

## Doctoral Program in Biology

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| Name of the degree to be conferred                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Doctor of Philosophy in Science                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Educational purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 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.                                                                                                                                   |
| Vision of human resources development                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | The human resources who have the following abilities shall be fostered:<br><ul style="list-style-type: none"> <li>· Capable of understanding the trend in fundamental research in various areas of natural science.</li> <li>· Capable of logically grasping the biological world and phenomenon and establishing the process from problem setting/ to problem solution from biological perspectives.</li> <li>· Capable of achieving internationally competent academic results by elucidating the basic principle behind problems.</li> </ul> |
| Competencies specified in diploma policy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Evaluation perspectives                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 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?<br>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?<br>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?<br>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?<br>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?<br>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?                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 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?                                                                                                                                                                                                                                                                                                                                                                               |
| Dissertation evaluation criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <p>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 master's programs and the ones from other universities are able to participate in such examination as sub examiner(s).</p> <ol style="list-style-type: none"> <li>1. If the real problems of biology are set with the basic scientific view or a view that anticipate their applications.</li> <li>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.</li> <li>3. If the points of argument from problem setting to conclusions are demonstratively and logically deployed in English.</li> </ol> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

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| <p>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.</p> <p>5. If the dissertation is presentable as a dissertation for doctor's degree.</p>                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Curriculum Policy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <p>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 &amp; Evolution, Ecology, Plant development &amp; physiology, Animal development &amp; physiology, Molecular cell biology, Genome informatics, Advanced cell biology (cooperated graduate school), Advance molecular biology (cooperated graduate school).</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Curriculum organization policy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>· 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.</li> <li>· 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.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Learning methods · Processes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>· 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.</li> <li>· One faculty member appointed by the program leader and two or more faculty members related to the research field shall be sub-supervisors.</li> <li>· 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 master' programs, as necessary.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Evaluation of learning outcomes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <ul style="list-style-type: none"> <li>· Preliminary examination for doctoral dissertation: research presentation and questions and answers shall be set. Through the contents of research presentation, degree of acquisition of advanced survey/analysis skills relating biology aiming at elucidating basic principle biological phenomenon, presentation ability and ability to explore problems shall be evaluated. Additionally, through questions and answers, deep knowledge in the biology of expertise and ability to understand shall be evaluated.</li> <li>· Doctoral dissertation examination: the students who passed preliminary examination for doctoral dissertation and taken 12 or more credits shall submit the doctoral thesis. The dissertation examiner shall examine the doctoral dissertation submitted.</li> <li>· Final doctoral dissertation examination: By asking for explanation relating to the dissertation, questions and answers regarding relevant matters shall be performed. Based on these results, through consultation by all the dissertation examiners, the following shall be evaluated: if the contents of the dissertation are worth conferring the doctoral (PhD in Science) degree as research outcomes, and if the author of the dissertation can be approved as the one who has the quality to receive the doctoral (PhD in Science) degree.</li> </ul> |
| Admission Policy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Desired students                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <p>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.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Selection policy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <p>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:</p> <ul style="list-style-type: none"> <li>· 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.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

·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.

