

# School of Engineering Science

## Educational Objectives

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In line with the Educational Objectives of the University of Osaka, the School of Engineering Science has a unique educational and research philosophy of “Fundamentally developing scientific technology by a fusion of science and engineering will create the true culture of humanity.” Based on this philosophy, we aim to nurture professionals with a sense of balance and humanity who can play an active role in society: Practicing deep academic major education balances science and engineering and providing high-quality liberal arts education fosters humanity as detailed below.

### **Advanced specialized knowledge and outstanding academic expertise**

In addition to advanced knowledge and skills in specialized fields, we aim to nurture human resources who have a wide range of academic expertise related to science and technology, and creativity and problem analysis ability to utilize it.

### **Broad-based knowledge and critical thinking**

Aiming to nurture human resources with the ability of broad-based knowledge and critical thinking. This is because we believe that the culture connecting a wide range of fields is necessary to open up a new multidisciplinary field that integrates science and technology.

### **International mindset**

From the viewpoint of integrating science and technology and developing multidisciplinary fields of study, we aim to nurture human resources with internationality who can understand the differences between different languages, cultures and specialized fields, and who can also interact beyond those differences.

### **Design prowess**

Aiming to nurture human resources with the ability to identify and analyze academic and social problems, plan a path to solve them, and communicate with people in various fields.

## **Degree Awarding Policy (Diploma Policy)**

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Under the Diploma Policy of the University of Osaka, and with a view to developing individuals with the competencies stated in the educational objectives, the School of Engineering Science confers a Bachelor's Degree in Engineering on individuals who have been enrolled in the School of Engineering Science for the required number of years; earned the stipulated number of credits in the subjects offered by one's course (educational program) including special research; and acquired basic knowledge in natural sciences, creative thinking, advanced specialized skills, broad-based knowledge, critical thinking, sense of ethics, international leadership skills and other social skills as stated below.

### **Advanced specialized knowledge and outstanding academic expertise**

- 1) Acquired broad-based academic expertise in science and technology in addition to advanced knowledge and skills in the field of specialty.
- 2) Acquired the ability to apply the advanced knowledge and skills in the field of specialty for identifying and solving problems in society and academia, while building on creative thinking and problem-analysis skills.

### **Broad-based knowledge and critical thinking**

Ready to open up new multidisciplinary fields of study by integrating science and technology:

- 1) Acquired broad-based knowledge necessary,
- 2) Obtained multifaceted and comprehensive viewpoints based on broad-based knowledge and critical thinking, and
- 3) Acquired the ability to make objective judgments.

### **International mindset**

- 1) Acquired the ability to understand the differences between different languages, cultures and specialties from the perspective of integrating science and technology and developing new multidisciplinary fields of study.
- 2) Acquired the ability to interact across different languages, cultures, and specialties with a wide range of cultures based on comprehensive intelligence and rich humanity.

### **Design prowess**

- 1) Acquired the ability to identify and analyze emerging problems in society and academia from the perspective of integrating science and technology and developing new multidisciplinary fields of study, and devise approaches to solutions.
- 2) Acquired the ability to collaborate with people in various fields to identify and solve social and academic problems from the perspective of integrating science and technology and developing new multidisciplinary fields of study.

## **Teaching and Learning Policy (Curriculum Policy)**

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In line with the Curriculum Policy of the University of Osaka, and with a view to guiding students to acquire knowledge and skills specified in the degree awarding policy, the School of Engineering Science systematically provides Liberal Arts education subjects as well as Academic Major and Global Literacy education subjects and other necessary subjects, combining lectures, seminars and practical training sessions as appropriate as stated below.

### **Principles of Curriculum Design**

#### **Advanced specialized knowledge and outstanding academic expertise**

Students are guided to acquire advanced specialized knowledge and a sense of ethics in the field of specialty by studying a wide range of topics from the basics to cutting-edge research results through required Academic Major education subjects offered in the form of lectures, seminars and practical training. Students also study elective Academic Major education subjects to acquire basic knowledge in science and technology in related fields.

#### **Broad-based knowledge and critical thinking**

Liberal Arts education subjects in mathematics, physics, chemistry and biology help students acquire broad-based knowledge and critical thinking to contribute to integrating science and technology and developing new multidisciplinary fields of study. The School of Engineering Science offers advanced Liberal Arts education subjects in quantum physics, chemistry, mechanics, intelligent systems science, bioscience, cybernetics, information science and mathematical science as elective required subjects. Students enrolled in and after AY2019 are required to select two of such subjects (one credit each) to study disciplines in fields other than their own to acquire broad-based knowledge and critical thinking to contribute to developing new multidisciplinary fields of study.

#### **International mindset**

In order to deepen the understanding of different languages, cultures and specialties, students will study Liberal Arts and Global Literacy education subjects, which will help improve their internationality and enable exchanges that overcome those differences.

#### **Design prowess**

Students are guided to acquire social skills such as the ability to take leadership, work in collaboration and think creatively through group activities in problem-based-learning (PBL) sessions and seminars.

By engaging in special research, students also acquire the specialized knowledge and skills required to continue studies at graduate school or work as R&D personnel.

#### **Contents and Methods of Education**

Required Academic Major education subjects are offered in the form of lectures, laboratory work and seminars to help students acquire advanced specialized knowledge in the field of specialty. By studying elective subjects and elective required subjects, students acquire academic expertise in related fields as well as broad-based knowledge and critical thinking, and an international mindset. Problem-based-learning (PBL) sessions, seminars and special research taught in an active-learning style help students acquire design prowess: the abilities to conceive ideas for identifying and solving problems in one's specialty and other fields, think creatively, take leadership, and work in

collaboration. The following method is used to assess the level of achievement of the learning goals specified in the syllabus of each of these subjects.

### **Academic Performance Evaluation Method**

With the aim of nurturing outstanding leaders who will constantly take on difficult challenges, the School of Engineering Science evaluates students multilaterally based on the following methods: 1) examinations and reports in lecture-based subjects, 2) oral examinations, reports, etc. in seminar- and practical training-based subjects, and 3) research presentations, discussion, oral examinations, reports, etc. in active-learning subjects, including special research, PBL sessions, and overseas training. The credits will be granted to students who have achieved a certain level of grades.