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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

10 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 10 Divisions: (1) Mathematical and Information Sciences, (2) Humanity, Society and Thought, (3) Arts and Letters, (4) Cognitive, Behavioral and Health Sciences, (5) Language Sciences, (6) Civilizations of Eastern Asia, (7) Studies on Global Coexistence, (8) Cultural, Regional and Historical Studies on the Environment, (9) Materials Science, (10) Earth, Life and Environment. Each Division sets its own education and research objectives; at the same time, the 10 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 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. Students select their major specializations from among the 10 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 10 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 has 10 divisions corresponding to the 10 divisions of the Faculty of Integrated Human Studies, allowing students to continue to learn and deepen knowledge in their specialized field of study seamlessly under the same professor who taught them as undergraduates.

Freshman Welcome Camp for the Faculty of Integrated Human Studies

10 Divisions of the Faculty of Integrated Human Studies

Each division represents a group of faculty members from neighboring disciplines. Students, who also belong to their selected division, deepen their learning systematically, focusing on courses in their specialized discipline.

Mathematical and Information Sciences

In mathematical science, we aim to uncover the mathematical structures underlying fluctuating processes in various phenomena, primarily using analytical methods. In information science, we explore a wide range of problems from both theoretical and practical perspectives. Our focus in mathematical science is on analyzing diverse mathematical phenomena, such as those described using ordinary differential equations, partial differential equations, stochastic differential equations, stochastic processes, discrete dynamical systems, complex dynamical systems, and theories of chaos and fractals. In information science, our studies encompass theories and applications in various fields such as machine learning, data science, media information processing, as well as the mathematical foundations of puzzles, games, and the emerging field of quantum computing. Additionally, we engage in studies for understanding the essence of computation, particularly computational concepts that arise in mathematics, through areas such as programming language theory, mathematical logic, interactive theorem proving systems, category theory, and descriptive set theory.

Humanity, Society and Thought

Humans are beings that live by forming societies and engaging with the world, others, and themselves. Language and thought are more than just human inventions to be regarded as subsequent additions. Rather, they fundamentally define and characterize the relationships between humans and societies. In this division, we seek to develop a fundamental understanding of humans as social beings that have language and thought as well as of their interactions with societies, by tracing back to their origins. Based on such understanding, we conduct empirical research, taking a detailed look at individual societies as well as specific human behavior and development within respective societies with an eye on their pathological states, and attempt to apply research findings in practice.

Arts and Letters

This division explores the essence of the arts and their future possibilities, looking at English-language literature originating from the United Kingdom and the United States that has spread across the world, continental European literature founded on a multi-language culture such as literature from German- and French-speaking countries, and Hebrew literature. We focus on the creative activities of various genres, ranging from the writing of literary works such as novels, poems, and plays to the creation of movies, performing arts, music, and fine arts. Students learn literary criticism, dramatic theory, film theory, and philosophy of art to acquire skills to illuminate each work of art as a dynamic and three-dimensional representation while taking heed of its cultural, social, and ideological backgrounds. By shedding light on both local and global aspects, we seek to ascertain the uniqueness and universality of works of art to explore ways to achieve a symbiosis of different cultures.

Cognitive, Behavioral and Health Sciences

In this division, we conduct basic research on the mechanisms of psychological and physical functions, processes of their development, and ways of their formation, as well as practical research on health promotion and sports activities. Its base is the foundation of knowledge in diverse areas of study such as neuroscience, cognitive science, psychology, physiology, kinesiology, health science, sports medicine and science, and psychiatry. We also carry out holistic research on various challenges facing humanity arising from social changes—such as the accelerating informatization of society, growing biological and cultural diversity, and symbiosis between humans and machines—and put research findings into action. On that basis, we explore the ways and means for human beings to better realize vital functions, health, and development.

Language Sciences

The most distinctive feature of human beings, language is essential to various intellectual activities. This division offers research programs designed to understand the nature of language from multiple perspectives, with a particular focus on the disciplines of theoretical linguistics, descriptive linguistics, and applied linguistics (education and learning). In the discipline of theoretical linguistics, we seek to understand the grammar and semantics of human language and the cognitive ability of human beings, using the theories of generative grammar, cognitive linguistics, and so forth. In the discipline of descriptive linguistics, we explore the universality and diversity of human language by investigating and comparing various languages in terms of historical and geographical variations and variety. In the discipline of applied linguistics, we investigate, among other things, the mechanisms and processes of learning foreign languages, as well as challenges in and systems of foreign language education from cognitive, psychological, and social perspectives.

Civilizations of Eastern Asia

Regions in East Asia have developed their own unique cultures, and yet they have together formed a politically, economically, and culturally coherent zone through active inter-regional interactions. In this division, we conduct extensive research on regional languages, literature, histories, and thought that have been developed over time in various parts of East Asia, building on research in specialized areas—such as Japanese language and literature, Chinese language and literature, Japanese and Chinese histories, and Chinese and Korean thought—and converging research across disciplinary boundaries. Through these activities, we aim to establish a holistic understanding of the history, culture, and society of East Asia as distinguished from Western civilization.

Studies on Global Coexistence

This division seeks to examine social systems and social relationships from a pluralistic perspective toward the realization of a new community based on peaceful coexistence, looking at both the possibility and difficulty of realizing a sustainable symbiotic world or society. To this end, we focus on a wide range of phenomena, including international and diplomatic relations, histories and societies of various regions in the world (America, Europe, India, etc.), economic and capitalist systems, the environment and resources, immigration, labor relations, public policy and democracy, the media, and constitutional and judicial systems. We seek to develop holistic knowledge conducive to the purpose stated above by crisscrossing a wide variety of academic fields including studies of politics, public policy, diplomacy, economics, the environment, law, society, history, and thought. We also train students to be able to put into practice and utilize such knowledge.

Cultural, Regional and Historical Studies on the Environment

In this division, we consider ethnic, cultural, regional, spatial, and landscape traits and habitational characteristics that have been uniquely developed over a long history as "cultural and regional environments," and seek to understand the process of their formation, development, and preservation as well as their current state. Covering various fieldwork-based disciplines such as cultural anthropology, architecture and urban planning, and human geography, we offer research and education programs that combine basic and practical studies on cultural and regional environments. We train future practitioners, instructors, and researchers who can contribute to urban development and city planning, neighborhood revitalization, preservation and utilization of cultural heritage, cross-cultural and cross-regional exchanges, and solutions to regional issues.

Materials Science

In this division, we conduct research on diverse material systems that vary in size and dimensionality, ranging from electrons and atoms, which are basic units of matter, and small molecules such as H_2 and CO_2, to more complex material systems such as organic and biological molecules and three-dimensional solid materials. Specifically, we conduct research to 1) make new organic molecules, nanomaterials, solid catalysts, battery materials, molecular crystals, and photo-functional materials, and explore their potential functions; 2) develop new methods and techniques of analysis and measurement such as mass spectrometry, nuclear magnetic resonance spectrometry, photoelectron spectroscopy, X-ray absorption spectroscopy, optical emission spectroscopy, and tunneling microscopy; 3) discover novel physical phenomena such as high-temperature superconductivity, strongly correlated electron systems, cold atom systems, and low-dimensional materials, and elucidate the mechanisms of their occurrence; and 4) determine the energy conversion mechanisms of photocatalysts and photothermal catalysts, fuel cells, and photo-functional materials.

Earth, Life and Environment

In an attempt to create a more symbiotic relationship between human beings and nature, we conduct research on the past, present, and future of the universe and earth; relationship between living things and the interior and surface of the earth; and functions of living things. Using knowledge and techniques, such as those in geophysics, geology, paleontology, geochemistry, and planetary science, we investigate the formation process of planets and satellites, movements in the earth's interior and surface, and changes in materials and the environment. We also look into the mechanism under which diverse living things exist and the stability of the ecosystem, by investigating the interrelationships between different species of living things. Furthermore, we conduct educational research on how living things adapt to their environments, how they take in and transform energy, and how we can make sound use of natural resources including living things.

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＞

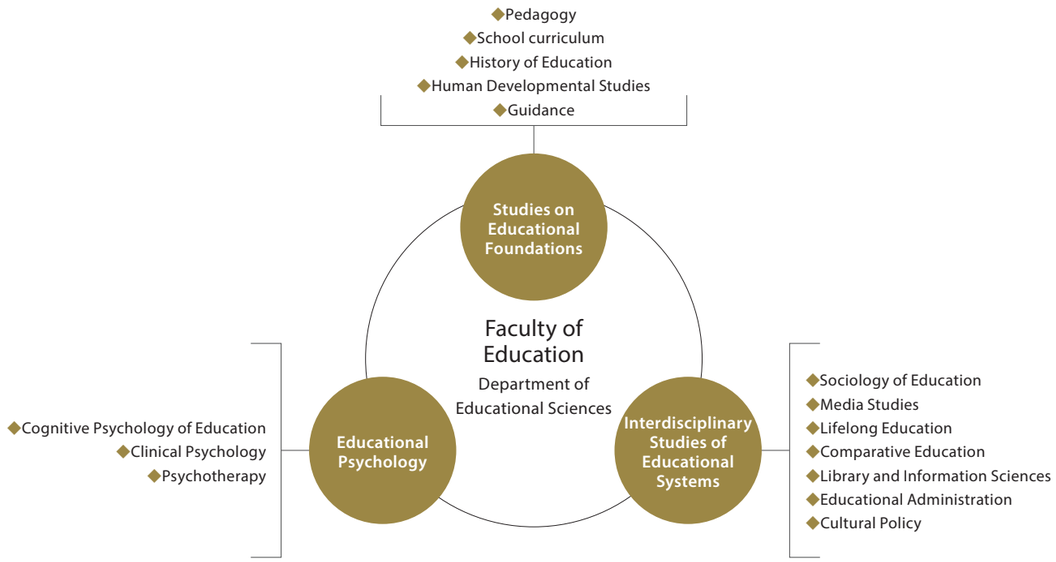
●**First year** / Students take courses such as "Introduction to Educational Studies" (required) and "Informatics" (recommended). They might also benefit from enrolling into courses from the teacher training program, or Liberal Arts and Sciences Courses and ILAS seminars (small group education) offered 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 fosters broader knowledge and flexible thinking about 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 in Education** / Students learn major theories and develop their base of knowledge on aspects of higher-order cognitive processes, including memory, language, inference, decision-making, intelligence, understanding others, empathy, and social cognition. Students also acquire and apply knowledge on psychological aspects closely related to educational activities, such as development, instruction and learning methods, motivation, and use of educational media and computers. Students develop fundamental skills for psychological research by conducting psychological experiments, surveys, and data analysis.

●**Clinical Psychology** / Students learn psychotherapy, psychological assessment techniques, survey methods, and methods of image representation, such as drawing and sandplay therapy, to deepen their understanding of themselves and acquire the skills necessary 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 such as law schools in the United States. However, 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 to become leaders of Japanese industry. This is one of the reasons that the Kyoto University Faculty of Law has gained an excellent reputation in the business world.

Studying major courses in law and political science

The Faculty of Law offers introductory major courses during the first-year, and students start to take most of their major courses in the 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 a variety of courses from the Faculty of Economics. These courses aim to allow students to gain broad insights into society, the corporate world, and the nation-state, and especially to understand the rules that govern them. As mentioned above, most graduates of the Faculty of Law go on to work in the business world as Japanese companies place a high value on students who have undergone this type of training.

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 predetermined 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 fact almost all students do (it is possible to take one seminar course each semester with a maximum of up to three in total). English is the designated 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. With a view to incremental learning, the major curriculum available to second-year students focuses on 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' horizons and developing individuals capable of re-evaluating the concepts of the state 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 a prominent feature of the Faculty of Law since its very foundation. 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 fields 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 groups of fields: (A) Microeconomics and Macroeconomics, (B) Institution and Economic History, (C) Management and Accounting, and (D) Mathematics, Statistics, and Information. Students are able to develop their expertise by taking classes in specialized subjects recommended for each field.

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. 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.

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.

Lecture on mathematical science.

●**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

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

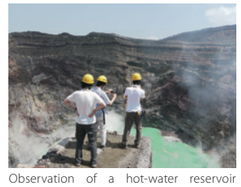
Physics seeks to determine the universal laws of nature and to understand the various phenomena that result from differences in types of substances and scales of time, space, and energy. Based on the scientific nature of the discipline, the Physics and Astrophysics Major is divided into three departments. 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.

Seminar on physical science.

●**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

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.



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

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

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.

A chemical experiment

●**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

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.

Students in a specialized learning environment.

●**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

Faculty of PHARMACEUTICAL SCIENCES

Contribution to medical care and society through innovative drug discovery and improvement

Learning in the Faculty of Pharmaceutical Sciences, Kyoto University

Develops pharmaceutical sciences through the synthesis and application of integrating scientific research studies

Pharmaceutical sciences are multi-disciplinary studies for the discovery, manufacturing, and use of pharmaceutical products that cure diseases and enhance health. Physics, chemistry, and biology form its scientific foundation. The Faculty of Pharmaceutical Sciences, Kyoto University, offers students opportunities to thoroughly learn the basic sciences. It integrates and applies the findings from scientific studies and provides more advanced pharmaceutical education and research.

Develops consciousness of social responsibility and morality

The recent advances in medical technology and advent of the aging society have increased the social importance of pharmaceutical sciences. Research and development and appropriate use of pharmaceuticals are closely related to human health and life. Because of the social implications of the discipline, our education and guidance place great emphasis on providing students opportunities to understand the scientific backgrounds essential for the academics involved in pharmacology and cultivate their consciousness about social responsibility and morality.

Nurtures drug discovery scientists and medical pharmacy researchers/pharmacists

The Faculty of Pharmaceutical Sciences, Kyoto University, includes two divisions: the Division of Pharmaceutical Sciences (4-year program), which aims to nurture scientists and engineers in the drug discovery sciences; and the Division of Pharmacy (6-year program) dedicated to producing pharmacists and medical pharmacy researchers and technicians. The students are assigned to one of the two programs according to their intentions and academic standings when they are enrolled in the fourth-year course. The Faculty provides the following curricula for undergraduates.

●The curricula of Years 1 and 2 include all-faculty common subjects, primarily comprised of liberal arts subjects including foreign languages in addition to fundamental subjects for specialized knowledge. The curricula are intended to encourage students to acquire a high-level knowledge of cultural backgrounds and scientific ways of thinking by accessing a wide range of disciplines. They also seek to develop basic skills and thinking required for learning more specialized subjects. Students are required to take fundamental subjects for specialized knowledge, including An Introduction to Pharmaceutical Sciences, An Introduction to Health and Life, Fundamental Physical Chemistry for Pharmaceutical Sciences, and Basic Organic Chemistry. Year 2 students are required to take all-faculty common subjects, lectures, and exercises for Fundamental Scientific Communication, one of the fundamental subjects for specialized knowledge. In addition, they are also required to take some specialized subjects in pharmaceutical sciences.

●The Year 3 curriculum is based on specialized subjects for acquiring expertise in pharmacology and experimental techniques. Students are required to take some research basics subjects in order to acquire a high level of expertise, which will assist them in their graduate school education. In addition, all specialized practical training courses are compulsory for acquiring experimental techniques related to all specialized areas of pharmacology.

●The Year 4 curriculum of Division of Pharmaceutical Sciences primarily includes special laboratory training, which covers most of that year. For this training, students enroll in one of the laboratories and work on a specific specialized study area, with academic staff providing guidance and advice. Special laboratory training is also important in that the students acquire a general idea about drug discovery research and because the experiences provide them opportunities to think about their future career paths as researchers.

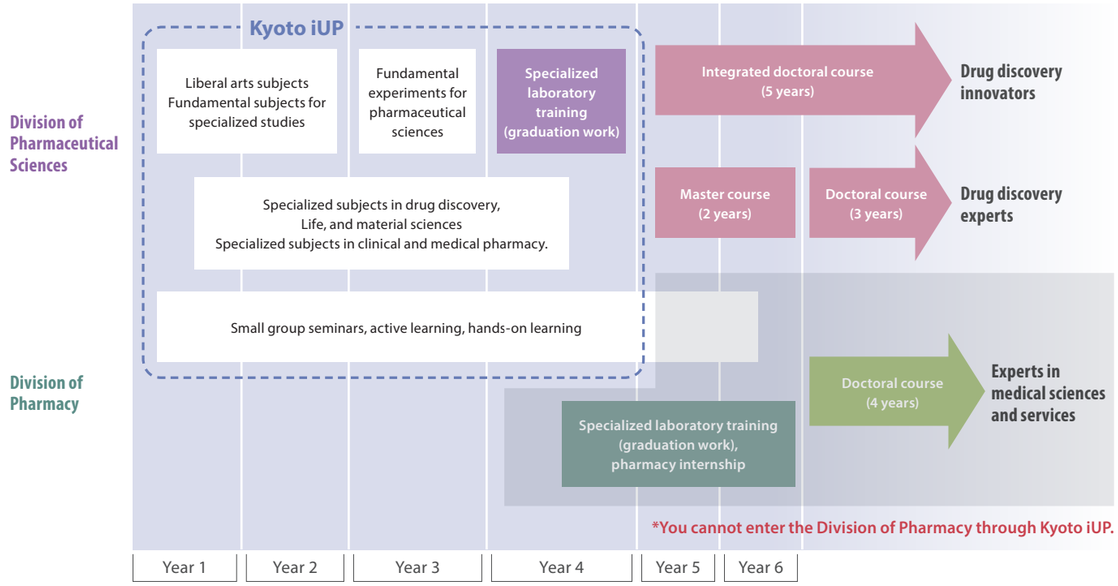
●Years 4, 5, and 6 (Division of Pharmacy): In the first semester of Year 4, lectures are conducted before noon, and medical pharmacy workshops are held in the afternoon. The objective here is to ensure that students acquire get a holistic idea about medical pharmacy. Special laboratory training begins in the second semester of Year 4 and continues through to Year 6. Students are enrolled in one of the laboratories to attend the special laboratory training and work on a specific specialized study area, with guidance and advice provided by academics in the laboratory. Through the process, students form a general idea about medical pharmacy and begin to think about their future career paths as medical pharmacy researchers/pharmacists. In Year 5, a five-month practical training course is provided at the Department of Pharmacy of Kyoto University Hospital and at off-campus dispensing pharmacies to help students understand the functions and responsibilities as pharmacists in medical institutions and learn pharmacist practices on the job.

***You cannot enter the Division of Pharmacy through Kyoto iUP.**

Curricula

■**Division of Pharmaceutical Sciences ＜4-year program＞**
The main objective is to nurture experts on drug discovery (graduates from the division are ineligible to take the national examination for pharmacists)

■**Division of Pharmacy ＜6-year program＞**
The main Objective is to nurture experts on medical pharmacy (graduates from the division are eligible to take the national examination for pharmacists)

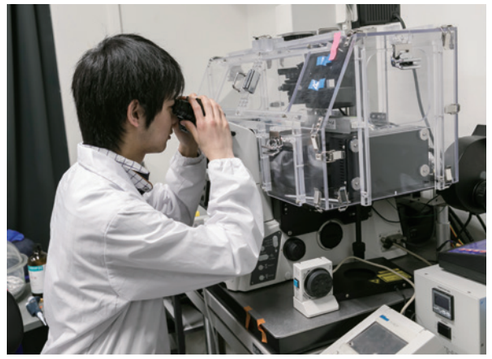


Study Programs in Divisions and Laboratories

Focuses on producing drug discovery sciences researchers and technicians

Division of Pharmaceutical Sciences ＜4-year program＞

The curriculum of the Division of Pharmaceutical Sciences is designed to equip students to work on questions related to the design and synthesis of pharmaceutical agents and their interactions with biomolecules. It also offers opportunities for students to acquire knowledge and develop technical skills related to the basics and application of drug discovery sciences, integrated knowledge body about structure, functions, effects, and kinetics field of pharmaceutical agents. In Year 4, students enroll in preferred laboratories and work on special laboratory training, which provides them access to the most advanced drug discovery sciences. The objective of the overall education program is to nurture researchers and technicians trained in drug discovery sciences. Many graduates proceed to the graduate school (master and doctoral courses involving 5 years) in order to deepen their expertise from a broader perspective and to develop their research capabilities, which is one of the prominent characteristics of the division.



Focuses on producing medical pharmacy researchers and pharmacists who can usefully work in advanced medical care settings

Division of Pharmacy ＜6-year program＞

Pharmacy is an integrated knowledge body intended to ensure appropriate use of pharmaceutical agents. Students of the Division of Pharmacy learn the knowledge and technical skills related to the basics and application of the discipline through clinical practices. Special laboratory training, hospital internship, and pharmacy internship are provided in Years 4 through 6. The objective of the Division of Pharmacy is to nurture medical pharmacy researchers and technicians and pharmacists who can usefully work in advanced medical care settings. The students are eligible to take the national examination for pharmacists once they graduate from the Faculty. Those students who wish to deepen their expertise from a broader perspective and develop their research capabilities can proceed to the graduate school (4-year doctoral course).

***You cannot enter the Division of Pharmacy through Kyoto iUP.**

Faculty of ENGINEERING

Contributing to society through original thinking and innovative engineering

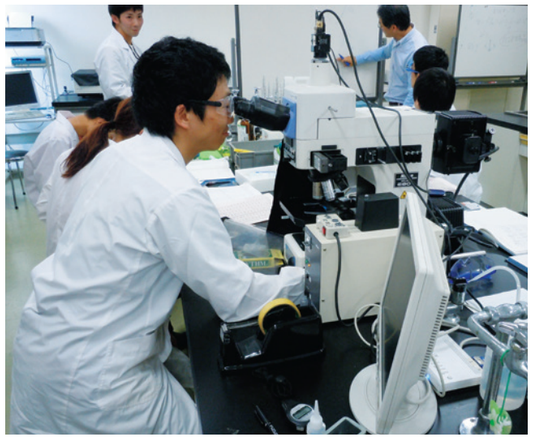
Features of the Faculty of Engineering, Kyoto University

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 schools 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 Chemical Science and Technology, Engineering Science, Electrical and Electronic Engineering, Informatics and Mathematical Science, Civil, Environmental and Resources 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, the 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 the 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

The 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 schools

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

Undergraduate School of Civil, Environmental and Resources Engineering

Civil, Environmental and Resources 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 Civil, Environmental and Resources 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 also offers an International Course Program of Civil Engineering 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 division 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 divisions, such as Mechanical Engineering and Science, Micro Engineering, Aeronautics and Astronautics, Nuclear Engineering, and Materials Science and Engineering, which are affiliated with the divisions 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 supports much of social activities. In addition, it plays an important role required to enrich future society, such as building sophisticated and safe information and telecommunications networks, creating materials 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, innovative creativity, and a sense of morality. Therefore, the curriculum is designed in such a way that students learn the basic subjects widely and are gradually introduced to their selected 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

As our society becomes more and more information-oriented, we must treat larger and more complicated systems and analyze big data, an enormous collection of information obtained through such systems. To accomplish this task, we need to understand how the systems function and generate information flow, and to develop efficient methods for the analysis. The Undergraduate School of Informatics and Mathematical Science consists of two courses, Computer Science; and Applied Mathematics and Physics. Students acquire a comprehensive education from the basic to the advanced level in informatics and mathematical sciences. In the Computer Science course, they acquire the fundamental ability to design, implement and utilize computer hardware, system software, and information systems. Furthermore, the Computer Science course provides advanced education on AI, Data Science, and Robotics to develop computational thinking for solving various problems related to societal problems. The Applied Mathematics and Physics course provides more focused education on mathematics and physics. Students develop competence in advanced mathematics and physics skills and learn how to apply them to various problems in diverse disciplines, including AI, Data Science, and Robotics.

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

Undergraduate School of Chemical Science and Technology

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 Chemical Science and Technology 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

Sciences for Life, Food, and Environment

Learning in the Faculty of Agriculture

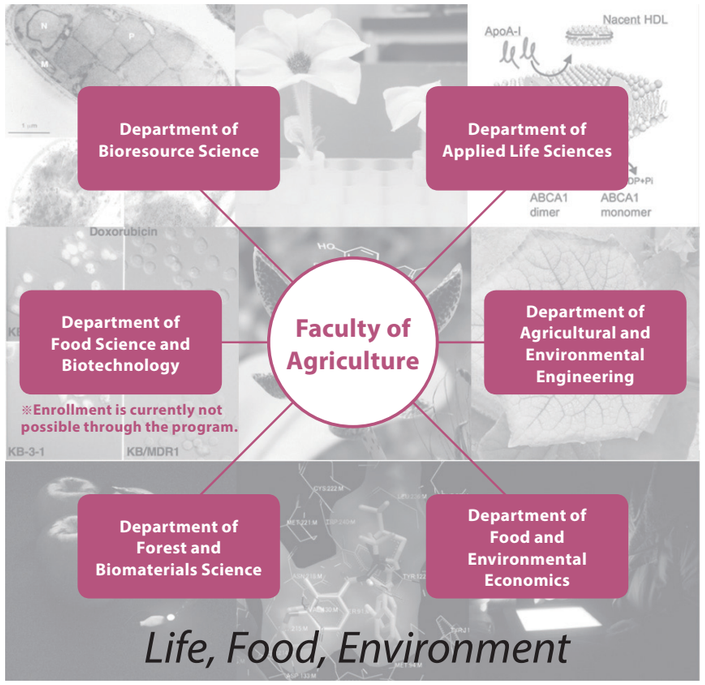
Five departments offer opportunities to acquire academic and advanced knowledge and develop broadened perspectives.

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 (Agricultural Biology), Department of Applied Life Sciences (Agricultural Chemistry), 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 projects and 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 (Agricultural Biology)

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-one 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.

Due to the broad range of subjects and disciplines within this Department, the educational curriculum is structured into four course options as outlined in the table below. During the first and second years, students initially study bioresource science in its entirety. As they enter the third year, students select one of the courses based on their growing interests and affiliations. In their fourth year, students further narrow down their focus by choosing specific fields within their selected course.




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 Life Science	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

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, paddy-upland rotation, nitrogen cycle, environmentally friendly agricultural production system, remote sensing
Plant Production Control	Genetic seedlessness in fruits vegetables, mechanism of selfish genes, elucidation of floral regulatory mechanism, cross combination and seed development, elucidation of fruit development and senescence mechanisms, development of postharvest technology, development and application of next-generation type crop model, farm system for generating crop and renewable energy together
Quality Analysis and Assessment	Molecular mechanism on gustation, flavor, sensory evaluation, palatability, functional compound, mass spectrometry, metabolomics
Food Quality Design and Development	Molecular design, food proteins and enzymes, food allergy, environmental allergy, plant protein utilization, antibody, protein engineering
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	Oocytes, preimplantation embryos, zygotic genome activation, cell differentiation, reprogramming, epigenetics, developmental origins of health and disease, mammalian embryogenesis, in vitro fertilization, transgenic animals, genome edition
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	Research on how to extract, analyze, and use the information on the utilization and conservation of bioresources in terrestrial and marine environments using big data, biotelemetry, and environmental DNA.
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, physiology of highly unsaturated fatty acids, molecular control of lipid metabolism
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, disease resistance, polyploid, cytoplasmic inheritance, population genetics, evolution, hybrid incompatibility, speciation, bioinformatics
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 (Agricultural Chemistry)

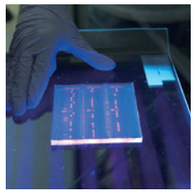
The 21st century is said to be the era of "bioindustry," and it is thought to be a time of progress for the environment, food, energy, health, and welfare. At the core of this fast-growing sector is biotechnology, a means of utilizing biological functions in advanced applications.

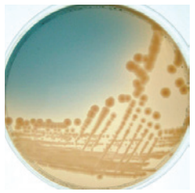
At the Department of Applied Life Sciences, students learn basic and advanced knowledge across a broad range of academic disciplines, giving them the ability to follow the principles of life phenomena. This in turn allows them to analyze various issues that may arise on the frontlines of agricultural 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 dynamic structure and functional expression of biological macromolecules based on atomic-level measurements, elucidation of mechanisms of gene expression, and basic and applied research on life, health, and food
Bioregulation Chemistry	Organic chemistry, mass spectrometry, bioactive molecules, animal toxins, 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	Molecular mechanism of photosynthesis, plant nutrition and growth, plant metabolism and functions, environmental, stress and plants, algal biotechnology
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

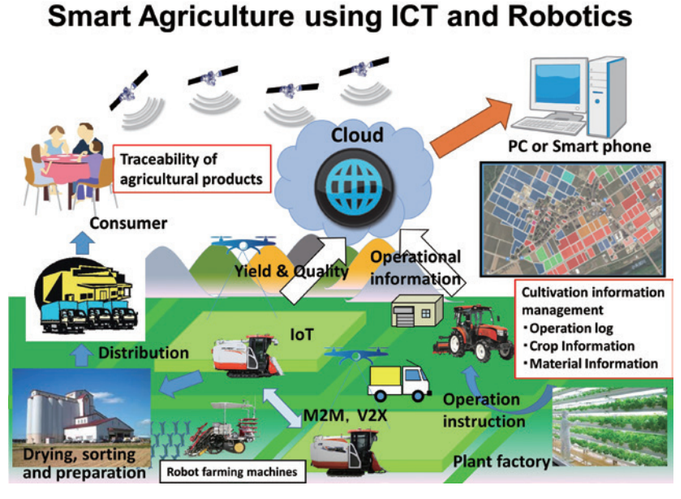
Food security is the most vital necessity for the survival of humanity. In this respect, agriculture is one of the most sublime and fundamental human activities, playing an integral part in the process of food production. It is believed that agriculture (cultivating plants and livestock) dates back roughly 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.

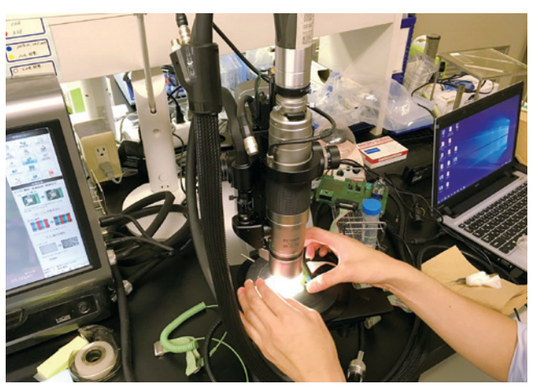
In the fields of the "Rural Environmental Engineering" which consists of 4 fields (Agricultural Facilities Engineering, Water Resources Engineering, Hydrological Environment Engineering, and Rural Planning), students learn about theories for creating rich and beautiful regional environments that encompass 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.

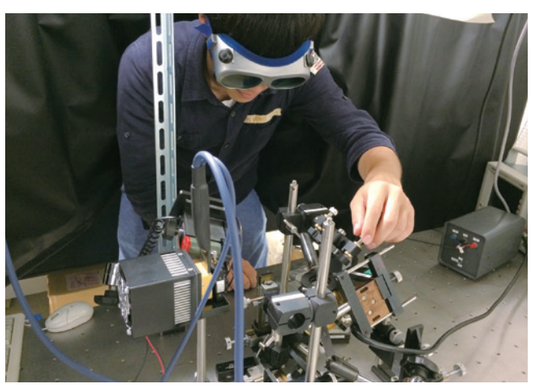
In the fields of the "Bioproduction Engineering" which consists of 3 fields (Agricultural Systems Engineering, Field Robotics, and Bio-Sensing Engineering), students learn how they should go about controlling production, harvesting, processing, and storing food, and developing biomass energy. They do 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.



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, system analysis, LCA for environmental management, resource recycling, methane fermentation, sensing and data analysis for soil, plant, and environment, data science
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	Planning and managing farm systems under uncertainty, 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.

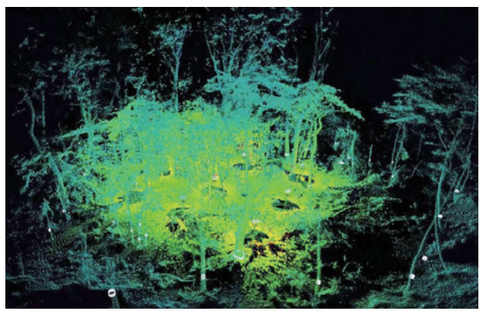
The Department of Forest and Biomaterials Science has 17 laboratories, covering a wide range of research topics. They can be grouped roughly in three groups. The six laboratories in the first group, including "Forest Biology", "Forest Ecology", "Tropical Forest Resources and Environments", "Forest Hydrology", "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, small-scale forestry, forest industry, silvotourism, forest and culture, forest certification system, forest resources and rural livelihoods
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 of wood, effective use of hardwoods from satoyama woodlands
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)