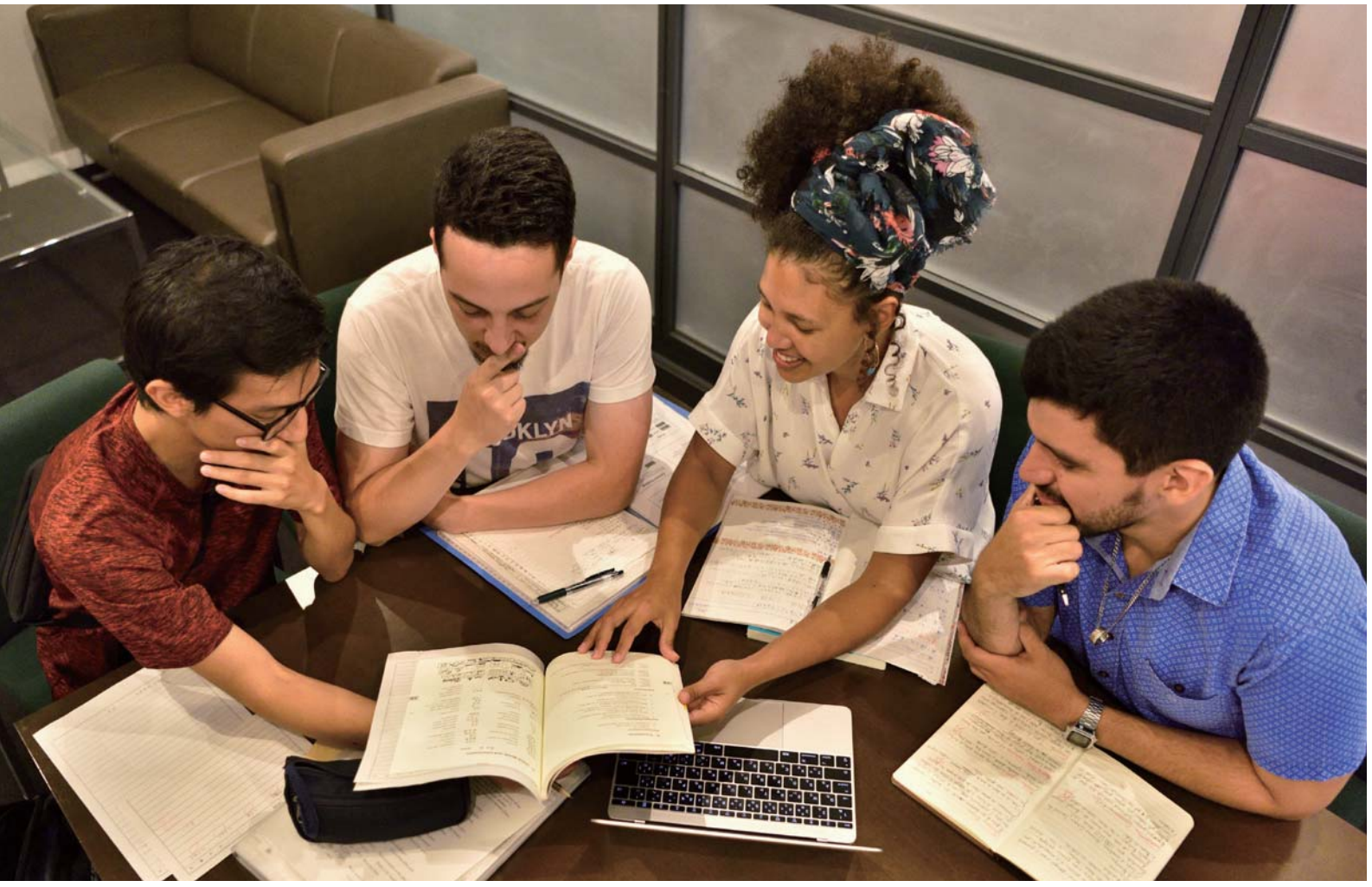
KYOTO iUP

KYOTO UNIVERSITY

International Undergraduate Program

FACULTY GUIDE 2021

京都大学



KYOTO UNIVERSITY KYOTO iUP

FACULTY GUIDE 2021

Faculty of INTEGRATED HUMAN STUDIES

Holistic understanding of human beings and their surroundings through interdisciplinary curricula

Features of the Faculty of Integrated Human Studies, Kyoto University

Five Divisions for developing unique human resources

The Faculty of Integrated Human Studies is the undergraduate college of the Graduate School of Human and Environmental Studies, and it consists of five Divisions: Human Sciences, Cognitive and Information Sciences, Multi-Disciplinary Studies of Civilizations, Cultural Environment Studies, and Natural Sciences. Each Division sets its own education and research objectives; at the same time, the five Divisions share a common goal of developing new and unique types of human resources. In order to achieve this goal, the Divisions cooperate with each other to provide a dynamic and interdisciplinary environment where students can learn about human beings and their surroundings from broad perspectives.

* See the next page for more details on each division.

Selecting a major specialization in the second year from a wide range of academic fields

Most high school students in Japan need to decide on their field of study at university before applying for university; however, the Faculty challenges this widespread convention. The Faculty provides an education in a wide range of academic fields spanning the humanities, social sciences, and natural sciences, and freshmen can fully take advantage of such an education by being exposed to various academic disciplines and exploring their interests. In the second year, students select their major specializations from among the five Divisions and continue their study toward graduation research. The Faculty's interdisciplinary nature can always benefit the students during their school years.

Four-year integrated curricula combining liberal arts education and specialized courses

The Faculty has developed curricula that link "general courses" for helping students develop flexible and broad knowledge, and "specialized courses" provided by each of the five Divisions. The integrated curricula offer both liberal arts education and interdisciplinary study of specialized courses throughout the four-year program. General and specialized courses are taught by the first-rate professors from the Graduate School of Human and Environmental Studies and other graduate schools to ensure that students receive education at the highest level. The Faculty offers the Professor Advisory System to support students with guidance on course selection and advice on student life.

The minor specialization system providing students with broad perspectives and creativity

The Faculty offers the minor specialization system that allows students to take courses outside their field of major specialization. The system aims to nurture students with broad perspectives and creativity, enabling them not only to acquire advanced expertise in their major specializations, but also to deepen knowledge in other academic fields. Students can decide on their minor specializations with the help of consultation with their academic advisors. At graduation, students completing minor specializations will receive certificates acknowledging their completion of the minor program in addition to their degree in major specializations.

Continuing study at the Graduate School of Human and Environmental Studies and other institutions

Nearly 40% of the graduates of the Faculty continue their study/research at the Graduate School of Human and Environmental Studies. (Graduates can also pursue their graduate study at other graduate schools at Kyoto University or at other academic institutions.) The Graduate School of Human and Environmental Studies comprises three Departments: Human Coexistence, Cultural Coexistence, and Interdisciplinary Environment. The three Departments provide a total of 14 integrated courses combining the humanities, social sciences, and natural sciences where students can engage in advanced research.

Freshman Welcome Camp for the Faculty of Integrated Human Studies

Overview of the Five Divisions

Division of Human Sciences

The Division of Human Sciences aims at comprehensive and fundamental understanding of human beings that have accumulated vast amount of knowledge throughout history. The Division focuses on three main dimensions: "thoughts," "society," and "culture." The "thoughts" dimension explores human existence from philosophical and ethical perspectives; it also explores creative activities from a historical perspective. The "society" dimension tries to understand human development and social behaviors from empirical and theoretical perspectives. The "culture" dimension examines cultural representations from historical and social perspectives. Research in the Division is pursued in the form of six fields of study mentioned below, seeking to redefine human intellect through the organic linkage among them.

Psycho-Social Development, Social Behavior, Social Studies of Arts and Culture, Human Ontology, Theory of Creative Arts, Literary Arts and Representation

A Young Man Being Introduced to the Seven Liberal Arts, Sandro Botticelli
The background shows the main gate of the Uji Branch Campus (1956)

Division of Cognitive and Information Sciences

People-to-people and people-to-environment interactions are achieved via cognitive and behavioral control mechanisms using the brain, body, and language as their interfaces. Based on this premise, the Division of Cognitive and Information Sciences studies the information processing system, used by human beings and machines, including human health, brain functions, human cognition, behavior emergence, and language features. The students in the Division carry out research on their own topics while studying fundamental sciences on exercise, metabolism and nutrition, information, and mathematics. This comprehensive approach helps young researchers gain critical and scientific methods based on an in-depth understanding of the human cognitive behavior and diversified creativity.

Cognitive and Behavioral Sciences, Mathematical Informatics, Linguistic Science, Foreign Language Acquisition, and Education

Experiment using MRI

Division of Multi-Disciplinary Studies of Civilizations

The social sciences and humanities are sometimes criticized as being incapable of coping with serious issues of the modern society, having lost flexible thinking and cooperation with other academic domains. In response to such criticism, the Division of Multi-Disciplinary Studies of Civilizations explores research on civilizations including the histories and cultures of Japan, other Asian countries, and Western countries, while addressing related modern social issues in an interdisciplinary way. Through such an approach, the Division provides its students with both an extensive "liberal arts education" in the true sense of the word, and practical training which enables students to acquire specialized expertise through flexible thinking.

Interdisciplinary Social Sciences, Social Cultural History

Division of Cultural Environment Studies

The Division of Cultural Environment Studies aims to examine the bases of human activities and habitations in this globalized world where region-specific ethnicities and characteristics form the basic units of the society. It also seeks to establish the concept of habitation in the future society. The students in the Division examine and compare regional characteristics of civilizations; they track interactions among civilizations and their cultural products. The Division places a critical importance on field-based work in studying civilization, culture, and the environment. It also emphasizes that civilization, culture, and the environment keep changing through interactions with each other, while people's core identities remain unchanged.

Comparative Studies of Civilizations, Cultural, Regional and Historic Studies on Environment

Fieldwork in Africa

Division of Natural Sciences

The Division of Natural Sciences aims to establish a new intellectual paradigm where the concept of nature, obtained from the study in natural sciences, and the concept of human beings, obtained from the study in the humanities and social sciences, are integrated. The Division helps students understand materials, lives, the earth and fundamental principles that control the universe, as well as the correlations among them. The Division's five fields (see below) provide students with opportunities to construct a repository of ideas and knowledge in each academic field while encouraging them to break the walls among the established domains in their study and research.

Physical science, Chemistry, Material science, Biological science, Geosciences

Comprehensive field practice
(Surveys of benthic organisms in Ise Bay)

Faculty of EDUCATION

Researching human minds, human relations, and social foundations of education

Overview

Enriched learning opportunities with high social impact

One primary objective of the Faculty of Education is to guide students as they acquire expert knowledge about human minds, human relations, and social foundations of education, through learning various ways to interpret diverse phenomena at the intersection of education and human society. Another goal is to encourage them to contribute to constructing a global society where people with different backgrounds can co-exist peacefully. The key outlook we seek to cultivate is one of wide perspective, understanding of diverse experience, synthetic thinking and critical judgement.

Interdisciplinary approach to education

The Department of Educational Sciences offers three specialty areas. As undergraduate students need comprehensive understanding, this institutional structure allows us to provide them with the fundamental knowledge concerning the various fields related to education. In addition, our study trajectory of gradual specialization allows them to address the complex and multilayered issues that modern education faces from multiple viewpoints.

*See the next page for details on each division.

Smooth transition from foundation courses to specialization

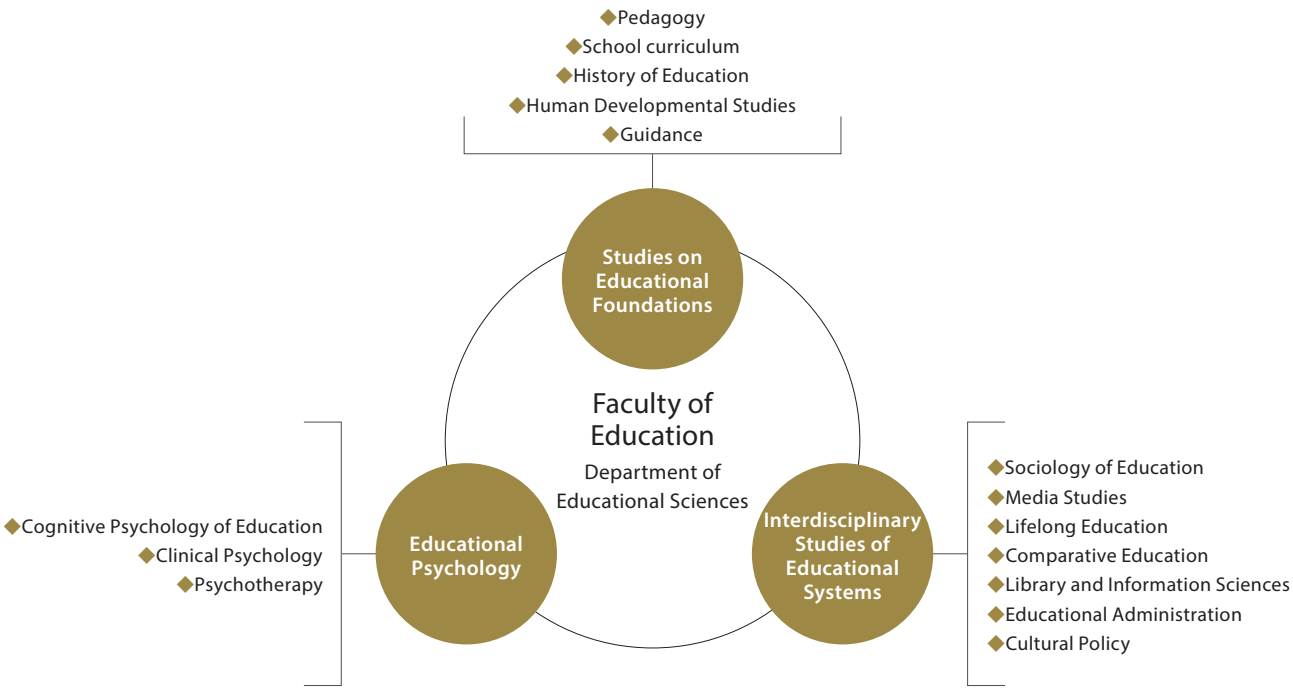
In the first year, students study Liberal Arts and Sciences Courses to acquire a broad general education. As the year progresses, they are introduced to basic subjects for their specialized fields and subjects.

In order to foster a broader view and multifaceted thinking, the faculty recommends that students also enroll in Liberal Arts and Sciences Courses offered by other faculties.

＜Curriculum Ladder＞

- **First year** / Students take courses such as "Introduction to Educational Studies" (required) and "Informatics" (recommended). They might also benefit from enrolling into courses from the teacher training program, or Liberal Arts and Sciences Courses and ILAS seminars (small group education) offered by the Faculty of Education.
- **Second year** / Students mainly take basic courses in specialized fields and, based on their interest and aptitude, start thinking about the divisions they will affiliate themselves with during their third year.
- **Third year** / Students take specialized courses from within their chosen division: Studies on Educational Foundations, Educational Psychology, or Interdisciplinary Studies of Education Systems.
- **Fourth year** / Students write a graduation thesis — the culmination of their studies up to this point. For those that will go on to graduate school, writing the graduation thesis will be the first step to becoming a researcher.

Specialty Areas



Outline of Specialty Areas

Multiple perspectives on complex issues in modern education

Studies on Educational Foundations

The courses in this division have been created for students interested in the following areas: working at schools; participating in the development of school curricula and educational assessments; examining emotional development or disorders from the preborn period, and; studying educational issues from a historical and philosophical viewpoints.

＜Main subjects＞

●**Philosophy of Education, History of Education** / Students analyze various educational issues from philosophical and historical viewpoints (e.g., Why do we need education? What types of schools are desirable?). They also study the establishment of school educational system, attitudes toward education from a historical viewpoint, and explore changes to education over time. Students obtain knowledge in general and concerning educational methodology in preparation to present their ideas on new learning experiences and forms of education.

●**Study of Educational Methods, Developmental Science** / Students learn the established theories and practices on curriculum, classroom instruction, and assessment. They also explore human physical and emotional development based on developmental science in areas where the humanities and science intersect. Overall, students should aim to discover appropriate and effective educational methods. This subject emphasizes fieldwork.

●**Educational Anthropology, Clinical Education** / Students primarily study thoughts by exploring the themes present under educational anthropology including the arts, the body, and languages. Students develop a sensitivity towards the deeper meanings of "words" and the ability to think practically in the field.

Discussion in Clinical-Philosophical Pedagogy

Broad-based knowledge and innovative thought on the mechanisms and functions of mind

Educational Psychology

This Division intends to foster broader knowledge and flexible thinking on the mechanisms and functions of the mind. It has an extensive curriculum that focuses on educational and cognitive psychology and clinical psychology, providing active educational and research activities in cooperation with other units or professors of psychology in other faculties.

＜Main subjects＞

●**Cognitive Psychology of Education** / Students learn established theories and develop their base of knowledge on aspects of higher-level cognitive processes, including memory, language, assumption, decision-making, intelligence, understanding of the 'other', empathy, and social cognition. Students also acquire and apply knowledge on psychological aspects closely related to educational activities, such as teaching and learning methods, motivation, use of media and computers, and the development of higher-level cognitive processes. They build a foundation for psychological research by performing psychological experiments, surveys, and data analysis.

●**Clinical Psychology** / Students learn psychotherapy, psychological assessment techniques, survey methods, and the methods of image representation, such as drawing and play therapy, to deepen their understanding of themselves and acquire the skills to support others mentally. Such expertise and skills are valued in multiple fields of work and will help interested students obtain certification as clinical psychologists through the master's course at the Graduate School.

Colloquium on Educational Psychology II lesson.

Psychology experiment

Connecting education and society for the future

Interdisciplinary Studies of Education Systems

In the 21st century, not only schools, but the entirety of society plays a role in education. As a result, flexibility and networking for education have become important issues. Therefore, students in the Division of Interdisciplinary Studies of Education Systems embark on creative explorations of the connections between education and society. The Division curriculum focuses on important issues that society and the next generation are anticipated to encounter and tackles these in unique courses, including small-group seminars and lectures.

＜Main subjects＞

●**Sociology of Education** / Students study the effects group education has on society and develop the sociological skills to examine related issues, such as a society based on academic credentials, juvenile problems, and educational changes.

●**Lifelong Education** / Students analyze education and culture from perspectives beyond compulsory schooling. Specifically, they study issues concerning social education, library and information science, and media culture.

●**Comparative Education, Educational Policy** / Students explore various education systems comparatively, through examination of policies, practices, and theories in countries across the world. This comparative research is done in conjunction with studying educational administration, financial systems, and concrete policy development from a policy science perspective.

Introduction to Library and Information Studies

Faculty of LAW

Fostering the conceptual ability to lead in the design and operation of systems and organizations

Features of Faculty of Law, Kyoto University

Fostering talent for business, law, government, and many other spheres of society

The name "Faculty of Law" often makes people think of a place for the training of professional lawyers, like law schools in the United States. But faculties of law in Japan have long functioned as places to foster talent for the business world. At most, only one in every four graduates from the Kyoto University Faculty of Law enters the legal profession. Most of the remaining three quarters pursue careers in private companies. Many have taken up executive posts at major Japanese corporations and been leading Japanese industry. This is one of the reasons that the Kyoto University Faculty of Law has gained such an enviable reputation.

Studying major courses in law and political science

The Faculty of Law offers introductory major courses for first-year students, but students start to take most of the major courses in their second year. The curriculum centers on courses in law and political science (in the ratio of around three to one), but students can also take up to about ten courses from the Faculty of Economics. These courses enable students to gain broad insights into society, the corporate world, and the nation-state, and especially the rules that govern them. Since Japanese companies place a high value on students who have undergone this type of training, as mentioned above, most graduates of the Faculty of Law go on to work in the business world.

Honing your research, presentation, and debating skills in seminars

The Faculty of Law offers small-group courses called "seminars" for students in their third and fourth years. In seminars, all students pursue research on a pre-determined theme, report their findings to the class based on a research paper, and discuss their report with the instructor and other students in the class. By proactively engaging in these courses, students can expect their skills of research, presentation, and debating to improve dramatically. For this reason, the Faculty of Law strongly encourages students to take seminar courses, and in reality almost all of its students do (it is possible to take one seminar course each semester with a maximum of up to three in total). English is designated as the language of instruction in some seminars.

Solid, incremental curricular requirements combined with respect for students' autonomy in learning choices

In order to encourage solid progress through the curriculum, the Faculty of Law sets limits (caps) on the number of credits students can take each semester; and with a view to incremental learning, the major curriculum available to second-year students is limited to a range of foundational courses. However, as none of the major courses are mandatory, students are free to make their own course choices in line with their individual plans for the future. In this way, students take the initiative for selecting their courses and planning their studies based on the idea that "all students design their own future." This is another distinctive feature of the Faculty of Law at Kyoto University.

Overview of Major Courses

Major Subjects

The Faculty of Law at Kyoto University offers the following elective major subjects aimed at broadening students' perspectives and developing individuals capable of re-evaluating the concepts of country and society, and taking leadership roles in organizations:

Legal / Legal Philosophy, Sociology of Law, Japanese Legal History, European Legal History, Roman Law, Chinese Legal History, Introduction to Anglo-American Legal Systems, German Law, French Law, Constitutional Law I, Constitutional Law II, Administrative Law I, Administrative Law II, Tax Law, International Law I, International Law II, Law of International Organizations, Civil Law I, Civil Law II, Civil Law III, Civil Law IV, Commercial Law I, Commercial Law II, Economic Law, Intellectual Property, Law of Civil Procedure, Private International Law, International Trade Law, Labour Law, Social Security Law, Criminal Law I, Criminal Law II, Criminal Procedure, Criminology, Introduction to Law I, Introduction to Law II, Family and Law

Political Science / Principles of Political Science, Political Process, Comparative Politics, American Politics, International Politics, Analysis of International Political Economy, Political History, Political and Diplomatic History of Japan, History of Political Thought, Public Administration, Public Policy Analysis, Introduction to Political Science I, Introduction to Political Science II

Research on Foreign Literature / Research on Foreign Literature (English/German/French)

Special Classes / Civil Execution and Civil Provisional Remedies, History of Japanese Political Thought, Diplomatic History, Introduction to European Law, Japanese Politics from a Comparative Perspective, International History 1900 to the Present, Modern Society and Justice, Modern Society and Lawyers, Practice and Law in Asset Management, Practice and Law of Life Insurance, Financial Law and Banking Business, Theory and Practice of Trust Law, A Practical Guide to International Business Practice and Law

Economic Relations / Microeconomics 1, Microeconomics 2, Political Economy 1, Political Economy 2, Public Finance, Economic History 1, Economic History 2, Tax System, Money and Banking, Monetary Policy, Basic Statistics, Economic Statistics, Accounting 1, Accounting 2, History of Economics, Economic History of Japan, Theory of Social Policy

Seminars

Our seminars prepare students to engage in vigorous debates and discussions and have been prominently featured since the establishment of the Faculty of Law. Seminars can be taken in the following areas:

Legal / Sociology of Law, Japanese Legal History, Roman Law, Anglo-American Legal Systems, German Law, Constitutional Law, Administrative Law, Tax Law, International Law, Law of International Organizations, Civil Law, Commercial Law, Economic Law, Intellectual Property Law, Law of Civil Procedure, International Trade Law, Labour Law, Private International Law, Social Security Law, Criminal Law, Criminal Procedure Law

Political Science / Principles of Political Science, Political Process, Comparative Politics, American Politics, International Politics, Analysis of International Political Economy, Political History, Political and Diplomatic History of Japan, History of Political Thought, Public Administration

Faculty of ECONOMICS

Promoting flexible thinking and greater creativity to pave the way for the future

Features of the Faculty of Economics, Kyoto University

Develop judgment to overcome difficulties

The Faculty of Economics at Kyoto University enables students to identify problems and find solutions for themselves in line with the fundamental learning principle of "self-study." This is based on the idea of "academic freedom," allowing us to pursue diverse methods of thinking and respond reasonably to the demands of a developing society along with scientific development. It is essential to build a foundation with which to exercise academic freedom under a spirit of self-study. Based on this belief, the economics and management studies offered at Kyoto University focus on developing the ability to make effective judgments, regardless of social position.

Four concentrations across the areas of economics and management studies

The Faculty of Economics at Kyoto University emphasizes the connection between economics and management studies and has combined them into one department. The Department offers four concentrations: Economic Theory and History, Economic Policy, Management, and Finance and Accounting. Students are able to develop their expertise by taking classes in specialized subjects recommended for each concentration.

Building the foundation for specialization in the first year

In the first two years, students mainly take Liberal Arts and Sciences Courses including language skills. To acquire independent learning skills in the first year, they participate in introductory seminars and attend nine introductory subjects: Introduction to Microeconomics, Introduction to Macroeconomics, Introduction to Political Economy, Basic Statistics, Introduction to Economic History and History of Social Thought, Contemporary Economic Affairs, Introduction to Management, Introduction to Accounting, and Introduction to Information Processing. (See the next page.)

Building expertise in the second and third years

In accordance with their goals for the future, students select subjects from the basic specialized subjects and specialized subjects (I) in the second year, and specialized subjects (II) in the third year. Furthermore, from the third year onward, students can enroll in law and political science classes provided by the Faculty of Law in addition to their specialized subjects in economics and management studies. Those intending to pursue more advanced studies can select subjects offered by the Graduate School.

Overview of Studies

Building the foundation of both economics and management studies for interdisciplinary learning

Nine introductory subjects

The Faculty of Economics at Kyoto University has introduced a one-department system, wherein the former Departments of Economics and Department of Management are integrated into the new Department of Economics and Management. Students are thus able to transcend the boundaries of these closely related fields by studying them in conjunction. In this system, students must develop a solid foundation of both economics and management studies by taking nine introductory subjects in the first year. An overview of the subjects is provided as follows:

＜Microeconomics＞

Microeconomics is the analysis of how economics functions based on the market mechanism. It adopts a perfect competition model that stems from the maximization principle popularized in the 19th and 20th centuries. Today, however, the economy tends to be dominated by mega corporations, making evident the fictitiousness in perfect competition models.

These factors have resulted in the emergence of the Game Theory, wherein strategic decisions are made by playing a game, such as ***Shogi***, Japanese chess. With a focus on this Game Theory, modern microeconomics has become a fundamental tool for cutting-edge applied economics, including healthcare and welfare economics, marketing economics, economics of information and communication, urban and transportation economics, business and organizational economics, and environmental economics.

＜Macroeconomics＞

Macroeconomics is the economics area that analyzes economic activities from a wider perspective. In other words, macroeconomics is not used to analyze economic activities of a specific individual, company, or industry; rather, it provides a comprehensive vision of national and world economies. This causes the following questions to arise: Why does the economy experience booms and busts? What measures should the government take to control economic changes? How did developed countries successfully transform their industrial structure and increase their income? Why do developing countries fail to change their agriculture-dependent economic structure and continue to have a low-income status? Macroeconomics provides the information to accurately respond to such questions.

＜Social Economics＞

Social economics was previously used as a generic term for the theories of classical economists, such as Adam Smith, David Ricardo, and Karl Marx. They had a wide social perspective that was not limited to economics, but which extended to politics and culture. Their long-term vision enabled the examination of centuries of history. However, in the early 20th century, classical economic theories began losing their validity due to changes in technology and organizational structure; mass-production technology was established and gigantic corporations emerged. With these changes in capitalism, John Maynard Keynes and Michał Kalecki created new theories. Modern social economics helps analyze the structure and system of modern capitalism, combining the social and historical viewpoints from classical economists with Keynes' and Kalecki's theories.

＜Management＞

Management studies broadly examine business phenomena. Management implies planning, directing, and running business activities to achieve a specific goal. The concept of management was previously limited to private companies; however, it has extended to other social entities where management quality is important, such as hospitals, government, local authorities, and NPOs. In addition, businesses are being required to not only pursue profits for themselves, but also benefit individuals referred to as stakeholders, creating a more complicated management system. This also makes theories of management studies that address optimal solutions more complex. Taking on these challenging issues of theory and practice is the essence of management.

＜Accounting＞

Accounting, or the "language of business," provides an accurate understanding of the status of entities and allows for the consideration of the best accounting status.

Accounting is broadly classified into two categories: macro accounting (including social accounting and national accounts) and micro accounting (including household accounting, corporate accounting, non-profit organization accounting, and public accounting).

In addition, based on the users, it can be further split into an additional two categories: financial accounting (intended for shareholders, outside enterprises, and creditors) and management accounting (intended for business managers). Thus, two academic fields, financial accounting studies and management accounting studies, have been developed for its examination.

＜Information Processing＞

Information processing is a social activity that refers to the decision-making process of human beings, requiring the support of information communication technologies, such as the Internet and computers. In addition, the rapid development of technology has drastically changed society; businesses not using them (or without familiarity with them) would fail.

However, this information processing class is not limited to the study of economics and management. Students learn about information processing technologies, including communication, while analyzing society and organizations using computer simulations, forecasting the future, and examining the foundation of economics and management studies.

＜Basic Statistics＞

Statistics was previously used to provide the necessary materials for public administration and to collect figures for the organization of populations, incomes, and cultivated land to measure national power. Currently, however, it covers a wide range of data and is applied to multiple fields, including public administration and commerce, as well as being a criterion for investments in stocks and currencies.

Thus, in this class, students mainly learn about two areas: descriptive statistics and mathematical statistics. In descriptive statistics, students learn about tools, such as the price index, that are primarily used in professional practice. In mathematical statistics, they learn to verify various estimations and hypotheses from a mathematical viewpoint.

＜Contemporary Economic Affairs＞

In the study of human society, economics is used to address economic and social issues; this concept is also referred to as "interest in policy." The topics of Economic Policy, Finance, Financial Theory, Social Policy, World Economics, and Public Economics included in this subject are common to the approach of "study based on current social and economic issues." Although there are many approaches to address economic issues, understanding complex social phenomena requires a holistic and multifaceted analytical perspective. The shared objective across the lessons in this subject is to develop sensitivity and a multifaceted view toward actual economic issues.

＜Economic History and History of Social Thought＞

The study of Economic History and History of Social thought is based on the notion of "温故知新 (Onkochishin)," which refers to the development of new ideas based on studying the past. The significance of studying these two areas is that students will examine current economic society from a historical perspective, rediscover the "forgotten issues" of economics and society, and generate "new issues" with a view toward "how economics should be." For example, students discover the secrets, conditions, and issues of the country with the largest economy by analyzing the process of their creation; consider the role of management by examining the growth and collapse of a company; or understand various issues experienced when forming a group. In this way, they can develop an opinion on ideal social models, acquire the ability to analyze matters from a historical perspective, and develop a viewpoint that facilitates the discovery of new possibilities in aspects of everyday life usually taken for granted.

Faculty of SCIENCE

Question Nature and Learn from It

Learning in the Faculty of Science, Kyoto University

Develop creativity with clear goals

The Faculty of Science, Kyoto University, has two educational objectives for nurturing students to take the responsibility for the future progression of the natural sciences in the next generation:

❶Provide opportunities to learn the fundamental knowledge of the natural sciences and develop students' ability to creatively apply that knowledge.

❷Develop students' ability to integrate knowledge into new intellectual values.

To achieve these educational objectives, we provide a liberal academic culture and encourage creative scientific activities and autonomous learning. We have established a one-faculty system, which allows students to first engage in a process of "gradual specialization" and then move forward to the forefront of the sciences.

Years 1 and 2: Focus on the Liberal Arts and Sciences Courses and the basics in specialized fields

All the students in the Faculty of Science of Kyoto University learn common subjects (subjects learned by the entire faculty) in Years 1 and 2, comprising mainly Liberal Arts and Sciences Courses and the basics in specialized fields. Liberal Arts and Sciences Courses include eight groups: Humanities and Social Sciences, Natural Sciences, Languages, Informatics, Health and Sports, Career Development, Interdisciplinary Sciences, and Seminars in Liberal Arts and Sciences(academic staff from the Faculty of Science provide lectures in many natural science subjects). The basic subjects for the specialized fields lay the foundation for more specialized major studies in Year 3 and later. The first two years provide students with opportunities to develop basic knowledge and skills to excel in specialized sciences, to explore various academic disciplines, and to broaden their horizons.

Years 2 and 3: Five majors of targeted expertise in the natural sciences

Students select one of the five majors at the end of Year 2 and begin studying in their specialized fields in Year 3. (Kyoto iUP students select their majors at the time of application and they are determined before Year 1.) In the majors, students take specialized subjects, including seminars, experiments, and practicums, to acquire the most advanced knowledge accumulated by the Faculty of Science, Kyoto University.

- Mathematical Sciences Major: Mathematics subjects
- Physics and Astrophysics Major: Physics and Astrophysics subjects
- Earth and Planetary Sciences Major: Geophysics and Geology Mineralogy subjects
- Chemistry Major: Chemistry subjects
- Biological Sciences Major: Zoology, Botany, and Biophysics subjects

* For details on the majors see the next page.

Year 4: Graduation work

All the students are required to submit a final piece of research in Year 4. The students are provided with personalized instruction from their supervisors to learn research methods and develop their ability to summarize results. Through these activities, their motivation to engage in more advanced specialized research is expected to increase.

Application for Graduate School at Year 3

The Division of Mathematics and Mathematical Sciences and the Division of Chemistry, Graduate School of Science provide undergraduate students who have studied in the Faculty for at least three years with admission to apply to the master's degree program if the candidates have been in excellent academic standing for the specified subjects. Graduates who are enrolled in the doctoral program may be granted a doctoral degree within the combined five-year master's and doctoral program period if they demonstrate remarkable achievements.

Study programs for the five majors

Mathematical Sciences Major: Students learn the basics of higher mathematics and explore cutting-edge mathematical theories

Mathematics is a discipline that aims to understand the laws governing changes in numbers, figures, and quantities, and has a long disciplinary history. Nowadays many new mathematical problems have arisen, including those in other disciplines, such as physics, earth planetary science, chemistry, and biological science, requiring new theories to solve them. Additionally, because of its universal nature, mathematics maintains close ties not only with the natural sciences, but also with many social science fields, such as informatics and economics. Within the context of mathematics, the Major provides a broad education on the basics of algebra, geometry, mathematical analysis established in the first half of the 20th century, as well as encourages students to explore the latest mathematical theories.

Learning areas / Number theory, algebra geometry, algebraic phase geometry, differential topology geometry, differential geometry, dynamical system, complex manifold theory, complex function theory, representation theory, function analysis, differential equation theory, stochastic theory, algebraic analysis/mathematical physics, theory of operator algebras, computer science, applied mathematics, and insurance mathematics


Lecture on mathematical science.

Physics and Astrophysics Major: Provides a wide range of research and programs, including theoretical examinations, experiments, and observations

Physics seeks to determine the universal laws of nature and to understand the various phenomena that result from differences in types of substances and scales of time, space, and energy. Based on the scientific nature of the discipline, the Physics and Astrophysics Major is divided into three departments. The Department of Physics I focuses on the structure and properties of substances. The Department of Physics II studies the basic structure of space-time, elementary particles, nucleus, gravity, and cosmology. The Department of Astronomy focuses on various scales of phenomena that can be observed, from the sun to the farthest known galaxies. Those departments are devoted to a wide range of research and educational activities, including theoretical exploration, experiments, and observations.

Learning areas / Irregular system physics, quantum optics/laser spectroscopy, low temperature physics, optical properties, solid quantum properties, quantum condensation properties, space-time/life physics, soft matter physics, nonlinear dynamics, condensed matter theory, phase-transition dynamics, fluid physics, non-equilibrium physics, nuclear and hadron physics, particle physics, cosmic-ray physics, particle theory, nuclear theory, nuclear astrophysics, solar physics, solar and astronomic plasma physics, stellar physics, galactic physics, and theoretical astrophysics


Seminar on physical science.

Earth and Planetary Sciences Major: Committed to educational and research activities around apparent but profound and far-reaching events

The Major deals with the Earth, the planet where we live, and the space between the planets surrounding the Earth. Courses encompass a wide scope of research, covering topics such as 1) the atmospheric flow's effect on cloud movement; 2) oceanic flows that occur deep below the Pacific Ocean beside Japan; 3) crustal movements inside the Earth, which cause earthquakes and form volcanos; 4) particles reaching the Earth from the sun that cause auroras and affect the Earth's magnetic field; 5) mantle flow, which built the Himalayas and split the continents of South America and Africa; 6) high-temperature and high-pressure environments, which created diamonds; 7) the evolution of organisms that originally existed as "rose algae" 3.5 billion years ago into their present forms and 8) the existence (past or present) of organisms on other planets. Although relatively familiar, these topics are related to profound and far-reaching events covered in the major.

Learning areas / Solid-earth geophysics, hydrosphere geophysics, atmospheric physics, solar-planetary electromagnetism, earth tectonics, petrology, mineralogy, stratigraphy, historical geology, and geochemistry, and cosmochemistry


Observation of a hot-water reservoir located at the first crater of Nakadake, peak of Mount Aso, for a Year 3 assignment.

Chemistry Major: Seeks creation of useful new substances based on understandings of nature

Chemistry works to discover structures, nature, and reactions at the atomic level and to create useful new substances based on scientific findings of nature. The Chemistry Major covers investigation of all the substances existing in nature, ranging from atoms to molecules and organisms to space, with vastly unexplored areas. Research methods and approaches vary greatly depending on the subjects and fields involved, ranging from the fields centered on experiments (synthesis, analysis, and measurements) to the theoretical and calculation-based fields. The wide variety of the fields and methods characterizes the varieties in chemistry, and students can select the major according to their interests and career objectives.

Learning areas / Solid state physical chemistry, biostructural chemistry, quantum chemistry, theoretical chemistry, physical chemistry, molecular spectroscopy, photophysical chemistry, molecular structure chemistry, electron spin chemistry, surface chemistry, metallography, inorganic material chemistry, organic chemistry, organic synthetic chemistry, agglomerate organic molecule function, biochemistry, molecular material, and genetic dynamics


A chemical experiment

Biological Sciences Major: Applies diverse methodologies to understand organisms and the environment holistically

The Major focuses on the various ways organisms exist on the Earth and the underlying phenomena of life. Macroscopic approaches are used to address ecology, behavioral science, phylogenetic taxonomy, anthropology, natural history, and outdoor research and seek to clarify the mechanisms underlying biological diversity. Life sciences are now shifting to a new stage of exploring the new frontier of genome decoding. Microscopic approaches used in cell biology, embryology, molecular biology, and structural biology have also produced creative works and contributed to our understanding of various life phenomena at the molecular level. The major seeks to understand organisms, taking their environments into account and using methodologies from both microscopic and macroscopic viewpoints.

Learning areas / Natural anthropology, human evolution, animal phylogeny, animal behavior, animal ecology, animal development, stress response biology, plant physiology, plant chronobiology, plant systematics, plant molecular cell biology, plant molecular genetics, genome information expression, theoretical biophysics, molecular physiology, neurobiology, structural physiology, and molecular embryology


Students in a specialized learning environment.

Faculty of ENGINEERING

Contributing to society through original thinking and innovative engineering

Features of the Faculty of Engineering, Kyoto University

Development of problem solving skills and execution of ideas

The Faculty of Engineering, Kyoto University, aims not only to provide students with opportunities to acquire expertise in a specific field, but also aims to nurture young researchers who can envision future scientific and technical developments and contribute to the creation of new fields. Therefore, all six divisions described in the next page, focus on providing a solid base of knowledge, cultivating critical thinking, and evaluating the growth potential of ideas.

Flexible learning to foster creativity

Creativity through flexible approaches to problems incorporating research, development, and technology is essential for the success of students embarking on study in the Undergraduate Schools of Industrial Chemistry, Engineering Science, Electrical and Electronic Engineering, Informatics and Mathematical Science, Global Engineering, and Architecture. Based on this premise, respective Divisions have based their curricula on a commonality of flexibility with the goal of encouraging creative thinking. In addition to the basic curriculum, students can broaden their knowledge by studying specialized subjects from other divisions and faculties based on their interests.

Focusing on Liberal Arts and Sciences Courses

The first- and second-year students of the Faculty primarily learn Liberal Arts and Sciences Courses centered around cultural education with the objective of broadening their individual perspectives. Liberal Arts and Sciences Courses are classified into eight subject groups: Humanities and Social Sciences, Natural Sciences, Languages, Informatics, Health and Sports, Career Development, Interdisciplinary Sciences, and Seminars in Liberal Arts and Sciences (small group education). During the first two years, students strengthen their foundation of knowledge in preparation for studying advanced specialized fields.

Gradual transition to advanced specialized subjects

In the Faculty, first-year students of almost all divisions are introduced to the basic subjects in their area, while the second-year students primarily focus on specialized subjects. Specialization, begun in the second year, intensifies for third-year students who primarily take advanced courses dealing with specialized subjects. By gradually transitioning from basic to advanced specialized subjects, students steadily develop their intellectual capabilities and make flexible use of their solid knowledge base.

Creative research toward graduation

Fourth-year students undertake specialized research in their own subjects called "Special Research" under the instruction of subject teachers. This is a major project required for graduation with research results presented in the form of a bachelor's thesis. In order to complete this project, each student works in a laboratory to experience creative research activities while engaging in discussions with teachers and graduate students.

Introduction of the six divisions

Supporting rational global development and conservation, as well as sustainable human development

Undergraduate School of Global Engineering

Global Engineering consists of three fields: the technical system of resources and energies necessary for civilization, the technical system of infrastructure (social infrastructure) that supports civilization, and the technical system that maintains the balance of the natural environment and human society. The Undergraduate School of Global Engineering thus covers a wide variety of science & technologies and aims to support rational global development and environmental protection as well as sustainable human development based on the well-known principle of "Think Globally and Act Locally". Education offered by the division intends to develop considerable insights of the comprehensive nature of science & technologies associated with relevant disciplines. Concerning more specialized science & technologies, students also develop their ability to execute advanced research and practical operations while acquiring cutting-edge knowledge in the field. This division offers an International Course wherein all classes are provided in English as a way to develop international engineers.

Learning about human technologies imbedded in every aspect of human civilization

Undergraduate School of Architecture

Architecture, which is responsible for creating human living environments and is relied upon to develop safe, healthy, and comfortable living, involves creative endeavors integrating multiple technologies. It can also be referred to as "human" technology because of its deep connection to every aspect of our lives. Because of these characteristics, the education offered by the Undergraduate School of Architecture covers a wide range of natural sciences, humanities, and social sciences. Graduates have diverse career options, including architectural design and construction, structural engineering, building environment engineering, building administration, new technologies research, and consulting for a wide variety of development businesses. Therefore, the department welcomes not only students who are interested in natural sciences, but also those who are interested in humanities, social sciences, and the arts by providing a broad-based education to fully cultivate their skills.

Five interdisciplinary courses aimed at cultivating individuals who create new technologies

Undergraduate School of Engineering Science

There are great expectations for 21st century engineering science with regard to the development of new systems, materials, and energy sources, as well as for the resolution of issues, such as utilization of cosmic space. To create new technologies that can meet such needs, students need to have a deep understanding of basic subjects. Based on this philosophy, the Undergraduate School of Engineering Science promotes education and research focusing on grasping the basics. In addition, five courses—Mechanical and Systems Engineering Course, Materials Science Course, Aeronautics and Astronautics Course, Nuclear Engineering Course, and Energy Science Course—collaborate closely to offer an interdisciplinary education. Furthermore, the Graduate School of Engineering (to which most students proceed) has departments, such as Mechanical Engineering and Science, Micro Engineering, Aeronautics and Astronautics, Nuclear Engineering, and Materials Science and Engineering, which are affiliated with the departments within the Graduate Schools of Energy Science and Informatics and other affiliated research centers allowing students to conduct basic research and advanced interdisciplinary study.

Supporting science and technologies required by all industries and infrastructures

Undergraduate School of Electrical and Electronic Engineering

Electrical and Electronic Engineering supports science and technologies essential to all industries of modern society and underpins much of social behavior. In addition, it plays an important role required to enrich 21st century society, such as building sophisticated and safe information and telecommunications networks, creating elements and devices with new functions based on nanotechnology, developing precise and sophisticated diagnostic technology, producing human-friendly medical technology, and using energy in highly efficient ways. Based on such needs, the Division aims to develop individuals with a wide range of integrated knowledge and expertise, as well as vision broadened by multiple aspects, excellent creativity, and a sense of morality. Therefore, the curriculum is designed in such a way that students learn the basic elements in great detail and are gradually introduced to their select specialized subjects. This approach enables young researchers to acquire the knowledge and techniques required to develop electrical and electronic engineering further.

Solving complex system issues in accordance with the developments of an advanced information society

Undergraduate School of Informatics and Mathematical Science(Computer Science Course)

As society becomes more information-oriented, information systems are becoming bigger and more complex. As a result, big data, an enormous collection of information obtained through complex systems, requires analysis. To complete this task, students must be able to identify how the systems function and the information flow, as well as propose efficient design solutions based on these factors. The Undergraduate School of Informatics and Mathematical Science consists of the two courses: Computer Science Course, and Applied Mathematics and Physics Course. iUP students can enter the Computer Science Course, and acquire a comprehensive education from the basics up to the advanced level. By developing a mathematical method of thinking, students are able to solve various problems related to complex systems, as well as design and utilize computer hardware, system software, and information systems.

A foundation of cutting-edge science technologies which supports comfortable living

Undergraduate School of Industrial Chemistry

Chemistry, which studies the reactions and processes of various artificial substances, as well as physical properties that determine the functions of materials, ensures a level of comfort in modern lifestyles and is the foundation of cutting-edge science technologies. Based on this premise, the Undergraduate School of Industrial Chemistry provides education aimed at developing individuals involved in research, development, and technology who will play active roles in a wide range of chemistry-related fields. Specifically, first-year students learn natural science-related basic subjects, such as chemistry, physics, and mathematics, while concurrently learning languages, the humanities, and social science subjects. Second-year students primarily learn basic specialized subjects of the Division in the first semester and then choose to join either the Frontier Chemistry Course, the Advanced Chemistry Course, or the Chemical Process Engineering Course in the latter half of the academic year. They then receive specialized education in Years 3 and 4. Fourth-year students strengthen their foundation as either a researcher or an engineer by undertaking sophisticated work in their laboratory required for graduation.

Faculty of AGRICULTURE

Life, Food, and Environment

Learning in the Faculty of Agriculture

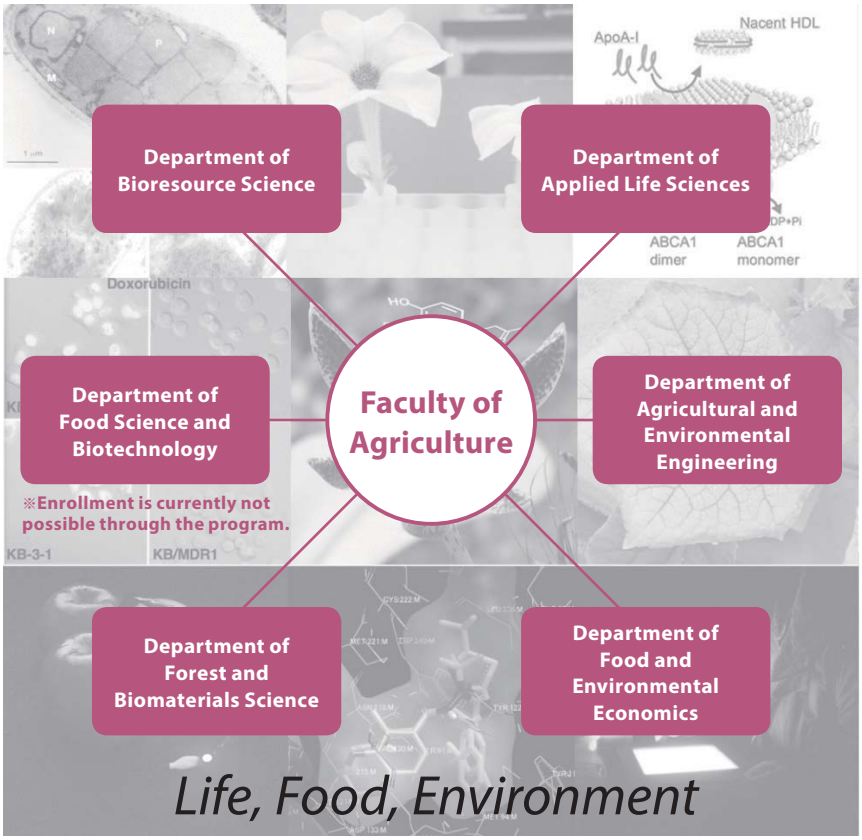
Five departments offer opportunities to acquire academic and advanced knowledge and develop broadened perspectives.

The objective of the Faculty of Agriculture is to provide opportunities to learn about agriculture and related knowledge and to nurture individuals with a solid sense of social responsibility. The Faculty supports the following objectives: (1) to ensure students develop broad perspectives enabling them to envision scientific solutions to address the challenges that mankind are facing, (2) to ensure students understand the significance of the agriculture, forestry, and fisheries industries, including the importance of food- and life science-related industries for society, and (3) to ensure students understand the latest developments in both natural and social sciences related to life, food, and environment.

To achieve these objectives, the Faculty of Agriculture has six departments, all of which strive to create a liberal academic culture, one of the Faculty's most respected characteristics, intent on nurturing graduate, who view issues with an open mind and seek holistic solutions to problems.

Human society coexists with various organisms, such as animals, plants, and microorganisms, on the Earth for our survival. To use these bioresources more sustainably, it is essential to acquire a deep understanding about the mechanisms, by which organisms maintain their life and the ways, in which ecosystems are constructed. Additionally, analysis through technological expertise and social science methodologies is also needed to ensure human activities support vital ecosystems. Students are required to obtain fundamental knowledge offered by the individual department, in which they major and to make active efforts to broaden their vision by extending their interest into related fields.

In next academic year, 5 of 6 Departments, namely the Department of Bioresource Science, Department of Applied Life Sciences, Department of Agricultural and Environmental Engineering, Department of Food and Environmental Economics and Department of Forest and Biomaterials Science offer opportunities to study in the Faculty of Agriculture.



Year 1 / Introductory learning

In the Faculty of Agriculture, students are enrolled in the individual department upon admission and follow a four-year education program specified by their departments. In addition to knowledge about natural sciences, such as biology, chemistry, and physics, methodologies used in social sciences must also be learned to study the agricultural sciences. The departments have established integrated curricula (lecture programs) that incorporate liberal arts subjects together with specialized subjects. It is important for first-year students not to limit their study within the disciplines selected in their departments in order to expand their base of knowledge. Therefore, first-year students should primarily concentrate on general education subjects, including subjects in natural sciences, humanities/social sciences, and foreign languages. They can also participate in health and physical education courses or add other subjects, including courses in international education, which provide opportunities for social exchanges with international students.

Years 2 and 3 / Enhanced learning

Second-year students take the basic courses in their specialized subjects in the second semester of Year 2 (autumn and winter) and prepare for a more intense specialized education in Year 3. In addition to lectures, the Faculty preferentially offers students opportunities to participate in specialized courses offering experiments, practical exercises, and seminars. In this way, students receive high-quality training in experimental techniques and methods, in preparation for specialized study later in their respective departments. The Faculty is one of the most enthusiastic at Kyoto University in terms of encouraging international exchange activities, sending many undergraduates to international institutions.

In the third year, students only take specialized subjects. Year 3 is an important year as the students take their first significant steps toward becoming researchers. The third year is when students must determine their study fields (laboratories). Third-year students are required to investigate their future career options by visiting laboratories and attending lectures with regularity. The departments have well-designed mechanisms to help assign third-year students to their laboratories.

Year 4 / Finalized learning

In Year 4, students work on research assignments in their research fields throughout the year and prepare graduation theses. This is the first step they take as researchers by working on contemporary topics with graduate students under the supervision and mentorship of academic staff. Therefore, fourth-year students are devoted to their own research, as well as assigned work in their study field seminars. Students intent on pursuing advanced studies also need to prepare for the Graduate School entrance examination. The students who earn the required credits are awarded a bachelor's degree (in agriculture).

Department of Bioresource Science

Humans have harnessed a vast diversity of plants, animals, and microorganisms that inhabit and flourish on the land or in the ocean—not just to sustain our livelihoods and activities, but also to support and enrich our daily lives. For centuries, humans have applied a great deal of effort and wisdom to find ways to grow and raise bioresources so as to maximize their potential and to develop environments suited for their habitation and growth, while at the same time improving such precious resources to better serve our purposes at any given time. These efforts have paid off to an extent, and an abundance of food and other necessities are within easy reach in some countries. On a global scale, however, humans are faced with the harsh reality that food production is not likely to keep pace with the population explosion of this century, and the excessive use of bioresources is severely damaging the global environment and destroying ecosystems. As this is the case, the citizens of earth are required to confront the momentous challenge of ensuring the stable production of bioresources and constantly increasing their productivity and quality. At the same time, we must achieve harmony with the environment and reduce negative impacts on ecosystems.

The Department of Bioresource Science offers a broad range of educational opportunities, from foundational knowledge to applied technology, in order to develop individuals who are ready to tackle this immense challenge. The Department covers as many as thirty specialized fields (see below for details) to study a diverse range of organisms, including food crops and other plant resources, livestock and other animal resources, and seafood and microorganisms in the ocean, from multifaceted perspectives on macro and micro levels, i.e., from populations and individuals to cells and molecules. Relatedly, efforts are being made to carry out various research projects, in a bid to protect each bioresource from invasive enemies, maintain preferred growth/habitation environments, and ensure high productivity in adverse environments. Some of those projects even attempt to create new species.

The broad-ranging academic fields covered by this Department can be grouped into four, as shown below. It is thus recommended that students take courses from each course in their first two years to study bioresource science as a whole, focus mainly on subjects from courses in which they have become interested in their third year, and proceed to select a field with which they are affiliated in their fourth year.




Course	Fields
Plant Production Science	Crop Science, Plant Breeding, Vegetable and Ornamental Horticulture, Pomology (Fruit and Fruit Tree Science), Plant Production Systems, Plant Production Control, Quality Analysis and Assessment, Food Quality Design and Development, Weed Science, Tropical Agriculture, Soil Science
Animal Science	Animal Breeding and Genetics, Reproductive Biology, Nutritional Science for Animals, Animal Physiology and Functional Anatomy, Animal Husbandry Resources, Bioresource Informatics
Marine Biological Sciences	Fisheries and Environmental Oceanography, Marine Stock Enhancement Biology, Marine Microbiology, Marine Environmental Microbiology, Marine Bioproduct Technology, Marine Biological Function
Fundamental and Frontier Biology	Plant Genetics, Plant Physiology, Crop Evolution, Plant Pathology, Insect Ecology, Insect Physiology, Terrestrial Microbial Ecology, Ecological Information

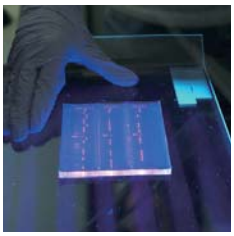
*This new course system will be introduced for the students enrolled in 2021 and thereafter.

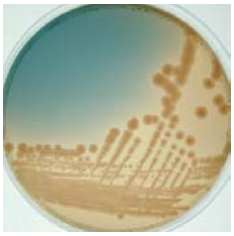
Keywords for Each Field of Affiliation

Field	Keywords
Crop Science	Food production and the environment, crop productivity and genotype-environment interaction, environmental stress tolerance, growth and development prediction modeling, information measurement, environmentally conscious crop production technology
Plant Breeding	Breeding of rice, soybean, and wheat, genomic and genetic analysis of important agronomic traits, transposon as a source of genetic variation, plant-microbe interaction in soil, mutation, morphogenesis, gametogenesis, genetic resources
Vegetable and Ornamental Horticulture	Environment control and growth and development control, development of functional vegetables, elucidation of flower color mutation mechanisms, breeding of useful varieties, application of organic matter to plants in an unsterile environment by using chlorination and insoluble phosphoric acids
Pomology (Fruit and Fruit Tree Science)	Fruit tree physiology of flowering and fruit set, fruit development/ripening mechanisms, fruit tree breeding and biotechnology, fruit tree molecular genetics, postharvest physiology of fruit
Plant Production Systems	Agricultural production ecosystem, group farming, paddy-upland rotation, nitrogen cycle, environmentally conscious agriculture production system, wide-area information measurement, group farming management systems
Plant Production Control	Control of floral induction based on molecular mechanisms of flowering, elucidation of fruit development and senescence mechanisms, development of postharvest technology, control of chloroplast positioning for optimal photosynthesis, development and application of next-generation type crop model, farm system for generating crop and renewable energy together

Field	Keywords
Quality Analysis and Assessment	Quality analysis and assessment of food crops and food materials, quality improvement of oil- and fat-containing food, structure-functional analysis and utilization of proteins and polysaccharides, gustatory receptor mechanisms, biological effect of oxidized lipids and its protection by food ingredients
Food Quality Design and Development	Molecular farming, design and development of high-quality crops, genetically modified crops, molecular mechanism of storage protein trafficking and accumulation, protein engineering, functional design of food proteins and enzymes, X-ray crystallography
Weed Science	Weed management, life-history traits of weeds, herbicide-resistant biotypes of weeds, invasion/colonization and dissemination of invasive weeds, crop-weed complexes, mimetic weeds
Tropical Agriculture	Agricultural resources, meteorological environment, water dynamics of soil and plants, environmental stress, cropping system analysis, changes in land utilization, distribution and transmission of crops, environment and physiology of tree crops, tropical horticulture, GIS
Soil Science	Degradation of tropical land and arid land and soil management technology, material dynamics in the soil ecosystem, evaluation of and restoration from soil pollution, space variation analysis of soil characteristic values, analysis of soil nutrient supply mechanisms
Animal Breeding and Genetics	Genetics of qualitative and quantitative traits, systems biology, omics analysis, big data analysis, genetic assessment, breed improvement, individual classification, preservation of animal resources and rare animals
Reproductive Biology	Cloned animals, cell differentiation and dedifferentiation, embryonic stem cells and germ stem cells, genetically modified animals, external fertilization and *in-vitro* culture of mammalian ova, elucidation of molecular mechanism of mammalian embryogenesis
Nutritional Science for Animals	Comparative animal nutrition, nutritional physiology, adipocyte differentiation, vitamin nutrition, mineral metabolism, metabolic regulation by bioactive substances in food and feed
Animal Physiology and Functional Anatomy	Evaluation of animals' physiological and producing functions, animals' ecophysiology and global warming, environmental pollution and endocrine-disrupting chemicals, cryopreservation of ovaries
Animal Husbandry Resources	Biological and economic assessment of animal production systems, comparison of animal production systems from around the world, environmentally sound animal production, evaluation of animal genetic resource conservation plans
Bioresource Informatics	Pasturing management technology using GPS/GIS, construction of information systems for animal production, analysis of aquatic bioinformatics using biotelemetry, etc., aquatic animal conservation technology
Fisheries and Environmental Oceanography	Coastal ocean, conservation of the marine environment, fisheries oceanography, marine ecosystem mechanisms, transportation of organisms/substances, interactions among rivers, coastal seas, and open seas, mechanisms of eutrophication and poor oxygenation, stable isotope ratio, material cycle
Marine Stock Enhancement Biology	Metamorphosis, hormone, organismal physiology, morphological abnormality, early life history, population structure, species diversity, interspecific hybridization
Marine Microbiology	Marine hyperthermophilic archaebacteria, deep-sea hydrothermal environment, physiology and ecology of extremophiles, extremozymes, biohydrogen production, physiology and ecology of denitrifying bacteria, genomic analysis and genetic diagnosis of poisonous microalgae
Marine Environmental Microbiology	Our research interests include microalgal productions of ω-3 fatty acids, carotenoids and biofuels by genetic analyses and engineering. In addition, we have studied ecophysiology and evolution of 'earth-eating' microorganisms inhabiting various extreme marine environments such as deep-sea hydrothermal fields.
Marine Bioproduct Technology	Unused resources, functional food, search for physiologically active substances, biological defense mechanisms of crustaceans, physiology of highly unsaturated fatty acids, molecular control of lipid metabolism, gene transfer, germ cells, endocrine disruption, killifish
Marine Biological Function	Marine biological function, gene manipulation for fish, genome editing, fish genetics, genetic improvement of cultured fish, functional food, health promoting compounds in marine products, marine peptide, biological active compounds.
Plant Genetics	Wheat, cell genetics, genome, chromosome, kinetochores, disease resistance, polyploid, cytoplasmic inheritance, *Arabidopsis thaliana*, population genetics, evolution
Plant Physiology	Regulation of growth phase transition in response to environmental signals, flowering, long-distance systemic signaling in development (florigen), sexual reproduction process (especially germline specification and gametogenesis), origin and evolution of regulatory systems for plastic development
Crop Evolution	Evolution of crop plants and their wild relatives, plant genomics and genetics, co-evolution of plants and humans, co-evolution of plants and pathogens, bioinformatics, ethnobotany, genetic resource management, fieldwork, natural history
Plant Pathology	Plant pathogenic fungi, plant viruses, host specificity, plant immunity, virulence factors, generation of resistant plants, coevolution, molecular biology, omics, bioinformatics
Insect Ecology	Evolutionary ecology, behavioral ecology, reproductive strategies, social insects, transgenerational epigenetic inheritance, self-organizing system, longevity
Insect Physiology	Physiology, endocrinology, molecular genetics, genomics, developmental biology, evolutionary biology, evo-devo, eco-evo-devo
Terrestrial Microbial Ecology	Mycology, fungal genetics, fungal adhesion and penetration mechanism, mode of action of fungicide
Ecological Information	Interaction among agricultural fields, natural enemies, integrated pest management, biological control, spider mites and minute pest insects, molecular ecology, genetic variation, evolution of adaptive characters, insecticide resistance

Department of Applied Life Sciences





The 21st century is said to be the era of "bioindustry," and it is thought to be a time of progress for the environment, food, energy, health, and welfare. At the core of this fast-growing sector is biotechnology, a means of utilizing biological functions in advanced applications.

At the Department of Applied Life Sciences, students learn basic and advanced knowledge across a broad range of academic disciplines, giving them the ability to follow the principles of life phenomena. This in turn allows them to analyze various issues that may arise on the frontlines of agricultural production, the fermentation, food processing, and chemical industries, and environmental conservation, and then to apply their research findings to the burgeoning realm of biotechnology.

Our Department encompasses the 13 fields of education and research below, which cover a wide range of organisms—from humans to microbes. The underlying academic purpose here is to elucidate life phenomena on the molecular level. Targeting inorganic compounds, low-molecular organic compounds, and other biomolecules such as nucleic acids, proteins, lipids, and polysaccharides, we set for ourselves the task of bringing to light biofunctions that may be caused by properties of individual molecules as well as interactions among molecules. Another fundamental research topic is the elucidation of how biomolecules work in relation to their cell structures.

To serve these purposes, we offer a four-year integrated curriculum. In the first two years, students take common basic subjects of physical chemistry, organic chemistry, and biochemistry, as well as introductory subjects that cover the entire range of academic disciplines that our Department has to offer, so that they can set their own learning goals. In the last two years, students systematically learn a broad range of disciplines—from basic to applied research—that concern animals, plants, and microorganisms, while performing lab work and practical training carefully prepared for them to understand related theories empirically. In the fourth year, students are assigned to laboratories, where they learn about approaches and attitudes toward creative research as they work on new challenges as budding researchers.

Through this curriculum, we develop self-driven biotechnology researchers and engineers who can respond to societal demands. Successful students must be motivated with a sharp and clear vision and be fully prepared to challenge themselves to attain their educational objectives.

Through its research and education, the Department of Applied Life Sciences aims to develop students who:

1. Study organisms and life phenomena deeply at the cellular and molecular levels and understand them in a chemical context;
2. Understand the commonality and diversity of biofunctions of microorganisms, plants, and animals;
3. Spearhead new discoveries and inventions to applied research; and
4. Gain skill with research approaches and logical thinking through the aforementioned research experience and make the most of applied education through lectures by guest speakers from private enterprises and visits to plants.

Keywords for Each Field of Affiliation

Field	Keywords
Cellular Biochemistry	Extracellular matrix, collagen, cell adhesion, cholesterol homeostasis, signal transduction, structure and functions of membrane proteins, migration and metastasis of cancer cells
Biomacromolecular Chemistry	Correlation between the structure of biomolecules and expression of physiological functions, basic analysis of cell kinetics, elucidation of the foundation of bio-information and its integration, combinatorial bioengineering, nano-biotechnology
Bioregulation Chemistry	Organic chemistry, bioactive molecules, drug design, crop protection
Chemical Ecology	Chemical interpretation of survival strategies of living organisms, specifically plant stress tolerance, insect adaptations, host-discrimination substances, defence compounds and insect hormones, based on organic chemistry of physiologically active substances
Plant Nutrition	Plant nutrition and growth, plant metabolism and functions, molecular improvement of nutritional properties of plants, chemical fertilizers and plants, stress and plants
Fermentation Physiology and Applied Microbiology	Applied microbiology, including fermentation, stemmed from screening and breeding of useful microorganisms with unique functions for useful substance production, health promotion, crop and food production, environmental control, and ecosystem management
Microbial Biotechnology	Metabolism and physiology of C1-microorganisms, heterologous gene expression, organelle dynamics, autophagy, plant-microbe interaction, redox dynamics, bioconversion of natural gas
Bioanalytical and Biophysical Chemistry	Bioelectrochemistry, enzymatic catalysis chemistry, photosynthesis and respiratory energy conversion, biosensors, microbial fuel cells, analysis of nitrogen metabolism
Biofunctional Chemistry	Chemical biology, organic chemistry, bioenergetics, mechanisms of mitochondrial respiratory enzymes
Applied Structural Biology	Appearance and workings of proteins, X-ray crystallography, folding of polypeptides, functional improvement of proteins
Molecular Microbiology	Metabolic stress and signaling, microbial biotechnology, microbial genome science, mechanism of gene expression, mechanism of response to environmental stress, reactive oxygen species and biological defense system, proteomics and metabolome.
Molecular and Cellular Biology	Totipotency of plant cells, functional differentiation of chloroplasts, photosynthetic function and stress tolerance, functional expression of secondary metabolism and production of useful substances, molecular breeding of plant cell functions
Plant Molecular Biology	Environmental response of photosynthetic organisms, reproduction of plants, genome science of plants, gene expression control, molecular genetics

Department of Agricultural and Environmental Engineering

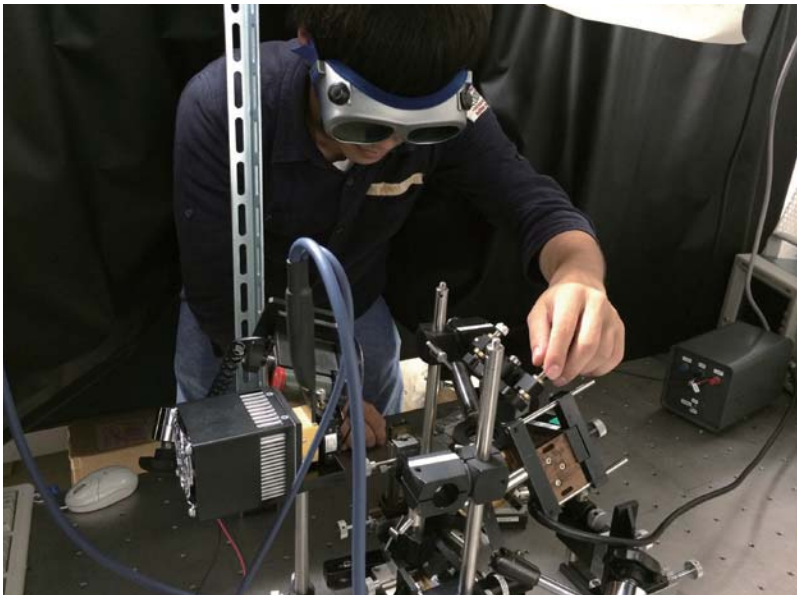
Food security is the most vital necessity for the survival of humanity. In this respect, agriculture is one of the most sublime and fundamental human activities, playing an integral part in the process of food production. It is believed that agriculture (cultivating plants and livestock) dates back roughly 10,000 years. The "discovery" of agriculture (i.e., a new method of procuring food whose carrying capacity was much higher than that of conventional ways of hunting and gathering) led humankind on to a path of rapid evolution. From that point onward, humans have utilized wisdom and innovation to advance and sustain the art of agriculture while meeting the needs of our times. At the same time, progress in engineering and technology that form the foundations of agricultural production has been instrumental in enhancing the productivity of land and agriculture workers. This is evidenced by the fact that the Faculty of Agriculture, Kyoto University had an engineering department (the Department of Agriculture and Forestry Engineering, later reorganized into an engineering department, the Department of Agriculture Engineering, to specialize in agriculture studies) since its inception in 1923 to conduct pioneering education and research on engineering/technical strategies and methodologies that maximize agricultural productivity. Towards the end of the last century, the emergence of global issues that could threaten the survival of humankind promoted a paradigm shift, and it also became necessary in the engineering field to redesign our basic research approaches to and perspective on the world under the more comprehensive and contemporary framework of "the environment." Based on this background, the Department of Agricultural and Environmental Engineering came to be in 2001.

This Department is devoted to research and education on the use of engineering and technology in "agricultural and farming regions;" namely, rural regions in which people engage in agricultural production activities for a living. Recent years have seen a growing recognition that rural regions have much more distinguishing precious features, compared to urban regions. This renewed recognition is chiefly attributable to the multifunctionality of agriculture, which serves the preservation of national land, the natural environment and ecosystems, on top of its inherent function of food production. Now, for rural regions to develop in a sustainable manner, it is necessary to properly develop and preserve water and soil (land), two key elements of environmental infrastructure in such regions, the production environment, such as production control systems and systems for harvesting, processing, and storing farm products, and the living environment in the regions. At the same time, harmony with the natural environment must be achieved. It is also important to utilize wisely potential resources unique to the rural regions, such as the development of biomass energy. The concept of "achieving harmony with the natural environment" means to stop to think how humankind should produce food and develop energy, both of which are necessary for human survival, while working in harmony with biosystems, ecosystems, and landscapes by respecting their inherent right. "All regions are cells of planet Earth," and maintaining a sound regional environment is vital for the conservation of the global environment. To make this ideal state of rural regions a reality, it is crucial to pursue engineering and technology studies in the realm of applied science based on the solid foundations of interdisciplinary fundamental sciences, with fields ranging from natural science to social science. Studies of agricultural and environmental engineering take scientific approaches to rural regions within such a paradigm. As a body of engineering and technological knowledge, these systematic studies are expected to play a significant role in solving the problems that threaten the survival of humankind, including those concerning agriculture and farming villages, the environment, and food and energy.

Education at the Department of Agricultural and Environmental Engineering is given mainly in seven research fields, which are divided into four fields of the "Rural Environmental Engineering" and three of the "Bioproduction Engineering." The first- and second-year students gain a basic overview of agricultural and environmental engineering, while third-year students mainly take subjects from a family to which the field that they plan to be affiliated with in their fourth year belongs.

In the fields of the "Rural Environmental Engineering" which consists of 4 fields (Agricultural Facilities Engineering, Water Resources Engineering, Hydrological Environment Engineering, and Rural Planning), students learn about theories for creating rich and beautiful regional environments that encompass production, living, and natural spaces. They also go on to learn how to improve and conserve such regional environments with engineering techniques that work on water, soil, and the environment, as well as study the technological approaches needed to achieve this. Students also learn how to utilize water and land in a regional setting with the conservation of national land and the environment in mind, along with how to plan, design, construct, and maintain various structures that give a concrete shape to their learning outcomes.

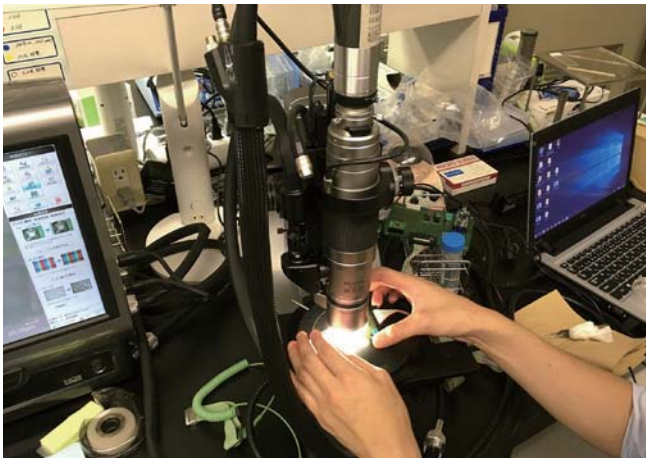
In the fields of the "Bioproduction Engineering" which consists of 3 fields (Agricultural Systems Engineering, Field Robotics, and Bio-Sensing Engineering), students learn how they should go about controlling production, harvesting, processing, and storing food, and developing biomass energy. They do so while considering not only the local natural environment but also the global environment, resource circulation, labor-saving, and energy-saving, as well as learning their underlying principles. Students are also expected to learn the skills and methodologies needed to realize all of the above. To this end, students study relevant bioresources, information processing, systems design, measurement and sensing technologies for organisms, machine design, mechatronics, physical properties of farm products and their non-destructive quality evaluation, and processing technology.



Faculty of AGRICULTURE

Keywords for Each Field of Affiliation

Field	Keywords
Rural Environmental Engineering	
Agricultural Facilities Engineering	Storage dams, underground dams, water facility design theory, analysis of water-use structure inverse problems, constitutive equation and structures of soil, geotomography of foundation ground, seismic design of structures
Water Resources Engineering	Optimal management of water resources and hydro-environments, hydro-environment modeling, dynamics of farm irrigation systems, rainwater harvesting, multiple functions of reservoirs and paddy fields for agriculture
Hydrological Environment Engineering	Irrigation and drainage, soil physics, hydrology, hydrochemistry, regional water and geochemical cycle management, groundwater management, water and soil quality conservation, agricultural water management for climate change adaptation and mitigation
Rural Planning	Rural sustainability, community development planning, rural revitalization, landscape planning, participatory planning tools, resource management, resilience building, social capital, knowledge management, system modeling, multi-agent simulation, virtual reality, information communication technology and drama theory
Bioproduction Engineering	
Agricultural Systems Engineering	Biomass energy, optimization of food production management, terramechanics, off-road vehicle engineering, systems analysis of machine utilization, biological and environmental engineering
Field Robotics	Robot farming, intelligent farm machinery, precision agriculture, remote sensing, monitoring of plant growth, GPS/GIS, artificial intelligence (AI) for agricultural machinery, harmful animal repelling system by AI
Bio-Sensing Engineering	Physical properties of agricultural and aquacultural products and foods and their non-destructive quality evaluation, near-infrared spectroscopic imaging, prediction of peak ripeness, freshness determination, detection of rice bran traces, identification of individual farm animals by biometric authentication techniques, traceability, food manufacturing process monitoring technology



Department of Food and Environmental Economics

Of the challenges that humankind faces today, those concerning food and environment are particularly relevant to everyday life. Although they are faced differently depending on the context, food issues and environmental problems arise in both developed and developing countries, regardless of political and economic system. Indeed, they are increasingly understood as the consequence of economic policies fixated on growth and rapid development. With growing awareness of our declining natural resources, more emphasis has been placed on the possibilities for sustainable development. To bring about such an alternative development path, governments around the world need to not only adjust their domestic policy, but also to coordinate with their counterparts at the global level to ensure that progress can be achieved collaboratively at the international scale. Unlike manufacturing industries, which rely on inorganic resources and global commodities, agriculture, forestry, and fisheries have a uniquely local character that is rooted in natural ecosystems and communities. Here, sustainable development means achieving harmony between economic output, environmental conservation, and local culture. We strongly believe that since food and environmental problems are the byproducts of human institutions and economic systems that humans can also solve these problems.

The Department of Food and Environmental Economics aims to find solutions to these problems using a diverse social science approach, while at the same time absorbing relevant knowledge and experience from the natural science approach of the departments in the Faculty of Agriculture. This organization allows us to determine how research findings can be applied and accepted in the real world, with the ultimate goal of encouraging more progressive and interdisciplinary scientific approaches in the agricultural sciences.

To this end, we deliberately look at agricultural production in a broader cultural and economic context. While other departments in the Faculty of Agriculture adopt predominantly natural science methods, this Department alone advocates a social science approach, rooted in the belief that this can better clarify the nexus of human and natural activities that comprise agriculture. In more concrete terms, we study the characteristics of people working in agriculture, forestry, fisheries, and livestock businesses as well as the social and economic contexts, such as the farm, mountain, and fishing villages they work in, with an eye toward developing rural industries sustainably and equalizing conditions with urban areas. To balance conservation of local environment and culture at both regional and global levels with the need to encourage economic advancement, we draw insight from international studies of agriculture, rural and urban community development studies, and environmental management as well as relevant industries.

The Department of Food and Environmental Economics is divided into eight fields of education and research, which can be roughly clustered into three groups, as outlined below.

The first group covers two fields, in which students take micro-level approaches to studying problems involving agriculture and farm families. In these fields, students learn agricultural business management and accounting information processing to understand agricultural problems from the perspectives of individual farming families and agricultural organizations. As such, this group relies primarily on field survey methodology. The second group comprises four fields that provide students with a micro- and macroscopic approach to resource and environmental problems on a regional level using rigorous empirical analysis. In these fields, students have opportunities to encounter current food and environmental problems from regional and national perspectives and then learn basic theories about conservation and development of regional environmental resources, policies for agriculture and forestry, and the development of farming communities in developing countries. The third group includes two fields in which students consider issues of food, agriculture and farming communities on the basis of history and philosophy, learn basic techniques to discover how such issues have evolved, and conduct cross-national comparisons. In these fields, students are given opportunities to examine the industrial and post-industrial aspects of agriculture, forestry, and fisheries and food system development, as well as the impact that historical trends have had in shaping farming communities, rural-urban relationships and, more generally, agriculture as a field of science.

Keywords for Each Field of Affiliation

Field	Keywords
Agri-Food System Management	Management and structure/behavior of agri-food organizations, environmental changes and development of farm management, distribution and marketing of agricultural products, comparative institutional analysis of farm management around the world, roles of family-run farming, food system/agribusiness, fair trade, agricultural/consumer cooperatives, food safety management
Farm Managerial Information and Accounting	Business improvement, business growth/development, business administration, technical/management/accounting information, competency of business managers and enterprise operators, HR development/training, industrial organizations offering management support services, survey methods for farming communities, regional agriculture, and farm management
Regional Environmental Economics	International and domestic food supply/demand and environmental problems, sustainable development of regional economies and environmental conservation, farm product trade and regional environments, technical change and productivity of agricultural sector, agricultural land issues, problems in hilly and mountainous areas and subsidies, commons and regional resilience
Agricultural and Environmental Policy	Global environmental problems, outlook of food supply/demand, multiple functions of agriculture and farming communities, external economic effects, import liberalization of farm produce, economic analysis of food safety, agriculture and biodiversity, GIS
Forest Policy and Economics	Forest resources in Japan and abroad, forestry production, forestry and lumber industries, production, supply, distribution, and consumption of timber, timber trade and environmental system, revitalization of mountain villages, ecosystem management, environmental functions of forests
International Rural Development	Agricultural development, poverty, rural institutions, income inequality, consumption smoothing, social capital, culture, risk sharing, area studies, field survey, political economy, field experiment, development economics
Comparative Agricultural History	Development patterns of socioeconomy and agriculture, history of relationships between urban and rural communities, history of relationships between agriculture and nature (technology, production capacity), history of farmers/history of farming communities/history of farmer movements, modern world-systems and agricultural problems and policies
Philosophy of Agricultural Science	Roles of agriculture, forestry, and fisheries in various human societies, changes in agriculture and farming communities around the world, issues and methodologies of new agricultural science, world food problems, exchange and unification between urban and farming communities

Department of Forest and Biomaterials Science

Recognizing that excessive and non-sustainable use of resources is the main drivers of global environmental problems, we must move away from a mere emphasis on economic productivity to a new set of social priorities that achieve sustainable and environmentally friendly use of natural resources. In other words, we must seek for a new way that enables harmonious coexistence of the earth and the humankind. Globally, forests cover 31% of the land, and they provide various ecosystem services including production of renewable resources. Hence, conservation and protection of forests, in combination with utilization of forest-based resources, are important for the survival of the human kind. More than ever, we need young people who can develop innovative strategies based on scientific understanding of forests and forest resources, in order to tackle global environmental issues.

The Department of Forest and Biomaterials Science promotes research and education on forests and the various forest-based resources. Our unit conducts basic research on forests, including biological and biogeochemical research addressing biodiversity and ecosystem matter cycles. We also analyze chemical and physical properties of wood, cellulose and various organic substances. We also conduct applied research relevant for reduction of greenhouse gas emission. and for achieving a society with sustainable resource cycles. In addition to natural science approaches, we use sociological and economic approaches. Through collaboration of researchers across various fields of specialization, we aim for a transdisciplinary science on forests and biomaterials. In educational activities, we aim to nurture broad perspectives on forest science, as well as to build capacities for investigation through thesis research activities.

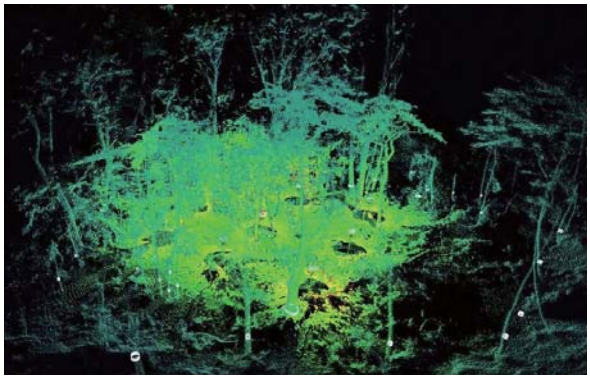
The Department of Forest and Biomaterials Science has 17 laboratories, covering a wide range of research topics. They can be grouped roughly in three groups. The six laboratories in the first group, including "Forest Biology", "Forest Ecology", "Tropical Forest Resources and Environments", "Forest Hydrology", "Forest Utilization", and "Biosphere Informatics", conduct basic and applied research on forest ecosystem. The eight in the second group, including the laboratories of "Wood Processing", "Biomaterials Design", "Fibrous Biomaterials", "Tree Cell Biology", "Chemistry of Composite Materials", "Chemistry of Biomaterials", "Forest Biochemistry", and "Energy Ecosystems", conduct basic and applied studies on biomaterials. The three laboratories in the third group, including "Forest Resources and Society", "Landscape Architecture", and "Erosion Control", study management of forests and landscapes, as well as disaster preventions in forested hills and mountains. In addition to these core laboratories, the Field Science Education and Research Center and the Research Institute for Sustainable Humanosphere support our research and education missions through their field research center in Hokkaido and Ashiu, or through their large or advanced experimental facilities.

During the first three years of our curriculum, undergraduate students will build foundational and comprehensive knowledge on forest and biomaterials science through lectures and field and lab courses. The 4th year students belong to one of the 17 laboratories to conduct thesis research. Our goal is to help students obtain specialized knowledge on forests and biomaterials, and build capacity to contribute to research and innovation with high moral standards.

Landscape study of historical building

Keywords for Each Field of Affiliation

Field	Keywords
Forest Resources and Society	Deforestation and conservation, sustainable forest management, dynamics of forestry and forest industry, silvotourism, forest and culture, forest certification system
Tropical Forest Resources and Environments	Functional understanding of forest trees and forest ecosystems, plant functional traits, forest stand structures, light utilization, seedling regeneration, plant-soil interactions, ecosystem matter cycles, sustainable forest management, climate-change mitigation and adaptation, with emphasis on tropical forests in Asia, Africa and Latin America.
Forest Utilization	Forests' functions on environmental conservation, biomass production of forests, growth dynamics of trees' root system、effect of environmental factors on tree growth and xylem formation, plantation management and wood quality
Forest Biology	Forest structure and dynamics, biodiversity conservation, phylogenetic and ecological analysis of forest organisms based on genetic/genomic information, prevention of forest damage caused by wildlife, interaction between forest insects and trees, insect damage control
Landscape Architecture	History of gardening, planning and design of gardens, urban parks, nature parks, conservation of landscape and biodiversity, urban afforestation, natural restoration, assessment mitigation of natural environments
Erosion Control	Prevention and mitigation of sediment disasters, impact of forest management on rainwater discharge, impact of forest management on sediment discharge, rainwater holding capacity of forest soil, prediction and forecast of debris flow, mechanisms of slope failure and landslides, warning and evacuation system against sediment disasters
Forest Ecology	Diversity of forest organisms, material cycle mechanism, soil decomposing organisms, plant behaviors, forests ecosystems from the arctic to the tropical
Forest Hydrology	Hydrological cycle, carbon cycle, gas exchange, ecosystem fluxes, plant-water relations and eco-physiology, methane dynamics, precipitation-runoff response, water quality formation, longterm monitoring
Biosphere Informatics	Geographical information systems, remote sensing, ecosystem modeling, conservation ecology, ecosystem service evaluation, environmental observation methods, ecological/environmental information systems and database
Biomaterials Design	Physical properties of forest biomass materials (lumber, bamboo, etc.), elucidation of properties of new wood-based materials, image analysis of wood surfaces, wood and human relations, fracture mechanics, lumber construction mechanics
Wood Processing	Technologies of wood processing, nondestructive evaluation of wood property and degradation of wood, and automatic recognition of wood and its processing
Fibrous Biomaterials	Structure and properties of cellulose and other polysaccharides, synthesis of polysaccharides by genetically engineered enzymes, functionalization of polymers by magnetic field orientation, development of novel NMR/MRI methods, decomposition of biomass in environmental water
Tree Cell Biology	Forest resources of the world, growth of trees, formation and function of cell walls, significance of forms and diversity of organisms, from macro to micro
Chemistry of Composite Materials	Precise polymer synthesis, block/graft copolymers, liquid crystalline polymers, biomass-based polymer blends, conversion of biomass to plastic materials, liquefaction and resinification of biomass, biodegradable plastics, bioplastics/nanofiller composites, structure-property-performance relationships of biomass-based functional materials
Chemistry of Biomaterials	Organic chemistry of biomass, elucidation of structure, properties, physiological bioactivity, and functions of cellulose, hemicelluloses, lignin, and extracts (tannin) and their utilization, efficient use of tropical forest produce
Forest Biochemistry	Material cycle of forests, molecular biology of wood-rot fungi, genetic engineering, genome editing, biodegradation mechanism of wood, biotechnology of fungi, plant tissue culture, DNA/RNA analysis of trees, translocation of sugar in plants, flowering control mechanism, plant molecular biology of bamboo, bamboo grass, and rice
Energy Ecosystems	Biomass, bioenergy, biochemicals, bioethanol, biodiesel, high temperature wood chemistry, molecular level thermal degradation mechanism, reaction control of pyrolysis/gasification, supercritical fluids, plasma treatment



Reconstructed forest structure from laser scanning

Nano-celullose vehicle body for sustainable future
(Provided by Ministry of the Environment Government of Japan)

KYOTO UNIVERSITY KYOTO iUP

FACULTY GUIDE 2021

京都大学

KYOTO UNIVERSITY

KYOTO iUP FACULTY GUIDE 2021

http://www.kyoto-u.ac.jp/en/
http://www.iup.kyoto-u.ac.jp/