

Doctoral Program in Life Science Innovation (Bioinformatics)

Name of the degree to be conferred	Doctor of Philosophy in Bioinformatics
Educational purpose	The Doctoral Program in Life Science Innovation cultivates highly specialized professionals or researchers who possess the world's top-class advanced specialized research ability with cross-disciplinary mind from a higher perspective, open up a new strides in life science research using bioresources, produce internationally highly appraised research outcomes, and are globally active in the areas of research and development of innovative pharmaceutical products and functional foods and in the areas of their maintenance and administration.
Vision of human resources development	The Doctoral Program cultivates “researchers and highly specialized professionals who can produce research outcomes that work on a high international level and lead to making innovations in bioinformatics” using not only the deep bioinformatics knowledge and skills gained in the Master's Program but also a wide range of knowledge in the associated areas.
Diploma Policy	
The degree of Doctor of Philosophy in Bioinformatics is commenced to those who have fulfilled the requirements for the completion of the Doctoral 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 competencies.	
Competencies	Evaluation perspectives
1. Knowledge creation competence: Ability to create new knowledge that can contribute to future society	① Are there any research findings that can be considered new knowledge? ② Can 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	① Can you make and implement long-term plans for critical challenges? ② Can 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	① Can 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? ② Do 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	① Can you set attractive and compelling goals? ② Are 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	① Do you have strong awareness and motivation to contribute to international society and international activities? ② Have you obtained adequate linguistic skills for international information collection and action?
6. Innovation ability: Ability to make innovations in the areas of life science.	① If there is the awareness and motivation to create new knowledge and pass it along to the society in the areas of life science ② If the research techniques and reasoning skills for the theory and practice that lead to innovation creation in the areas of life science were gained ③ If issues that have not been revealed in bioinformatics were identified and solved ④ If there is the motivation to identify and solve cross-disciplinary research tasks in cooperation with researchers from different areas and not just one's own area

7. Specialized knowledge: Leading-edge knowledge in the area of expertise	① If leading-edge specialized knowledge about bioinformatics was gained ② If a research plan for solving unsolved issues was drawn up based on gained specialized knowledge
8. Advanced practical English: Command of English sufficient for performing various activities involving research in the international society	① If the presentation ability that can impact the international society when research outcomes are reported or shared in English was gained ② If the English proficiency and knowledge to debate equally with researchers active in the front lines were gained

Dissertation evaluation criteria

【Level standards required for the degree thesis】 The degree dissertation must be the results of work in which the diploma applicant took the initiative and must contain research findings that are unprecedented and internationally highly appraised and that contribute to make strides in the areas of bioinformatics.

The degree dissertation must be written in English logically and scientifically and must be constructed in an appropriate format as a degree dissertation.

【Review board members】 A dissertation is reviewed by an exclusive board formed by one chief reviewer and three or more sub-reviewers.

The chief reviewer must be a faculty member assigned to supervise the research in the Program. As the three or more sub-reviewers, two or more faculty members qualified to supervise the research in the Program must be included.

The four 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 four 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.

The presentation of dissertation content and a question-and-answer session, which are part of the final exam, are publicly administered. During this examination, in which the applicant is required to make a presentation about his or her degree dissertation 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 with insight and by using the advanced specialized knowledge of the areas of bioinformatics and including the latest research trends.

Curriculum Policy

Students are engaged in the research activities for identifying and solving unsolved issues for making innovations in the realms of bioinformatics. The curriculum includes internship subjects to support students in making innovations, for which they need to have the high awareness and motivation to work on research tasks in very different and/or cross-disciplinary areas in cooperation with researchers in different areas not just one's own area of expertise. In addition, to gain the cross-disciplinary way of thinking with the big picture in mind and cultivate the world's top-class advanced specialized research ability, the curriculum also organizes seminars taught by researchers who are active in the front lines and belong to overseas research institutes.

Curriculum organization policy	<ul style="list-style-type: none"> • The curriculum in the bioinformatics realms are composed of Major Subjects, the foundation subjects shared by the six realms of the Master's Program in Life Science Innovation (Disease Mechanism, Drug Discovery, Food Innovation, Environmental Management, Bioinformatics, Biomolecular Engineering), and Graduate General Education Courses. In specialized knowledge, students are supervised for bioinformatics research. • Competence of knowledge creation is gained through doctoral dissertation creation, etc. • Management competence is gained through "Doctoral Competency Development", etc. • Communication competence is gained with "Practices in Life Science Innovation", etc. • Leadership competence is gained through "Doctoral Research in Life Science Innovation". • Competence in Internationality is gained through "Doctor's Life Science Innovation Seminar", etc. • Innovation ability is gained through General Foundation Subjects, Major Subjects, etc.
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	<ul style="list-style-type: none"> • Specialized knowledge is gained through “Doctoral Research in Life Science Innovation”, etc. • Advanced practical English is gained through “Doctor's Life Science Innovation Seminar”, etc.
Learning methods • Processes	<ul style="list-style-type: none"> • With the understanding of the latest research trends in bioinformatics, students identify issues that have not been revealed and draw up and carry out an appropriate research plan for solving them. Further, through critical debates with supervisory faculty members, students develop the plan into a research that leads to produce life science innovations. • Obtained research findings are presented in academic journals, etc. With this, students improve their English proficiency, and in the process, gain reasoning skills. • With General Foundation Subjects and Graduate General Education Courses, students learn the latest research trends in the areas of life science and also improve English presentation ability. • With internships, research ability is honed through the experience of creating new knowledge in cooperation with researchers in other areas not just one's own area of expertise.
Evaluation of learning outcomes	<ul style="list-style-type: none"> • One year after enrollment, the initial 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 after enrollment, the interim review for the progress of research for doctoral dissertation creation is conducted by the supervisory faculty member and two sub-supervisory faculty members. • One year before the expected completion of the Program, interim evaluation (Achievement evaluation II) is conducted by the achievement evaluation board formed by the supervisory faculty member and two sub-supervisory faculty members. • Five months before the expected completion of the Program, the final evaluation (Achievement evaluation III) 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 five months before the expected completion of the Program, the preliminary review for the doctoral dissertation is conducted by the chief reviewer and three sub-reviewers. • At the final exam which is administered three months before the expected completion of the Program, the diploma examination is conducted by the chief reviewer and three sub-reviewers based on the presentation and question-and-answer session for the doctoral dissertation content.
Admission Policy	
Desired students	We seek candidates who have the sufficient qualities to gain the basic research abilities that are expected to make innovations in the areas of bioinformatics, the specialized knowledge necessary to achieve it, and good command of English serving for various research activities in the international society.
Selection policy	<ul style="list-style-type: none"> • Candidates are selected through document screening to evaluate if they possess master's degree level specialized knowledge (excellence in the current academic performance), and the ability to explain concretely in English about research backgrounds, research plans and about passing along research findings to the society. • With an English proficiency exam, candidates are evaluated if they possess the English proficiency (equivalent to level B2 or higher in CEFR) necessary for carrying out research activities in the Doctoral Program in Life Science Innovation. • With an oral exam, students are evaluated if they have the motivation and basic research abilities necessary for making innovations in the areas of bioinformatics and the ability to explain and debate in English.