Culture and History of Aizu
Sociology of Local Community
Economic Development
Graduation Thesis
Introductory English 1
Introductory English 2
Bridge 1 to Intermediate English
Bridge 2 to Intermediate English
Intermediate English 1
Intermediate English 2
Advanced English
Foreign Language Courses (15 credits from 13
Thesis Writing and Presentation
Elective English 1-3
Global Experience Gateway
Global Experience Gateway
Global Experience Gateway
Global Experience Gateway
(F)
Introductory English 1
Introductory English 2
Bridge 1 to Intermediate English
Bridge 2 to Intermediate English
Intermediate English 1
Intermediate English 2
Advanced English
Foreign Language Courses (15 credits from 13 courses)
Thesis Writing and Presentation
Elective English 1-3
Global Experience Gateway
Global Experience Gateway
Global Experience Gateway
Global Experience Gateway
Integrated Exercise for Systems I
Integrated Exercise for Systems II
Integrated Exercise for Software I
Integrated Exercise for Software II
Practical Projects (3 credits from 4
Graduation Thesis
Health and Sports Sciences (2 credits from 4 courses)
Health and Sports Sciences Practicum 1
Health and Sports Sciences Practicum 2
Health and Sports Sciences Practicum 3
Lifelong Sports Science Practicum