Master's Program in Life Science Innovation (Biomolecular Engineering)

Master of Bioengineering

Program Educational Objectives

This program shall train “the persons with basic ability for doctoral thesis research and highly specialized professionals who have thorough knowledge about the application development of biomolecules to the functional materials, acquire management technology related to them, can contribute to realization of innovative analytical technologies and functional materials with high environmental and biocompatibility and plan an active role globally”.

Graduate Profile	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, use all bioresources and globally play an active role in the areas of R&D of innovative functional materials that open up new developments in life science research using bioresources.

Diploma Policy

The degree of Master of Bioengineering is commenced to those who have fulfilled the requirements for the completion of the Master's programs, as set out in the Graduate School Regulations of the University of Tsukuba and related university regulations, and who are deemed to have the following competences.

	Competences	Evaluation perspectives
Knowledge and Skills	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 bioengineering issues
	7. Specialized knowledge: Advanced knowledge and command of an area of expertise	①If leading-edge specialized knowledge about bioengineering was gained ②If gained knowledge was put to use to solve issues

	Competences	Evaluation perspectives
Knowledge and Skills	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
Guidelines for Assessing Learning Outcomes	The knowledge and competences outlined in the Diploma Policy are assessed using the following direct evaluation methods. – Based on a curriculum designed to achieve the competences defined by the Master's Program in Life Science Innovation, student outcomes—including work from required subjects—are evaluated continually by course instructors, supervisory faculty members, and thesis committee members from enrollment to completion. – At the end of the first year, Achievement Evaluation I is administered, through document review and an oral examination, to determine whether the student has attained the required level of the competences specified in the Diploma Policy. – In the second year, Achievement Evaluation II and the Final Examination are administered, through document review and an oral examination, to verify that the student has fully achieved the competences specified in the Diploma Policy.	
Evaluation Criteria for Degree Theses/ Dissertations	【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 Biomolecular materials field. The degree thesis must be written logically and scientifically and must be constructed in an appropriate format as a degree thesis. 【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. 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 their degree thesis content and then questioned by exclusive board members about what they have explained. During this examination, in which the applicant is required to make a presentation about their degree thesis logically and scientifically, the applicant is evaluated to see if they can convince the reviewers sufficiently by answering the reviewers' questions using the specialized knowledge of the areas of Biomolecular Materials Field 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 Biomolecular Materials Field. 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 biomolecular materials are also organized.

Curriculum Design Framework	− Curriculum of biomolecular engineering 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 biomolecular engineering, 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, etc. − Management competence is gained with “Regulatory Science”, etc. − Communication competence is gained with “Master's Research in Life Science Innovation”, 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, “Master's Research in Life Science Innovation”, etc. − Specialized knowledge is gained with Major Subjects, etc. − Advanced practical English is gained with General Foundation Subjects for Major, Major Subjects, etc.

Teaching and Learning Methods	– 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 biomolecular materials issues and round up the results into research outcomes. – Students acquire English presentation skills in the process of presenting their research outcomes at the T-LSI student workshop and other events. – Through General Foundation Subjects 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.

Admission Policy

Desired Student Profile	We seek candidates who possess the motivation to make innovations in the areas of Biomolecular materials field and have the sufficient qualities to gain the specialized knowledge necessary to attain such innovations, and advanced practical English.
Student Selection Process	– 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. – Through an English proficiency test and an oral examination, candidates are evaluated on their motivation to drive innovation in the field of Biomolecular Engineering and their English proficiency (equivalent to CEFR level B2 or higher), which is necessary for studying in the Master's Program in Life Science Innovation.

Learning Support Framework

Academic Support	In the Master's Life Science Innovation Seminar, key research skills—such as presentations, grant writing, and CV preparation—are covered by international faculty, including those from the University of Oxford. Laboratory performance is assessed through supervisory interviews, with feedback provided based on records of daily research activities.
Opportunities for Peer Interaction	Research presentations and journal clubs are conducted online in small groups throughout the year,providing opportunities for active discussions even among students from different disciplines.
Opportunities for Student–Faculty Interaction	Sessions are organizedat the Tsukuba Conference (odd-numbered years) and Tsukuba Global Science Week (even-numbered years) to facilitate broad interaction between students and faculty. When international faculty conduct in-person seminars, networking events with students are organized in conjunction.

Approaches to Assuring and Enhancing Educational Quality

Every year, the three policies of the degree program are explained to faculty members, along with the principles of credit acquisition, grading criteria and policies, and the degree completion process. Additionally, course evaluation results are shared, and faculty members provide feedback based on their reflections on teaching and the student survey results. For achievement evaluations, a review session is held exclusively among evaluators to discuss the assessment results and exchange opinions aimed at improving educational quality. In addition, the Degree Programs Steering Committee regularly evaluates students' learning outcomes by tracking Achievement Evaluation scores, and evaluates the validity of the curriculum and evaluation criteria, as well as the appropriateness of academic guidance.