

**Graduate School of Science**  
**Department of Mathematics and Science Education**

**Diploma Policy**

1. The master's program in the Department of Mathematics and Science Education aims to train personnel with advanced expertise in mathematics and science education who can practice "the scientific method" and the concept of "meritocracy". Successful candidates will have attended school for a specified period and acquired the necessary credits for the Department of Mathematics and Science Education. Furthermore, those who have passed a final examination on their master's thesis will receive a master's degree (Master of Philosophy).

A graduating student will acquire the following abilities:

- (1) The ability to conduct research in the field of ICT in secondary mathematics and science education.
  - (2) The ability to conduct research in the field of ICT in public and private secondary school mathematics and science teachers who wish to familiarize themselves with the latest research in these fields.
  - (3) The ability to disseminate mathematics and science education thereby contributing to the development of scientifically sound citizens.
2. The doctoral program trains mathematics and science educators and researchers to be at the core of research and educational institutions, The doctoral degree (Doctor of Philosophy), or doctoral degree (Doctor of Science) is accredited and awarded to those who have attended courses in the program, who have acquired the necessary credits and had their doctoral dissertation recognized as having reached the standard required.

A graduating student will acquire the following abilities:

**Doctor of Philosophy**

- (1) The ability to conduct research in the fields of mathematics and science education in secondary school. Moreover, for this research to be communicated from a basis of an inclusive attitude and an advanced sense of ethics.
- (2) The acquisition of the necessary skills for those with the intent to actively discover and solve problems through research in mathematics and science education in order to propose new findings. In addition, to gain the ability to lead researchers and skilled professionals in the same field.
- (3) Global perspectives and dialogue skills through the ability to proactively address international

issues in the fields of mathematics and science and related fields are formed with attendance at international conference activities.

#### Doctor of Science

- (1) Advanced and specialized academic knowledge of science and independent research ability, and the ability to set research projects and issues by oneself, in order to solve them in a wide range of specialized fields and related fields, and propose new knowledge by development of original research methods.
- (2) The ability to disseminate and teach the results of science based on the advanced expertise and research ability of science, and the ability to objectively evaluate the results of science and technology, discover and set issues on their own, and solve them creatively, as well as comprehensive perspectives and communication skills based on a high sense of ethics.
- (3) The ability to take the initiative in coping with international issues in the specialized field of science and a wide range of related fields, and the ability to have a global perspective and dialogue through the activities of international academic societies in the specialized field.

#### Curriculum Policy

1. In the master's program, the curriculum is based on courses in the liberal arts, basic academic ability and expertise in research gained in undergraduate study; and organized not only develop the necessary skills that mathematics and science teachers need - a comprehensive understanding of mathematics and science educational teaching methods - but also for them to develop engaging classes and curriculums for their students, through Specialist Courses, Courses in the liberal arts, and Research Guidance.

- (1) In order to acquire more advanced specialist knowledge, in each course of 'the mathematics course' and 'the science course', special lectures, experiments and seminars are taught in a focused and effective manner.
- (2) Courses in the liberal arts are available, which support the high degree of academic knowledge and practical ability necessary for students to carry out research and development as independent researchers or highly skilled professionals.
- (3) Research Guidance helps students acquire the knowledge and experience necessary to conduct research through an understanding of the literature and discussions with supervisors. Moreover, Research Guidance helps students to develop such skills as how to conduct presentations of research and academic papers at domestic and foreign academic societies. In addition, students will be guided to increase their ability to express themselves effectively, and to acquire a mastery of both research and development skills and problem-solving skills. Students will be given

guidance on how to start becoming active as a researcher or highly skilled professional in their field of study, either at home or abroad.

2. The doctoral program is based on the advanced ability to expand on the knowledge about research and development that was acquired up to master's program level. The doctoral program develops graduates with the high level of research skills necessary for the workplace. The curriculum is organized so as to create graduates who are able to apply scientific expertise based on advanced subject knowledge, teaching ability and leadership, mathematics and science; and/or the ability to conduct research in the fields of mathematics and science education in secondary school, through Research Guidance and Courses in the liberal arts.

#### Doctor of Philosophy

- (1) Research related to school education and science education is conducted. Research Guidance helps students acquire the knowledge and experience necessary to conduct research through gaining an understanding of the literature and through discussions with supervisors. By presenting research results at study meetings and research conferences, students will acquire the ability to objectively evaluate research results and communicate them correctly and effectively. In addition to the former, research guidance will enable the deepening of ties with the wider international community of researchers. The three-year process of putting together research results in a doctoral dissertation, research guidance will help foster the ability to analyze, evaluate and communicate research content.
- (2) Researchers in mathematics and science education attend four required seminars as a science education researcher: Science Education Research Techniques, Understanding Science Education, Science Education Presentation Techniques and Science Education Research Ethics.
- (3) Courses in the liberal arts are available, which support the high degree of academic knowledge and practical ability necessary for students to carry out research and development as independent researchers or highly skilled professionals.

#### Doctor of Science

- (1) Research on advanced and specialized fields of science is conducted. Research Guidance helps students acquire the knowledge and experience necessary to conduct research through an understanding of the literature and discussions with supervisors. Moreover, research guidance helps students to develop such skills as how to conduct presentations of research and academic papers at domestic and foreign academic societies. In addition, students will be guided to increase their ability to express themselves effectively, and to acquire a mastery of both research

and development skills and problem-solving skills. Students will be given guidance on how to start becoming active as a researcher or highly skilled professional in their field of study, either at home or abroad.

- (2) Researchers in mathematics and science education attend four required seminars as a scientist who can play a central role in advanced science education activities: Science Education Research Techniques, Understanding Science Education, Science Education Presentation Techniques and Science Education Research Ethics.
- (3) Courses in the liberal arts are available, which support the high degree of academic knowledge and practical ability necessary for students to carry out research and development as independent researchers or highly skilled professionals.

### **Admissions Policy**

The university seeks those who can practice "the scientific method" and the concept of "meritocracy" in research and education.

1. The master's degree program seeks those such as university graduates who either wish to work in the fields of mathematics and science education in secondary school; or current teachers who wish to familiarize themselves with the latest research in these fields. The master's degree program builds on the basic academic ability in a wide range of liberal arts acquired in the bachelor's degree program. The aim is to acquire the necessary skills for those with the intent to actively discover and solve problems through research in mathematics, science and mathematics and science education.
2. In the doctoral program, the university seeks either students who have completed a master's course who wish to acquire advanced research skills related to mathematics and science education; or current science and mathematics teachers wishing to independently conduct creative research based on the specialist knowledge and research skills acquired in the master's course.

Evaluation methods for the types of abilities required for the admissions policy in differing entrance examinations:

(General entrance examination)

Students who have expertise in mathematics and science education, thinking skills required to solve problems using the ability to think for oneself. In the master's program, candidates will be selected through an examination of documents submitted, an oral examination on a pre-submitted essay, English ability and through interview. In the doctoral program, candidates will be selected through an examination of documents submitted, and an oral examination of their master's thesis.

(Recommendation entrance examination)

In the master's program the university seeks those who have the professional knowledge, English ability, thinking skills and communication skills commensurate with the characteristics of mathematics and science and those who have the determination to conduct independent research. Candidates will be selected through an examination of documents submitted and interview.