

# Graduate School of Engineering

## Educational Objectives

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In line with the Educational Objectives of Osaka University, the Graduate School of Engineering engages in education and research to contribute to the sustainable development of human society by cultivating advanced specialized knowledge in engineering and applying such knowledge proactively for practical purposes, based on the belief that “Engineering is a discipline that integrates various fields of science and technologies for the betterment of society.” In doing so, the Graduate School of Engineering aims to nurture global leaders with the ability to make a meaningful contribution to a wide array of engineering-related activities, ranging from the pursuit of scientific and technological innovations to exploration of uncharted engineering frontiers, and to play a major role in the development of international society with a comprehensive understanding of research trends. To achieve this aim, the Graduate School of Engineering guides students to tackle world-class, cutting-edge research themes to develop the ability to identify problems and find solutions to them, and if appropriate, makes students participate in industry-university joint research projects.

In addition to the abovementioned ability, doctoral students are guided to develop the insight to foresee problems likely to face human society in the future and the ability to explore uncharted engineering frontiers, so that they will be able to play a leadership role in global society in line with the motto of Osaka University, “Live Locally, Grow Globally.”

### **Cutting-edge, advanced specialized knowledge and outstanding academic expertise**

Gain a deep understanding of the mechanisms of human society and the natural world and broad-based, advanced scientific knowledge, and acquire world-level cutting-edge expertise and skills in each engineering field based on such understanding and knowledge. Deepen academic expertise and develop the ability to identify and solve problems from a comprehensive viewpoint by setting a research theme on one’s own and pursuing the theme.

### **Advanced broad-based knowledge and deep critical thinking**

Develop an interest not only in one’s research field but also in other related or different fields so that one can establish an interdisciplinary research theme by identifying the commonality between one’s research and other research fields, and acquire broad-based advanced scientific expertise as well as broad-based knowledge and deep critical thinking that enable one to deepen understanding of the mechanisms of human society and the natural world.

### **Sophisticated international mindset**

Develop the ability to apply expertise in engineering for the genuine progress of international society by taking opportunities to participate in international joint research and make presentations at international conferences as much as possible.

### **Advanced design prowess**

Develop profound thinking skills that enable one to find solutions to complex problems affecting human society through the specialized study of one’s research theme, and then acquire design prowess and a strong sense of ethics to apply expertise in engineering for the genuine progress of international society.

## **Completion Approval/Degree Awarding Policy (Diploma Policy)**

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Under the Diploma Policy of Osaka University, and with a view to developing individuals with competencies stated in the educational objectives, the Graduate School of Engineering confers a Master's Degree in Engineering and a Doctoral Degree in Engineering on individuals who have been enrolled in the master's degree and doctoral degree programs respectively for the stipulated period, acquired advanced abilities and skills in the field of specialty stated in the following objectives, earned the stipulated number of credits, and passed the examinations specified in the Graduate School Regulations.

### **[Master's Degree Program]**

#### **Cutting-edge, advanced specialized knowledge and outstanding academic expertise**

Acquire advanced specialized knowledge and skills in the field of specialty.

Acquire cutting-edge knowledge and skills in the field of specialty necessary to conduct master's thesis research.

Develop the ability to present and discuss the contents and results of one's master's thesis research.

#### **Advanced broad-based knowledge and deep critical thinking**

Develop the ability to appropriately organize one's research to write a master's thesis.

Develop the ability to correctly understand various problems facing international society from a comprehensive viewpoint and offer solutions to such problems.

#### **Sophisticated international mindset**

Develop the ability to present research results in English and discuss the research results with foreign students, including international students studying at Osaka University.

#### **Advanced design prowess**

Develop logical thinking, communication, and problem-solving skills necessary to conduct R&D.

Develop the ability to present and discuss the contents and results of one's master's thesis research.

### **[Doctoral Degree Program]**

#### **Cutting-edge, advanced specialized knowledge and outstanding academic expertise**

Acquire advanced specialized knowledge and skills in the field of specialty and develop an understanding of the essence of the specialty.

Develop the ability to discover an original research theme, formulate a research plan, promote research and present one's research widely.

#### **Advanced broad-based knowledge and deep critical thinking**

Acquire a strong sense of ethics necessary for conducting research.

Develop logical and original thinking, problem-exploration, problem-solving, and expression skills.

#### **Sophisticated international mindset**

Develop international communication skills and the practical ability to present and discuss research.

**Advanced design prowess**

Develop the ability to write a doctoral dissertation with novelty, originality and academic significance.

Develop the ability to present the contents and results of one's doctoral dissertation research and discuss specialized topics relating to the research.

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

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In line with the Curriculum Policy of Osaka University, each department of the Graduate School of Engineering offers a curriculum to study cutting-edge, advanced theories to deepen the specialized knowledge and skills learned in the undergraduate program. To apply the specialized knowledge and skills for practical purposes, students are guided to acquire broad-based knowledge and critical thinking, design prowess and an international mindset through the study of Academic Major education subjects, advanced Liberal Arts education subjects and advanced Global Literacy education subjects. The academic performance of students in these subjects is strictly and fairly evaluated and credits are awarded accordingly.

### **< Principles of Curriculum Design >**

The curriculum of the master's degree program is designed to educate students to deepen advanced specialized knowledge and skills by studying various subjects and develop practical R&D skills. The ultimate goal of the curriculum is successful completion of master's degree research through laboratory-based in-person research guidance. Students may study abroad under academic partnership between Osaka University and foreign universities if they wish. To complete the master's degree program, students must earn at least 30 credits in specified subjects, receive necessary research guidance, and pass the review of the master's thesis.

The curriculum of the doctoral degree program is designed to educate students to acquire more advanced, cutting-edge specialized knowledge and skills, develop the ability to conduct world-class R&D in the field of specialty and receive research guidance from a supervisor for the ultimate goal of writing a doctoral dissertation with originality and usability, backed by a strong sense of research ethics. To complete the doctoral degree program, students must earn the stipulated number of credits in specified subjects, receive necessary research guidance, and pass the review of the doctoral dissertation.

To nurture high-caliber researchers and engineers with outstanding creative skills through the master's and doctoral degree education, the Graduate School of Engineering, in addition to its own academic staff, invites instructors from Osaka University's other organizations, such as related research institutes and centers, as well as from external organizations, to give research guidance to students.

### **< Contents and Methods of Education >**

Academic Major education subjects are designed to guide students to systematically study the field of specialty and develop an interest in other related fields. The Graduate School of Engineering also offers a sufficient number of subjects taught by instructors with business experience to help students recognize the role of engineering in society. Along with Academic Major education subjects, advanced Liberal Arts education subjects and advanced Global Literacy education subjects are offered to enable students to develop the ability to think from a broad-based, comprehensive perspective and enhance their international mindset. Through individualized guidance given by a supervisor (Research Training for Thesis), students pursue their own research theme and write a master's thesis or doctoral dissertation on the theme.

### **< Academic Performance Evaluation Method >**

Academic Major education subjects of the Graduate School of Engineering are offered in a variety of modes. The academic performance of students in these subjects is evaluated strictly and fairly by methods suitable for the respective modes, such as written examination, report, oral examination and research presentation, and credits are

awarded accordingly.

The master's thesis includes research contents that contributes to the development of the field of study for acquiring research ability in the field of study and ability to carry out profession that requires advanced degree of specialization. After presentations and discussions suitable for academic research are conducted at the thesis presentation, the thesis defense is conducted in each major, and the final judgment is made at the department director's meeting.

The doctoral dissertation must have sufficient academic value to make an important contribution to the theory of academic study and its application, and should be the result of research that has been independently and autonomously undertaken. Also, it should be only one unique and does not include the contents of doctoral dissertations published by any institutions or persons. The contents of the doctoral dissertation shall be published internationally, and the thesis defense is conducted by each dissertation committee and department, and the final judgment is made at the department director's meeting.