Educational Purpose

To develop global human resources with the extensive knowledge needed to realize a sustainable society, and having specialties from the basics to applications of science and technology, flexibility in thinking, competencies for intellectual creativity with problem finding and solving skills, broad perspectives, enriched sense of humanity, and collaboration skills to work in teams, all with a view to contributing to the international society.

College of Engineering Systems

Bachelor of Engineering

Educational Purpose

Human resources who can support and lead safe, secure, comfortable, affluent, and sustainable human life from an engineering perspective, i.e.

1. basic skills that can be applied to a wide range of fields
2. the ability to carry out work with a broad perspective
3. basic human skills as a member of society and a professional

We train engineers and researchers who have acquired the skills and the ability.

Desired Students

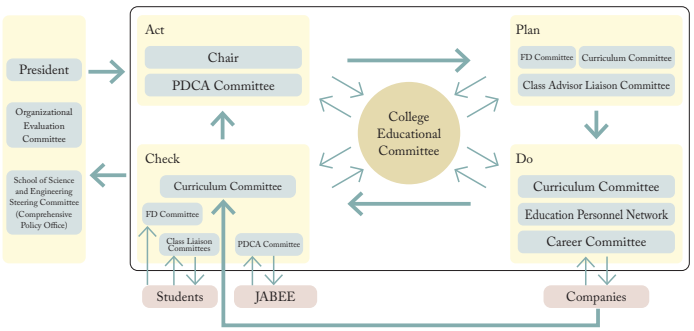
Students admitted to College of Engineering Systems are expected to have the following

(1) to have the basic academic skills and sense required for engineering.
(2) to be full of curiosity and a desire to learn.
(3) to have a clear sense of purpose to become an engineer.
(4) to acquire excellent thinking, judgment, and expression skills and communication skills.

Measures to Ensure and Improve the Quality of Education

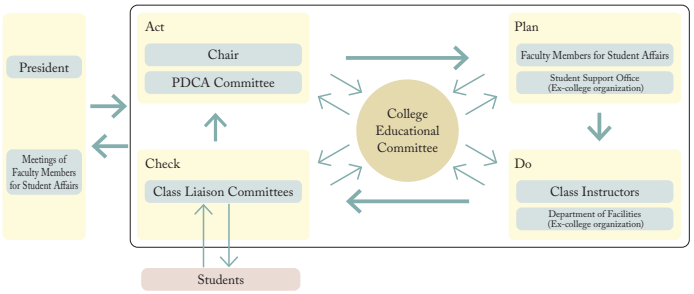
Practice of PDCA cycle and FD activities: We organize curricula to achieve educational goals (Plan) and conduct classes based on syllabi (Do). At the end of each course, a class questionnaire survey is conducted (Check) to examine the effectiveness of the course and to examine the content improvement (Act). With the establishment of the educational inspection system (shown in the figure below), use of the PDCA cycle and the college faculty development (FD) activities aimed at improving class methods, we are constantly examining and improving our whole education system.

Educational Inspection System



Improvement of the educational and learning support environments: We have established a system for improvement of the educational and learning support environments (see the figure below). The university obtains facilities, equipment and systems necessary for conducting education and supporting student learning by referring to the opinions of students and take necessary measures to maintain, operate and update them.

System to Improve the Educational and Learning Support Environments



JABEE-accredited colleges: In 2004, College of Engineering Systems is accredited by Japan Accreditation Board for Engineering Education (JABEE) as a JABEE program in the Field for Multi- and/or Trans- disciplinary Engineering and New-disciplinary Engineering. In addition, our graduates have been recognized as engineers who have completed engineering education at the international level (Washington Accord) since 2005.

Bachelor of Engineering

Diploma Policy

A bachelor's degree in engineering will be awarded to students who have acquired knowledge and abilities (i.e., General Competence) based on the educational objectives of the University of Tsukuba's Bachelor's Program, and who have acquired the basic skills and logical thinking abilities to deal with various problems in the field of engineering based on the educational purposes of School of Science and Engineering and College of Engineering Systems.

In terms of basic abilities that can be applied to a wide range of fields, students are required to acquire specialized basic subjects related to mathematics, physics, and computers, and to be able to apply this knowledge to analyze various engineering problems. Specifically, students are expected to acquire the ability to think and analyze logically and mathematically, to deepen their understanding of physical and natural phenomena, and to acquire the ability to get and process information using computers.

In terms of the ability to carry out work with a broad perspective, students are expected to master the specialized subjects of each major, acquire the latest knowledge, understand the relationship between science and technology and society, the world, and the entire globe, and be able to plan new technologies and design and operate specific systems. In addition, students are expected to be able to devise concrete solutions to problems and carry out their work systematically through cooperation with their classmates and guidance from their supervisors in experiments and graduation research.

In terms of basic human skills as a member of society and a professional, students are required to acquire subjects such as foreign languages, experiments, and graduation research, and to acquire communication skills that will enable them to be active internationally, as well as presentation skills that will enable them to express their ideas in a logical and easy-to-understand manner to a third party. In addition, students are expected to possess a sense of responsibility and ethics as well as social skills as engineers, along with initiative and the ability to take action.

Curriculum Policy

The program is designed to enable students to acquire the basic skills and logical thinking abilities to deal with various problems in the field of engineering and to achieve the goal of a bachelor's degree in engineering.

General policy

This college covers an extremely wide range of engineering fields, and consists of two majors: the major in Intelligent Engineering Systems and the major in Engineering Mechanics and Energy. Although there are some differences in the content of study in each major, it is easy to take courses in other majors, and there are no barriers to major assignment in the final year of study. The curriculum is designed to emphasize cross-disciplinarity as much as possible while maintaining some differences in expertise among majors.

Course sequence policy

In the first and second years, students study the concept of "engineering systems," which is a cross-sectional approach to engineering fields, and develop basic skills that can be applied to any major in College of Engineering Systems, through a curriculum system that allows students to study a variety of specialized fields in a cross-sectional manner.

From the fall semester of the second year, students are divided into two majors, where they can select distinctive courses in a variety of specialized fields and acquire in-depth specialized knowledge.

In the second and third years, through the completion of basic, specialized, and applied experiments in each major and related specialized subjects, students develop the integrated creative solution skills necessary to design various systems. In addition, all experiments are conducted in group units, which helps students to cultivate teamwork skills.

In the fourth year, students are assigned to a laboratory of their choice in the college without

being limited to their major field of study, and complete their graduation research using the basic skills and broad range of specialized knowledge they have acquired. Students complete their graduation research by utilizing their acquired basic skills and a wide range of specialized knowledge. In this way, we foster engineers with the ability to construct engineering systems that are useful in people's lives. In addition, students with excellent grades up to the second year can graduate early by conducting special graduation research in the third year.

Implementation policy

In order to ensure the level of education demanded by society, we actively appoint part-time lecturers from industry in several specialized subjects, such as practical business, and we also offer specialized English courses taught by foreign faculty. In addition, we have a sufficient number of laboratories and equipment for the experiments and exercises conducted in each year, as well as a large-scale programming laboratory that can be used by many students simultaneously. In addition, each semester, the class teachers conduct personal interviews with students to provide detailed guidance for their studies.

Policy for evaluation of learning outcomes

Grading is conducted strictly in accordance with the syllabus, and the grading process is recorded.

Structure of Majors

Intelligent Engineering Systems
Informatics
Artificial Intelligence
Risk Engineering
Electrical and Electronic Engineering
Communication Engineering
Control Engineering
Mechanical Engineering
Systems Engineering
Cybernics
Robotic Engineering

Engineering Mechanics and Energy
Architectonics
Mechanical Engineering
Civil Engineering
Materials Engineering
Aerospace Engineering
Informatics
Risk Engineering
Energy Science
Electrical and Electronic Engineering
Nuclear Engineering

Curriculum structure

Intelligent Engineering Systems | **Engineering Mechanics and Energy**

Artificial Intelligence, Communication, Electrical and Electronic Engineering, Control and Systems Engineering, Robot Engineering, Architecture Engineering, Civil Engineering, Aerospace Engineering, Risk Engineering, Materials Engineering, Energy Science

4th year

Graduation Project and Thesis

Ethics for Engineers

3rd year

Pattern Recognition, Information Theory, Numerical Analysis, Devices and Elements for Mechatronics, Image Processing, Info-Telecommunication Systems II, Principles of Research and Development, Machine Learning A·B, Intelligent Information Processing, System Dynamics, Advanced Programming

Reliability Engineering
Measurement Engineering

Combustion Engineering, Steel Structure, Gas Dynamics, Disaster Preventive Engineering, Introduction to Environmental Engineering, Electric Power Engineering, Architectural Equipments, Geotechnical Engineering, Remote Sensing, Machinery Engineering of Energy Conversion, Reinforced Concrete Structure, System Dynamics, Hydrogen Energy Engineering

Laboratory of Intelligent Interactive Systems

Advanced Laboratory of Mechanics Engineering and Energy/Applied Laboratory of Engineering Mechanics and Energy

Artificial Intelligence, Communication Engineering, System Optimization, Robotics, Info-Telecommunication Systems I, Human Computer Interface, Digital Signal Processing, Data Structure and Algorithm, Technical English Exercise

Electronic Circuits
Topics on Engineering Systems

Heat Transfer, Architectural Environmental Engineering, Planning and Design, Mechanics of Composite Materials, Architectural Design and Planning , Soil Mechanics, Aquatic Environment, Power Electronics, Engineering Fluid Dynamics, Concrete Engineering, Technical English Exercise, Introduction to Energy Studies

2nd year

Discrete Mathematics, Introduction to Programming C·D, Control of Linear Systems, Logic Circuits, Materials Engineering for Mechatronics, Technical English B, Computer and Network, Biosystem

Feedback Control
Machine Design
Applied Mathematics B

Advanced Thermodnamics, Materials Engineering, Physical Chemistry, Fluid Mechanics, Electro magnetics Engineering, Numerical Computation, Electromagnetic Materials, Applied Thermodynamics, Theory of Vibration, Structural Mechanics, Technical English B

Basic Laboratory of Engineering Systems

1st year

Mathematics Subjects
Complex Analysis
Ordinary Differential Equations
Advanced Analysis
Advanced Linear Algebra
Calculus 1·2·3
Linear Algebra 1·2·3
Mathematics Literacy 1·2

Physics Subjects
Introduction to Materials Engineering
Introduction to Fluid Mechanics
Introduction to Thermodynamics
Advanced Mechanics
Advanced Electromagnetics
Mechanics 1·2·3
Electromagnetics 1·2·3

System Programming
Introduction to Programming A·B
Introduction to Engineering Systems

Foundation Subjects for Major

Probability Theory and Statistics
Electric Circuit
Introduction to Material Science for Engineers
Applied Mathematics A
Technical English A

Contents Engineering System
Space Technology
Tsukuba Robot Contest
Contents Media Engineering
Introduction to Engineer of Large Scale Projects

Information Literacy (Lectures・Exercises)
Data Science
Invitation to Engineering Systems
Invitation to Arts and Science
English, Physical Education (until 3rd year)
Introductory Subjects that are offered by other Schools and Colleges

Common Foundation Subjects, Specific Foundation Subjects

Note: Two-major system is applied from the new students enrolled in academic year 2021. Please refer to the College Standard for a cademic year 2020 and before for the former four-major system.