

# Graduate School of Science

## **Educational Objectives**

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In line with the Educational Objectives of Osaka University, the Graduate School of Science offers advanced education on science, a discipline that underlies all natural sciences aiming to pursue truth and that is at the basis of today's technology. Natural science owes much of its progress to the efforts of people who were genuinely fascinated by the beauty of Nature, without considering the potential of science and technology to generate profits. Science, with such a principle and spirit, is the basis of social development and cultural and intellectual heritage of humanity. Education at the Graduate School of Science aims to help students learn the principle and spirit of science and develop scientific skills that can be applied to various areas of society by guiding them to achieve the following objectives.

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

Acquire advanced specialized knowledge and outstanding academic expertise to understand cutting-edge research results in various areas of natural sciences. Develop the ability to apply the scientific thinking and methodologies acquired through the educational process to various areas of society.

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

Acquire research ethics, broad perspectives, and outstanding academic expertise, and develop the ability to play an active role in various areas of society.

### **Sophisticated international mindset**

Develop communication skills in English, etc., an international mindset, and the ability to act globally as researchers, R&D personnel, or teachers at universities, public agencies, or companies.

### **Advanced design prowess**

Acquire profound scholarly knowledge and outstanding academic expertise and the ability to discover new problems by pursuing questions and curiosity utilizing the acquired scientific thinking and methodologies and work in an interdisciplinary manner to solve a diverse range of complex problems.

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

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Under the Diploma Policies of Osaka University and guided by the words of Dr. Hantaro Nagaoka, the first president of Osaka University and the founder of the School of Science, "*Souhaku wo namuru nakare* (Be always creative)," the Graduate School of Science confers a Master's Degree in Science and a Doctoral Degree in Philosophy on master's and doctoral students respectively, who have learned the essence of science in the pursuit of truth in the field of natural sciences, not formally but in substance, and who have achieved the following objectives by studying subjects offered by the Graduate School of Science.

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

Acquire cutting-edge knowledge in the field of specialty and develop the ability to understand the essence of research in the field.

Develop the practical ability to conduct research based on cutting-edge specialized knowledge in the field of specialty upon completion of the master's degree program.

Develop the ability to conduct high-level research independently based on cutting-edge specialized knowledge in the field of specialty upon completion of the doctoral degree program.

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

Acquire basic academic skills to play an active role in a variety of areas, research ethics, and advanced broad-based knowledge and deep critical thinking to communicate with people with specialties in different fields.

### **Sophisticated international mindset**

Develop the ability to present one's research results in English, and write academic papers in English.

Acquire enough foreign language proficiency to discuss matters relating to research with foreign researchers.

### **Advanced design prowess**

Develop a comprehensive perspective based on outstanding expertise in the field of specialty and apply the expertise also in different fields.

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

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In line with the Curriculum Policies of Osaka University, the Graduate School of Science offers a curriculum consisting of: Academic Major education subjects to acquire knowledge from basic to advanced levels in the fields of specialties and develop the ability to apply the knowledge for practical purposes; advanced Liberal Arts education subjects to acquire advanced broad-based knowledge and deep critical thinking to communicate with people with specialties in different fields; and advanced Global Literacy education subjects to develop the ability to communicate with foreign researchers. The academic performance of each student in these subjects is strictly evaluated before credits are granted.

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

Students are required to study Academic Major education subjects offered by the respective departments to acquire knowledge from basic to advanced levels in their fields of specialties.

The curriculum of the master's degree program is designed to enable students to develop the practical ability to conduct research based on cutting-edge specialized knowledge in their fields of specialties through the process of: engaging in advanced research under the individualized guidance of a supervisor; presenting the progress of the research in a seminar held by the laboratory or research group; and discussing the research results, to achieve the eventual goal of writing a master's thesis under the guidance of a supervisor.

The curriculum of the doctoral degree program is designed to enable students to develop the ability to conduct high-level research independently based on cutting-edge specialized knowledge in their fields of specialties through the process of: formulating and implementing a high-level research plan under the guidance of a supervisor; presenting

the progress of the research in a seminar held by the laboratory or research group; and discussing the research results, to achieve the eventual goal of writing a doctoral dissertation.

The Graduate School of Science also offers advanced Liberal Arts education subjects, as well as the Graduate Minor Program, Graduate Program for Advanced Interdisciplinary Studies and Advanced Programs in liberal arts and sciences, with the aim of guiding students to acquire basic academic skills to play an active role in a variety of areas, research ethics, and advanced broad-based knowledge and deep critical thinking to communicate with people with specialties in different fields.

In addition, advanced Global Literacy education subjects help students acquire enough foreign language proficiency to present their research results overseas, write academic papers in English, and discuss matters relating to research with foreign researchers.

With the abovementioned curriculum, the education at the Graduate School of Science enables students to develop a comprehensive perspective based on outstanding expertise in their fields of specialties and apply the knowledge also in different fields, in a manner that meets their career needs, e.g. using the expertise to conduct applied research as a company researcher, or to give research guidance to students as a high school teacher.

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

The curriculum of the Graduate School of Science allows students to systematically acquire knowledge from basic to advanced levels in the fields of specialties of their departments. Specifically, students are guided to learn the method of conducting high-level research and, in the doctoral degree program, develop the ability to formulate and implement a high-level research plan by attending a seminar/special seminar held by the laboratory or research group and discussing the progress of research under the individualized guidance of a supervisor, to achieve the eventual goal of writing a master's thesis or doctoral dissertation.

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

The academic performance of each student is strictly and fairly evaluated according to the methods specified in the syllabus of each subject. To be more specific, academic performance in lecture- and exercise-based subjects is evaluated through examinations, quizzes, reports and class attitude. Academic performance in laboratory work and practical training is evaluated on the basis of class attitude and reports. Academic performance in seminar-based subjects is evaluated through presentations made at the seminar and academic papers. In the review and final examination of the master's thesis and doctoral dissertation, the quality of the thesis/doctoral dissertation, the method used for the presentation of the topic of the thesis/dissertation, and the results of oral examination on the topic are considered.