Doctoral Program in Mathematics

Name of the degree to be conferred	Doctor of Philosophy in Science
Educational purpose	The Doctoral Program in Mathematics cultivates researchers and university faculty members who can be internationally active with a wide perspective covering from pure to applied mathematics, and also social instructors in education and industry circles, etc. as well as highly specialized professionals who can apply mathematical knowledge into various areas.
Vision of human resources development	Researchers who can be internationally active with a wide perspective covering from pure to applied mathematics, social instructors in education and industry circles, etc., and other human resources who can apply advanced mathematical knowledge into various areas.
Competencies specified in diploma policy	**Evaluation perspectives**
1. Knowledge creation competence: Ability to create new knowledge that can contribute to future society	①Are there any research findings that can be considered new knowledge? ②Can we expect you to create knowledge that will contribute to future society?
2. Management competence: Ability to plan and implement measures to identify and solve challenges from a higher perspective	①Can you make and implement long-term plans for critical challenges? ②Can you identify challenges, even in other areas of expertise, and solve them from a higher perspective?
3. Communication competence: Ability to express the true nature of academic findings positively and clearly	①Can you explain the true nature of research content and specialized knowledge clearly and logically to researchers from different areas and to people other than researchers? ②Do you proactively share your findings with researchers and experts from your field of expertise and accurately answer questions?
4. Leadership competence: Ability to have objectives get accomplished under your leadership	①Can you set attractive and compelling goals? ②Are you capable of building systems to realize goals and accomplish objectives as the leader?
5. Internationality competence: Possession of a high level of awareness and motivation to be internationally active and contribute to international society	①Do you have strong awareness and motivation to contribute to international society and international activities? ②Have you obtained adequate linguistic skills for international information collection and action?
6. Mathematical analysis ability: Ability to see the nature of issues from a higher (mathematical) perspective and analyze them mathematically	①If deep understanding was gained as to the important problems in various research realms ②If a good command of basic mathematical knowledge was gained
7. Ability to carry out mathematical research: Ability to carry out research independently while setting up research tasks based on leading-edge advanced knowledge	①If problems are identified by oneself based on the leading-edge advanced knowledge in one's own area of expertise ②If research is carried out independently while a long-term plan is drawn up to work on its tasks
8. Ability to solve mathematical tasks: Ability to work on tasks from a higher perspective and by using leading-edge advanced mathematical knowledge	①If the use of leading-edge advanced mathematical knowledge is actively tried ②If capable of seeing problems from a higher perspective and solving them under a long-term plan
9. Information provision ability: Ability to provide research findings to the society through academic papers, academic lectures, etc.	①If sufficiently capable of debating on research with experts through academic papers or presentations in academia ②If one's research findings are clearly expressed to those from different areas and not just one's own area and if efforts to contribute to the society through mathematics are made
10. Mathematical expressiveness: Ability to debate with experts in various areas inside and outside Japan	①If the ability to smoothly communicate with overseas researchers was gained ②If the ability to explain and understand was gained to make specialized debates with experts of various areas

Dissertation evaluation criteria	
【Review board members】	

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Structure of thesis review board
Set up with one chief reviewer and three or more sub-reviewers.
【Review method】
Prior to the receipt of a degree thesis, to determine the acceptance of the submission, the degree thesis is preliminarily reviewed. The dissertation review board administers dissertation review and the final exam or the confirmation of academic abilities.
【Review items】
1. The research theme must be clearly indicated with the presence of academic significance.
2. The preceding researches associated with the research theme must be appropriately presented.
3. The line of reasoning to reach the conclusion must be provided logically and clearly.
4. The degree dissertation must be academically contributory of high academic value in the area.
5. The thesis must have appropriate sentence expressions and thesis construction as a degree thesis.
【Level standards required for the degree thesis】
All of the above evaluation items must be met. The dissertation passes as a doctoral dissertation with the final exam or the confirmation of academic abilities included in the judgment.

Curriculum Policy

The curriculum is diversely organized with a system of education and research in the four areas of algebra, geometry, analysis and mathematics of information.

Curriculum organization policy	Through fine research supervision according to each student's ability and the seminars in the areas of expertise, the curriculum is organized to train students to have a broad range of perspective from the foundation to application in the associated areas to leading-edge modern mathematics. ・With Research in Algebra IIIA to VB, students gain advanced thinking ability for the grasping of algebraic structures. ・With Research in Geometry IIIA to VB, students gain advanced thinking ability for the grasping of geometric structures. ・With Research in Analysis IIIA to VB, students gain advanced thinking ability for the analysis of analytical structures. ・With Research in Mathematics of Information IIIA to VB, students gain advanced thinking ability for mathematics of information. ・With Internship in Mathematics III and Internship in Mathematics IV, students increase the abilities necessary for forming their future career paths. ・With this area's Research IIIA, Research IIIB, Research IVA, Research IVB, Research VA and Research VB, students gain the above thinking abilities and at the same time gain the ability to carry out research while setting up research tasks independently, and the communication ability to grasp the problem awareness that those from different areas and not just one's own area have and express one's own specialized knowledge clearly to those from different areas and not just one's own area.
Learning methods・Processes	Carrying out leading-edge research under the advice of supervisory faculty members helps students develop the fundamental and applied abilities appropriate to a doctoral degree in science to grow to be a human resource who can conduct highly ingenious research.
Evaluation of learning outcomes	・Major Subjects: Whether the fundamental abilities in the areas of mathematics appropriate to a doctoral degree in science were gained is evaluated with an oral exam. ・Foundations in associated areas: Whether the fundamental abilities in the areas associated with the research appropriate to a doctoral degree in science were gained is evaluated with an oral exam. ・Wide perspective: Whether a wide perspective appropriate to a doctoral degree in science was gained is evaluated by the interview at the time of the presentations. ・Presentation and communication abilities: Whether the presentation and communication abilities appropriate to a doctoral degree in science were gained is evaluated by the interview at the time of the presentations. ・Academic outcomes: Whether research outcomes appropriate to a doctoral degree in science were accomplished is evaluated through the review of his/her international academic papers. ・The achievements in these items are evaluated at the final examination administered in the degree dissertation review and final exam.

Admission Policy	
Desired students	He or she should possess mathematical knowledge as equivalent to a master's program completed in graduate school and have the great interest and motivation to research on mathematics and the high motivation to conduct research on leading-edge modern mathematics. In addition, we seek candidates who pursue to draw on their mathematical research abilities in the future to become a "researcher", "educator" or "highly specialized professional".
Selection policy	Selection places emphasis on the master's thesis content and post-enrollment research plan.