

Tokyo Metropolitan University Graduate School Education Curriculum Diploma Policy and Curriculum Organization and Implementation Policies

Program: Graduate School of Science — Biological Sciences

1. Diploma Policy (DP)

(1) Degrees to be conferred

[Master's Program]

Master's degree (Master of Science): Awarded upon successful completion

[Doctoral Program]

Doctorate (Doctor of Science): Awarded upon successful completion

(2) Certifications to be granted

i. Certifications to be granted upon completion (Master's program):

Junior High School Advanced Teacher's License in Science, High School Advanced Teacher's License in Biology

Students who have obtained the Junior High School Class 1 Teacher's License and/or High School Class 1 Teacher's License can apply for the above teacher's license upon completion of the master's program at the University.

ii. Examination eligibility to be granted upon completion:

Not applicable

iii. Certifications to be granted upon completion of a separately specified program:

Not applicable

iv. Programs that waive the examinations of some courses upon completion (Major certifications only):

Not applicable

(3) Educational goals

The Department of Biological Sciences aims to develop graduate students with creative research skills, actively engaging in new projects through biological sciences.

[Master's Program]

The master's program aims to develop the basic skills to set objectives and methods and identify problems independently to understand the basic mechanisms of the growth of organisms, higher-order structures, behavior, and ecology. The program also aims to train students to become researchers, educators, and developers with global perspectives and communication skills to play active roles in Japan and the international arena.

[Doctoral Program]

The doctoral program aims to develop the basic and applicable skills to set objectives and methods and identify problems independently to understand the basic mechanisms of the growth of organisms, higher-order structures, behavior, and ecology. The program also aims to train students to become researchers, educators, and developers with great communication skills and global perspectives to play active roles as leaders in Japan and in the international arena.

(4) Program features

The Department of Biological Sciences consists of about 15 laboratories. Each lab conducts cutting-edge,

high-level research on microorganisms, animals, and plants at the micro level, such as molecules and cells, and the macro level, such as evolution, ecology, and phylogeny. Taking full advantage of the diverse and high-level research structure, the members (students and faculty) improve one another in a liberal and academic environment, aiming for cutting-edge biology that opens up new areas. Based on this vision, each course will establish educational goals for students and provide systematic support to accomplish the objectives described in Section (3) above.

(5) Specialized knowledge, R&D skills, and other skills

Through research and learning in the fields of biology and biological sciences, students will acquire knowledge, understanding, and skills specific to the fields described below as well as global skills applicable to other fields.

[Master's Program]

In the master's program, students will acquire:

1. Extensive knowledge, ways of thinking, and practical methods necessary to conduct research in basic biological sciences and biology, as well as more specialized knowledge, ways of thinking, and practical research methods related to their chosen research topics.
2. Basic research skills in each biological science and biology field through initiating new research projects or applied or educational research projects independently or under the graduate advisor's guidance as well as writing papers and presenting the research findings.
3. Writing and communication skills in English necessary to conduct research and work on the international stage, and the ability to present the research findings to a wide range of audiences.

[Doctoral Program]

In the doctoral program, students will acquire:

1. Extensive knowledge, ways of thinking, and practical research methods necessary to develop the skills to explore and discover advanced and important topics in basic biological science and biological research.
2. Independent research skills in each field of basic biological science and biology through initiating new research projects or applied or educational research projects independently, as well as delivering satisfactory research findings and publishing them as original papers in English.
3. Advanced communication skills in English, which are essential for leading research in the international arena, and the presentation skills to convey the results and significance of research to a broad audience.

(6) Completion requirements

[Master's Program]

In order to complete the master's program, students must complete the two-year enrollment period by attending regular classes, acquiring 30 or more credits of required courses in the master's program, submitting a thesis, and taking the final examination. In this case, if the graduate advisor considers it academically beneficial, up to 10 credits out of the 30 credits may be used as required credits by taking the following courses as prescribed by the graduate school:

- Non-major courses provided by the same graduate school
- Major courses provided by other graduate schools, or
- Undergraduate courses

As for the enrollment period for those who are recognized as delivering excellent research results, enrollment in the master's program for one year or more satisfies the completion requirement.

Of 30 or more total credits required for completing the master's program, 20 or more credits must be earned in courses other than Seminar in Biological Sciences or Advanced Experimental Techniques in Biological Sciences offered by the research laboratory where the student belongs. For Seminar in Biological Sciences and Advanced Experimental Techniques in Biological Sciences, students shall, in principle, take only the

courses offered in the research laboratory where they belong.

1. Course grading criteria: A syllabus shall be provided for each course, which describes the learning objectives, course content, teaching method, and grading criteria. Learning outcomes shall be assessed based on examinations, reports, presentations, questions, and discussions, or a combination of these.
2. Thesis evaluation criteria: The applicant shall write and submit a master's thesis in English or Japanese. The applicant shall give a public presentation on the research findings in English or Japanese and answer questions. The Review Committee shall evaluate the thesis and presentation on a five-point scale based on the criteria below. The final grade of two points or higher shall be a passing grade.
 - (1) Did the applicant engage in a research project on an unsolved issue? (Required)
 - (2) Were the research plan and methods appropriate? (Required)
 - (3) Were experiments and investigations conducted sufficiently during the period of the standard two-year program? (Required)
 - (4) Did the applicant perform the appropriate analysis for the research findings? (Required)
 - (5) Have the research results already been published as an oral (poster) presentation at a conference or in an academic paper? (Optional)
 - (6) Was the thesis written in logical and clear language? (Required)
 - (7) Were the presentation and response to questions in the thesis presentation logical and clear? (Required)

[Doctoral Program]

In order to complete the doctoral program, the students must complete the three-year enrollment period by attending regular classes, acquiring 20 or more credits in the required courses in the doctoral program, submitting a dissertation, and taking the final examination.

As for the enrollment period for those who are recognized as delivering exceptional research results, enrollment in the doctoral program for one year or more shall satisfy the completion requirement. However, for those who have completed the master's program with one-year enrollment, two-year enrollment in the doctoral program satisfies the completion requirement.

Students are not allowed to retake a course with similar content to the one they have taken in the master's program. For Seminar in Biological Sciences and Advanced Experimental Techniques in Biological Sciences, students shall, in principle, take only the courses offered in the research laboratory where they belong.

1. Course grading criteria: A syllabus shall be provided for each course, which describes the learning objectives, course content, teaching method, and grading criteria. Learning outcomes shall be assessed based on examinations, reports, presentations, questions, and discussions, or a combination of these.
2. Dissertation evaluation criteria: The applicant shall write and submit a doctoral dissertation in English. The applicant shall give a public presentation on the research findings in English or Japanese and answer questions. The Review Committee shall make the final pass/fail decision on the dissertation and presentation by evaluating based on the following criteria, whether the applicant has sufficient ability to conduct research independently and to be successful in the international arena in research-related work.
3. Dissertation evaluation criteria
 - (1) Did the applicant engage in a research project on an unsolved issue with scientific significance? (Required)
 - (2) Were the research plan and methods appropriate and sufficient? (Required)
 - (3) Was a part of the research project or learning of research methods done in a laboratory abroad? (Optional)
 - (4) Did the applicant achieve significant results on the research project? Did the applicant have

- sufficient findings during the standard three-year program? (Required)
- (5) Have all or part of the research results already been published in academic papers as an original paper (in English and peer-reviewed)? (Required)
 - (6) Have some of the research results been presented at an international conference? (Optional)
 - (7) Was the dissertation written in logical and clear language? (Required)
 - (8) Were the presentation and response to questions in the dissertation presentation (public) logical, clear, and fully convincing to the evaluators and audience? (Required)
 - (9) Are appropriate ethical considerations given to planning and conducting research, presenting the research findings, and storing the data? (Required)

The students currently enrolled are advised to refer to the Course Guide issued in their first year of enrollment to check the completion requirements of the enrolled program.

2. Curriculum Policy (CP): Policy on curriculum organization and implementation

(1) Basic policy on curriculum organization

The curriculum shall be appropriately organized to provide students with a high level of expert knowledge and competence in their field of study and to develop basic knowledge in related fields as follows.

The master's and doctoral programs provide curricula that help students achieve academic goals. The curriculum provides:

1. Advanced learning of fields similar to the student's research projects and extensive study of biological sciences and biology: Students will gain knowledge, ways of thinking, and the latest insights in a wide range of fields in biology and biological sciences through lecture courses (advanced and special lectures) and special seminars in biological sciences by full-time and part-time faculty members.
2. Courses to develop English communication skills and broad communication skills in research: The curriculum offers a variety of English courses, such as Special Course in Biology, English for Biology, and communication courses for research, such as Technique for Research Communication.
3. Courses to establish research methodologies and research projects: Students will develop the ability to independently set and work toward research objectives and discover research methods and problems through Biology Course in Research Evaluation and Biology Course in Planning and Management.
4. Institutional support and promotion for inter-laboratory activities such as interaction and joint research: The curriculum promotes inter-laboratory activities through group work of graduate students from different laboratories, such as Lecture on Biological Sciences, BIO Conference, Special Seminar in Biological Sciences, Biology Course in Planning and Management, and Biology Course in Research Evaluation.
5. Institutional support for developing skills in planning and management through voluntary involvement in research and outreach groups: Students are encouraged to actively attend the Biology Course in Planning and Management and BIO Conference and take part in open laboratories to promote voluntary research and outreach activities.
6. Institutional support and promotion for research experience in laboratories abroad: The curriculum provides Biology Course in International Research Experiences, which includes work in a laboratory abroad. The curriculum also supports presentations at academic conferences abroad and organizes seminars to interact with international graduate students.
7. Additional research guidance by the system with secondary advisors: Multiple faculty members (secondary graduate advisors) in each laboratory provide appropriate guidance from a broad perspective and support students by understanding the objectives, plans, and progress of the research projects of graduate students and actively discuss with the students about their research projects. Students are asked to prepare a research plan and an interim report in the first and second year of the master's program, and advisors will provide guidance on these plans and reports. In this way, students

- can receive guidance not only from the primary graduate advisor but also from multiple faculty members in other laboratories from different perspectives.
8. Improved understanding of biological sciences and biology and teaching skills through involvement in undergraduate and graduate education as a teaching assistant.

(2) Policy on teaching and learning methods in the curriculum

The courses shall be taught with various methods and forms, such as lectures, exercises, and practical training, in accordance with the objectives and learning goals of each course so that students can learn independently and actively and acquire the qualities and abilities appropriate to the objectives of human resources development and the degree awarding policy.

Research guidance shall be provided to improve students' research skills and methods under the research guidance plans defined separately.

(3) Policy on the assessment of learning outcomes

All courses shall be assessed according to the level of achievement of the course objectives, based on the assessment methods and criteria specified in the syllabus. Theses/dissertations shall be assessed according to the following process and criteria.

[Master's Program]

☐ Thesis evaluation criteria:

The applicant shall write and submit a master's thesis in English or Japanese. The applicant shall give a public presentation on the research findings in English or Japanese and answer questions. The Review Committee shall evaluate the thesis and presentation on a five-point scale based on the criteria below. The final grade of two points or higher shall be a passing grade.

- (1) Did the applicant engage in a research project on an unsolved issue? (Required)
- (2) Were the research plan and methods appropriate? (Required)
- (3) Were experiments and investigations conducted sufficiently during the period of the standard two-year program? (Required)
- (4) Did the applicant perform the appropriate analysis of the research findings? (Required)
- (5) Have the research results already been published as an oral (poster) presentation at a conference or in an academic paper? (Optional)
- (6) Was the thesis written in logical and clear language? (Required)
- (7) Were the presentation and response to questions in the thesis presentation logical and clear? (Required)

[Doctoral Program]

☐ Dissertation evaluation process:

The applicant shall write and submit a doctoral dissertation in English. The applicant shall give a public presentation on the research findings in English or Japanese and answer questions. The Review Committee shall make the final pass/fail decision on the dissertation and presentation by evaluating based on the following criteria, whether the applicant has sufficient ability to conduct research independently and to be successful in the international arena in research-related work.

☐ Dissertation evaluation criteria:

- (1) Did the applicant engage in a research project on an unsolved issue with scientific significance? (Required)
- (2) Were the research plan and methods appropriate and sufficient? (Required)
- (3) Was a part of the research project or learning of research methods done in a laboratory abroad? (Optional)
- (4) Did the applicant achieve significant results on the research project? Did the applicant have sufficient findings during the standard three-year program? (Required)
- (5) Have all or part of the research results already been published in academic papers as an original

paper (in English and peer-reviewed)? (Required)

(6) Have some of the research results been presented at an international conference? (Optional)

(7) Was the dissertation written in logical and clear language? (Required)

(8) Were the presentation and response to questions in the dissertation presentation (public) logical, clear, and fully convincing to the evaluators and audience? (Required)

(9) Are appropriate ethical considerations given to planning and conducting research, presenting the research findings, and storing the data? (Required)

Research guidance through courses of Advanced Experimental Techniques in Biological Sciences 1, 2 (2) and Seminar in Biological Sciences 1, 2 (2)

Acquiring extensive expertise

Advanced Lecture on Biological Sciences (Genome Science, Biochemistry, Taxonomy, Molecular Biology, Developmental Biology, Biological Information, Ecology, Cell Biology, Evolutionary Biology, Genetics, etc.) (2), Special Seminar in Biological Sciences 1, 2 (1), Special Course in Biological Sciences I, II (English for Biology, Special Course in Biology I, II, Technique for Research Communication, etc.) (1 or 2), Practice in Biological Sciences (Radioisotope Techniques) (1), Biology Course In Planning and Management 1, 2 (1), Biology Course in International Research Experiences 1, 2 (1), Biology Course in Research Evaluation 1, 2 (1), Internship in Biological Sciences 1, 2 (1 or 2), Special Experiment in Biological Sciences (Experimental Techniques 1–6) (1), Special Practice in Biological Sciences II (Research Techniques 1–6) (2)

Acquiring advanced and high-level expertise

Special Lecture on Biological Sciences (Phylogenetic Evolution, Responses to Environment, Ecological Science, Genetic Information, Cellular Communication, Biomolecules, Developmental and Regenerative Biology, Cell Differentiation, Neuroscience, Cell Organization, etc.) (1)

Public presentation of the master's thesis

Submission of the master's thesis; evaluation by the first and second evaluators

Advanced research guidance through courses of Advanced Experimental Techniques in Biological Sciences 1, 2 (2) and Seminar in Biological Sciences 1, 2 (2)

Acquiring extensive, advanced, and high-level expertise

Preliminary evaluation of the public presentation of the doctoral dissertation

Submission of the doctoral dissertation; evaluation by the first and second evaluators

Master's Year 1, 1st

Master's Year 1, 2nd

Master's Year 2, 1st

Master's Year 2, 2nd

Master's program

D1

D2

D3

Doctoral program