

## Master's Program in Life Science Innovation (Environmental Management)

Name of the degree to be conferred	Master of Environmental Management
Educational purpose	Life, including humanity, is determined to survive and grow depending on the surrounding environmental conditions. In recent years, keywords such as food safety and sustainable use of bioresources, which have attracted social attention are closely related to appropriate control of the environment. Therefore, "the persons with basic ability for doctoral thesis research and highly specialized professionals aiming at becoming researchers and learn widely from the relationship between life survival and growth and environmental conditions, that is, from microscopic environmental physiology to microscopic environmental ecology on a global scale, and the latest expertise and research basic ability on environmental impact assessment and control, and play an active role globally in the area of research and development related to appropriate control of the environment" shall be fostered.
Vision of human resources development	Highly specialized professionals who acquire cross-sectional and bird's eye view of life science relating to life science innovation, acquire world-class advanced specialized research capabilities and open new developments in life science research using bioresources in the areas of R&D subject to environment/energy as global issues and their management.
Competencies specified in diploma policy	Evaluation perspectives
1. Knowledge application competence: Ability to contribute to society with advanced knowledge	①Can you apply knowledge gained through research and other activities in society? ②Can you identify new problems, even in other fields of expertise, based on broad knowledge?
2. Management competence: Ability to appropriately address challenges from broad standpoints	①Can you take on major tasks with systematic planning? ②Can you understand and solve problems from multiple perspectives?
3. Communication competence: Ability to accurately and clearly communicate expert knowledge	①Are you capable of efficient communication for research purposes? ②Can you discuss research or research-specific knowledge with experts from your own field and from other fields?
4. Teamwork competence: Ability to work with a team and actively contribute to the achievement of goals	①Do you have experience cooperatively and actively working on challenges as part of a team? ②Have you helped promote projects and activities other than your own research?
5. Internationality competence: Willingness to contribute to international society	①Are you aware of making contributions to international society and getting involved in international activities? ②Have you obtained the linguistic skills necessary for international information collection and action?
6. Innovation ability: Ability to open up new developments in the areas of life science	①If the basic concepts about the areas of life science were widely gained and problems are interpreted from a higher perspective ②If one has the motivation to gain new skills and knowledge instead of being bound by one's area of expertise ③If the social needs in the areas of life science are understood ④If appropriate research plans are drawn up and carried out to solve Environmental Control Science issues
7. Specialized knowledge: Advanced knowledge and command of an area of expertise	①If leading-edge specialized knowledge about Environmental Control Science was gained ②If gained knowledge was put to use to solve issues
8. Advanced practical English: Practical English proficiency that works in the areas of life science	①If an accurate description of one's understandings or opinions about problems in the areas of life science is provided in English ②If written research proposals, reports, etc. are created in English
Dissertation evaluation criteria	

**[Level standards required for the degree thesis]** The degree thesis must be the results of work in which the diploma applicant took the initiative and must contain unprecedented research findings that contribute to make strides in the areas of Environmental Control Science. The degree thesis must be written in English logically and scientifically and must be constructed in an appropriate format as a degree thesis in the order of theme, abstract, background and purpose, research methods, results, discussion and conclusion, acknowledgments, and bibliography.

**【Review board members】** A thesis is reviewed by an exclusive board formed by one chief reviewer and two or more sub-reviewers. The chief reviewer must be a faculty member assigned to supervise the research in the Program, excluding the applicant's chief supervisory faculty member. As the two or more sub-reviewers, one or more faculty members qualified to supervise the research in the Program must be included. The three or more reviewers of the exclusive board must include one or more reviewers from each of the both internal and external Program faculty members, and this is how diploma examination is administered in a system cooperative between internal and external faculty members. In addition, as the three or more reviewers of the exclusive board, no more than one reviewer who does not belong to the Program can be included.

**【Review method and review items, etc.】** The applicant is asked to explain his or her degree thesis content and then questioned by exclusive board members about what he or she has explained. During this examination, in which the applicant is required to make a presentation about his or her degree thesis in English logically and scientifically, the applicant is evaluated to see if he or she can convince the reviewers sufficiently by answering the reviewers' questions using the specialized knowledge of the areas of Environmental Control Science with insight.

### Curriculum Policy

Under the education and research environment where there is the active participation by not only the faculty members of Tsukuba but also by collaborative graduate school faculty members from the research institutes or such which belong to the Tsukuba Life Science Promotion Association, students learn about unsolved issues of the society and get engaged in research activities to pursue to open up new strides in the areas of Environmental Control Science. The Master's Program in Life Science Innovation, whose purpose is to cultivate globally active highly specialized professionals, offers all lectures in English and organizes lectures and seminars taught by researchers who are active in the front lines and belong to overseas research institutes. To cultivate the ability to have the big picture in mind from a cross-disciplinary perspective, students benefit from the General Foundation Subjects which cover all-around basic concepts in the areas of life science. As part of the career training, the curriculum includes internship subjects and other subjects such as for learning the operations of research organizations, etc. Moreover, Major Subjects for cultivating the expert abilities in environmental control are also organized.

Curriculum organization policy

- Curriculum of environmental management area shall be composed of Major Subjects, basic courses common to six program areas of this Degree Program (Disease mechanism, Drug Discovery, Food Innovation, Environmental Management, Bioinformatics and Biomolecular Engineering) and Graduate General Education Courses. In Major Subjects, other than the lectures to cultivate professional ability relating to environmental management, students shall receive research supervisor relating to environmental management in the laboratory to which each student belongs.
- Competence of knowledge application is gained with master's thesis creation, academic conference presentations, etc.
- Management competence is gained with "Regulatory Science", etc.
- Communication competence is gained with "Life Science Innovation Master's Special Seminar", etc.
- Teamwork competence is gained with "Team Learning in Life Science Innovation (Basic)", etc.
- Competence in Internationality is gained with "Master's Life Science Innovation Seminar", etc.
- Innovation ability is gained with Major Subjects, "Life Science Innovation Master's Special Research", etc.
- Specialized knowledge is gained with Major Subjects, etc.
- Advanced practical English is gained with General Foundation Subjects, Major Subjects, mid-term presentation, etc.

Learning methods Processes

- After learning how to gather information and understanding social needs under the supervision of supervisory faculty members, students draw up and carry out an appropriate research plan for solving environmental control issues and round up the results into research outcomes.
- Through Foundation Subjects for Major and Graduate General Education Courses, students widely gain the basic concepts in the areas of life science and improve communication ability in English in order to be capable of using knowledge not bound by one's area of expertise.
- Practical abilities as working individuals are cultivated through internships.
- Specialized knowledge is gained through Major Subjects.

Evaluation of learning outcomes

- One year after enrollment, the interim evaluation (Achievement evaluation I) is conducted by the achievement evaluation board formed by the supervisory faculty member and two sub-supervisory faculty members.
- At the mid-term presentation which is administered a year and two months after enrollment, the interim review for the progress of research for master's thesis creation is conducted by the chief reviewer and two sub-reviewers.

- Four months before the expected completion of the Program, the final evaluation (Achievement evaluation II) is conducted by the achievement evaluation board formed by the supervisory faculty member and two sub-supervisory faculty members.
- At the preliminary review which is administered four months before the expected completion of the Program, the preliminary review for the master's thesis is conducted by the chief reviewer and two sub-reviewers.
- At the final exam which is administered two months before the expected completion of the Program, the diploma examination is conducted by the chief reviewer and two sub-reviewers based on the presentation and question-and-answer session for the master's thesis content.

#### Admission Policy

Desired students	We seek candidates who possess the motivation to make innovations in the areas of Environmental Control Science and have the sufficient qualities to gain the specialized knowledge necessary to attain such innovations, and advanced practical English.
Selection policy	<ul style="list-style-type: none"> <li>• Candidates are selected through document screening to evaluate if they possess bachelor's degree level knowledge necessary for learning in the Master's Program in Life Science Innovation and the ability to write about research backgrounds and future prospects in English.</li> <li>• With an English proficiency exam, candidates are evaluated if they possess the English proficiency (equivalent to level B2 or higher in CEFR) necessary for learning in the Master's Program in Life Science Innovation.</li> <li>• With an oral exam, students are evaluated if they have the motivation to make innovations in the areas of Environmental Control Science and the ability to explain and debate in English.</li> </ul>