Doctoral Program in Biology

Doctor of Philosophy in Science

Program Educational Objectives

Based on understanding diversity of the biological world, by fostering the human resources that have an ability to gain a comprehensive understanding of universality and uniqueness in individual living things from biological perspectives, we shall aim at producing researchers in biology area and the world top leaders who can play an active role in research/development site in life science area.

Graduate Profile	The human resources who have the following abilities shall be fostered: – Capable of understanding the trend in fundamental research in various areas of natural science. – Capable of logically grasping the biological world and phenomenon and establishing the process from problem setting/ to problem solution from biological perspectives. – Capable of achieving internationally competent academic results by elucidating the basic principle behind problems.

Diploma Policy

The degree of Doctor of Philosophy in Science 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 competences.

	Competences	Evaluation perspectives
Knowledge and Skills	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. Use of natural science: an ability to understand and make use of the trend of fundamental research of natural science with a broad vision.	Can understand and utilize the trend of basic research in various fields of natural science with a broad vision?

	Competences	Evaluation perspectives
Knowledge and Skills	7. Advanced research ability relating to biology: advanced research ability to establish/carry out biological research process.	Having an ability to logically grasping the biological world and phenomenon, an ability to establish the process from problem setting to problem solution and an advanced research ability to appropriately carry out research process?
	8. Total ability as a PhD in Science: an ability to achieve international results.	Having research ability to achieve internationally acceptable academic results, presentation ability, communication skills and an ability to create dissertation?
Guidelines for Assessing Learning Outcomes	The evaluation of learning outcomes is conducted through achievement assessments based on the "Competence Achievement Evaluation Sheet". This process objectively verifies and evaluates the acquisition of competences aligned with the degree conferral policy at each stage. The stages and methods of achievement assessment are outlined below. At the end of the second-year fall semester, the primary and secondary advisors conduct an interim assessment. This provides a comprehensive evaluation of whether the student meets the competences regarding research progress, related knowledge, and presentation skills. In the middle of the third year's fall semester, the Preliminary Review Committee conducts a preliminary thesis review (closed). This confirms the student's learning status and provides guidance toward the final achievement assessment. After passing the preliminary review, students who submit their final thesis undergo a doctoral thesis review (public) conducted by a thesis review committee composed of the primary supervisor and at least three secondary supervisors. Concurrently with the final review, a final achievement evaluation is conducted. At this time, students are required to document competences related to activities beyond coursework, such as research activities (international collaborative research, experience presenting at domestic/international conferences), participation in various workshops, and involvement in organizing academic societies or research meetings. This actively evaluates independent learning and research activities.	

Evaluation Criteria for Degree Theses/ Dissertations	The dissertation that satisfies all the following items shall be a pass as the dissertation for doctoral degree after going through preliminary examination, dissertation examination and final examination. The preliminary examination shall be performed by the preliminary examination committee composed of one chief examiner and three sub examiners, dissertation examination and final examination by dissertation examination committee composed of one chief examiner and three sub examiners, respectively. Additionally, as appropriate the faculty member(s) of other doctoral programs and the ones from other universities are able to participate in such examination as sub examiner(s). 1. If the real problems of biology are set with the basic scientific view or a view that anticipate their applications. 2. If the research methods such as theory, experiments and surveys used to explore problems and the methods to analyze the data acquired is scientifically appropriate in light of international standard. 3. If the points of argument from problem setting to conclusions are demonstratively and logically deployed in English. 4. If internationally competent academic results for the problems set are acquired and the basic principle behind problems are elucidated or the methods to solve the problems with a view that anticipate their applications. 5. If the dissertation is presentable as a dissertation for doctor's degree.

Curriculum Policy

Based on understanding diversity of the biological world, in order to acquire advanced ability to elucidate the basic principle of biological phenomenon, the curriculum shall be organized which is composed of eight area of expertise including Taxonomy & Evolution, Ecology, Plant development & physiology, Animal development & physiology, Molecular cell biology, Genome informatics, Advanced cell biology (cooperated graduate school), Advance molecular biology (cooperated graduate school).

Curriculum Design Framework	– In Seminars of each area of expertise, intensive reading of the newest and latest articles shall be performed. Through this, bioethics, research management ability and communication skills shall be acquired, basic natural scientific understanding of life ethics and life phenomena shall be deepened. Additionally, advanced research ability relating to biology (ability to foresee, ability to analyze, presentation ability) shall be acquired. – The methods to create research dissertation /doctoral dissertation in Thesis Research of each area of expertise shall be instructed. Through these, examination of validity of the conclusions derived from the actual experiments/research and comparison with the preceding research shall be instructed and an ability to achieve international results (total ability as a doctor) shall be trained.

Teaching and Learning Methods	– The standard learning year shall be three years. As the requirements to complete doctoral degree, it is necessary to acquire 12 or more credits of Seminars and Thesis Research in each area of expertise, to put the research outcomes together in doctoral dissertation and to pass the final examination. – One faculty member appointed by the program leader and two or more faculty members related to the research field shall be sub-supervisors. – Through research supervision system (advisory committee) by three or more sub supervisors in addition to practical education/research supervision by supervisor, the learning effects and research progress of students and the situations of their courses etc. shall be supervised. The advisory committee member can be participated from other doctoral programs as necessary.

Admission Policy

Desired Student Profile	The desired student shall be the one who has a deep interest in biological world and phenomenon, finds the real problems with strong sprit of inquiry, has motivation to work on solution for such problems and have communication skills to be able to explain the research outcomes and activities in a way easy to understand and foreign language skills to be able to transmit them to the world.
Student Selection Process	Various kinds of selection methods, such as general entrance examination (for the applicants from University of Tsukuba and other universities), special selection of international students and special selection of working individuals etc., shall be adopted. Through the document submitted and oral examination and the results of the interim examination of the master's course etc., the following abilities shall be evaluated: – For the applicants from University of Tsukuba (general entrance examination and special selection of international students), high basic knowledge and research ability, and suitability relating to biology shall be evaluated by the interim examination of the master's course etc. – For off-campus students (general entrance examination and special selection for international students), high basic knowledge about biology, research ability, and aptitude will be evaluated by submitted documents and oral examination, and English language ability will be evaluated by the score of the English proficiency test.

Learning Support Framework

Academic Support	The primary and secondary advisors provide guidance on presentations and thesis writing. They also offer support for managing research time. Furthermore, they actively encourage participation in events such as the Japan-China-Korea International Graduate Student Academic Forum, Global Science Week, and academic society annual meetings, while providing instruction to enhance presentation skills.

Opportunities for Peer Interaction	Seminars involving multiple laboratories provide opportunities for student exchange. Furthermore, the Graduate Student Association organizes poster sessions and networking events, actively encouraging participation from students and faculty both within and outside the degree program. To foster interaction with students outside the university, students present their research findings at academic conferences and research meetings, thereby enhancing their motivation to learn and improving the quality of their research.
Opportunities for Student–Faculty Interaction	Orientation session for incoming students is held to provide opportunities for interaction with faculty members. Additionally, Graduate Student Association takes the lead in organizing poster presentations and social gatherings, actively encouraging faculty participation to foster interaction between faculty and students. Furthermore, preliminary thesis review sessions are conducted publicly, encouraging active participation from both students and faculty to create opportunities for interaction.

Approaches to Assuring and Enhancing Educational Quality

The Curriculum Committee shares information on final-year students' research activities (publication of papers, awards received, international collaborative research, presentations at domestic and international conferences, etc.) and discusses whether the quality of education provided to students is assured. Additionally, student surveys, graduation rates, and employment status are shared at the Education Council, where challenges and improvement measures are discussed. Furthermore, faculty participation in the Master's Thesis Preliminary Review Committee is encouraged to stimulate more active discussion.