# PhD in Biosciences

### See study programme

| Autumn 2023 (1. semester)                        |                 |
|--|-----------------|
| Science and Ethics in Practice                   | DR433F<br>5 sp  |
| Frontier Topic in Biosciences                    | DR444F<br>5 sp  |
| Elective courses                                 |                 |
| Current Topics in Ecology I                      | BIO9003<br>5 sp |
| Aquaculture Production and Environmental Impacts | BIO9002<br>5 sp |
| Advanced Biological Data Analysis                | BIO9000<br>5 sp |

## Spring 2024 (2. semester)

| Elective courses   |                 |
|--|-----------------|
| Biodiversity and Biogeography                                  | BIO9007<br>5 sp |
| Molecular Biology of RNA                                       | BIO9006<br>5 sp |
| Current Topics in Ecology II                                   | BIO9004<br>5 sp |
| Modelling the distribution of biodiversity under global change | BIO9009<br>5 sp |
| Population Genomics  | BIO9001<br>5 sp |
| Comparative Immunology   | DR446F<br>5 sp  |
| Principles in Animal Experimentation                           | DR443F<br>5 sp  |
| High Throughput Sequencing of Non-Model Organisms              | DR425F<br>5 sp  |

| Individual Special Curriculum | DR435F |
|-------------------------------|--------|
|                               | 5 sp   |

### Autumn 2025 (5. semester)

| Elective courses                                 |                 |
|--|-----------------|
| Current Topics in Ecology I                      | BIO9003<br>5 sp |
| Aquaculture Production and Environmental Impacts | BIO9002<br>5 sp |
| Advanced Biological Data Analysis                | BIO9000<br>5 sp |

# Spring 2026 (6. semester)

| Doctoral Thesis  | DR445F<br>0 sp  |
|--|-----------------|
| Elective courses   |                 |
| Biodiversity and Biogeography                                  | BIO9007<br>5 sp |
| Molecular Biology of RNA                                       | BIO9006<br>5 sp |
| Current Topics in Ecology II                                   | BIO9004<br>5 sp |
| Modelling the distribution of biodiversity under global change | BIO9009<br>5 sp |
| Population Genomics  | BIO9001<br>5 sp |
| Comparative Immunology   | DR446F<br>5 sp  |
| Principles in Animal Experimentation                           | DR443F<br>5 sp  |
| High Throughput Sequencing of Non-Model Organisms              | DR425F<br>5 sp  |
| Individual Special Curriculum                                  | DR435F<br>5 sp  |

The doctoral programme is designed in such a way that candidates can complete their studies within the stipulated time frame, normally three years of full-time work. An important part is the educational training component with a set of appropriate courses at PhD level. The training component consists of an educational segment of credit-earning courses (30 ECTS) and a presentation segment that covers the dissemination/communication of the research conducted by the candidate as an essential part of the programme. Courses included in the training component are normally bioscience-related and this helps the candidate to get an in-depth understanding of the research theme. Technology-related topics such as those on bioinformatics, artificial intelligence, and other topics may also be included, if deemed relevant for the training component, to support the PhD research project.

The training component consists of mandatory coursework of 10 credits: covering philosophy and ethics in science (DR443F Science and Ethics in Practice, 5 ECTS) and one PhD level course in a subject area directly related to the student's research topic (DR444F, Frontier Topic in Bioscience, 5 ECTS). PhD students are advised to complete the mandatory course Science and Ethics in Practice during the first year of their studies. This helps to create awareness on the philosophy of science, and to anchor the candidate's research efforts on ethical principles relevant for the fair conduct of studies by following national and international standards, guidelines and regulations to generate knowledge relevant for the society, preserve biodiversity and protect nature. The remaining 20 credits of the training component consist of elective coursework (an overview of the electives is found in appendix 7). Students are encouraged to choose courses from the PhD course portfolio at the faculty, provided they are relevant for their research theme. A minimum of 10 ECTS should be obtained from courses offered at Nord, which opens the possibility of including up to 10 credits of master-level courses that are suitable for the candidate's research project (in this case §9-1 of the PhD regulations at Nord University applies and candidates must obtain a grade B or better). Relevant PhD courses offered at other universities in Norway or abroad, or by a third party that conducts appropriate workshops/PhD-level courses, may also be recognised as part of the training component. External courses that do not have a formal approval as components of PhD education must be quality assessed by the main supervisor in consultation with the programme coordinator to verify their learning outcomes (no more than 5 ECTS can be gained from such courses). Furthermore, the candidate may participate in and earn credits from Research Schools funded by the Research Council of Norway (e.g., "NORBIS", "PHOTOSYNTEC") where researchers with expert knowledge in the field of biosciences hold courses and share their competence with PhD students.

As part of the presentation segment, candidates are required to actively participate in recognised national and international research environments and disseminate and communicate results originating from their PhD project (transferable skill activities). The candidate must give at least two internal presentations (oral) at the faculty and at least two external presentations (either oral or poster), mainly at national / international conferences. The study programme coordinator approves the course and presentation segments which form part of the candidate's training component.

#### Research component:

The research component together with transferable skill activities includes preparation of a PhD thesis that is an independent academic work based on an original piece of high-guality research within biosciences. Normally the research topic is aligned to one of the research disciplines at the faculty. In certain cases of multi-disciplinary themes, competences from other faculties at Nord University or regional institutions or industry can be made use of to conduct cutting-edge research. Candidates in the programme that are linked to externally-financed projects, especially those funded by the industry, gain knowledge and skills that are important for the chosen area of applied biosciences. These learning outcomes could then be directly transferred to the respective sectors, thus benefiting society. Irrespective of the funding source, all PhD research work is carried out, in accordance with the existing learning outcomes, under the guidance of an academic supervisory committee. The research theme is normally part of an externally-funded research project, or a PhD project awarded by the faculty administration. The PhD student is expected to prepare a scientific thesis at an advanced academic level based on the research performed and to submit it for evaluation within the contractual period. The research work undertaken by the candidate during the contract period will be laboratory-based or field-oriented investigations, and/or bioinformatics-based on data collections. The research component in biosciences generally consists of several parts, normally including: 1) preparation and submission of the initial research project proposal for admission that describes the project objectives and envisaged experimental plan, and the feasibility of carrying out the research

within the stipulated time; 2) performing sampling/data collection/ laboratory work according to the project plan; 3) data analyses and interpretations that address the project objectives; 4) writing scientific papers or chapters aimed for peer-reviewed publication; and 5) compiling a coherent thesis that documents the candidate's scientific proficiency in the research theme. By addressing important and relevant problems, formulating new questions, developing new tools, methods, or approaches the candidate can acquire the necessary skills for self-driven investigations.

The resulting thesis is normally a compilation of coherent peer-reviewed published articles, or publishable scientific papers that reports new findings from the doctoral research performed by the candidate. The thesis includes an introductory segment that reviews the state-of-the-art in the field, and a discussion section that integrates the generated new knowledge in the articles and contextualises the research to meet international standards in the field. A thesis submitted by the candidate must be approved by the Research Board prior to it being sent for evaluation by an external committee. The evaluation committee appointed by the Research Board includes national and international experts in the field. The committee evaluates the thesis and submits a recommendation stating whether the doctoral work is worthy of defence for the doctoral degree and explaining the reasoning behind its assessment.

The educational training component and research component of the PhD programme together with the thesis and defence are in accordance with the national and international guidelines, and are intended to develop highly skilled scientists, and provide the academic breadth and depth as stated in the learning outcomes of the programme.

#### Learning outcomes

The erudition of the candidate completing a PhD degree at the Faculty will be on par with the national standards. Candidates who are adjudged as qualified for the doctoral degree in Biosciences at Nord is expected to possess the knowledge, skill and general competency in the particular field of science.

The learning outcomes are maintained on the standards stipulated by the Norwegian Agency forQuality Assurance in Education (NOKUT; regulations on the supervision and control of the quality of Norwegian higher education "Tilsynsforskriften" § 4.2.)

Knowledge:

The candidate

- is at the forefront of knowledge within the academic field of biosciences and masters the field's philosophy of science and methods required to answer questions arising in the pursuit of science

- must be capable of judging the implications of the research methods and processes chosen, including the ethical elements when relevant, in the quest of knowledge in biosciences

- should be proficient in biosciences and can develop new knowledge, theories, methods, elucidations, forms of documentation, and communication within their area of expertise

Skills:

The candidate

- can develop new research questions and topics for scholarly work in the field of biosciences, perform research meticulously, systematically, and timely to obtain the right answers

- can plan and conduct research fairly and righteously to achieve the set goals and obtain answers that are at the

highest levels of international standards

- can solve complex academic questions and challenge established knowledge and practice within specific areas of biosciences

- can maintain scientific integrity while generating information relevant to society

- understand the value of nature and the importance of biosciences as a tool to appreciate it in its entirety

General competencies:

The candidate

- should be competent to manage and undertake assignments, projects and complex interdisciplinary tasks, individually and collaboratively when demanded

- can recognize ethical issues, new and otherwise, when performing research, disseminating and communicating knowledge, and be guided by strong moral principles that reflect the candidate's scholarship

- should be able to disseminate and communicate research through appropriate national and international channels to ensure knowledge-sharing with stakeholders and community at large

- can engage in debates on topics in biosciences in relevant forums

- can promote pluralism of cultural values and diversity of thought important in discourses to further our understanding in the field of biosciences

- can realize the importance of innovation to carry out novel research that aids the progression of human thinking and well-being, with minimal footprint on nature, and to align with the UN sustainable development goals.

- shares knowledge and protects it where necessary following internationally accepted guidelines and regulations

#### Admission requirements

#### 1. Qualification

The Faculty of Biosciences and Aquaculture (FBA) welcomes applicants who have successfully completed their master's degree (120 ECTS) in biosciences or biosciences-related disciplines, which is relevant to the theme of the proposed research project, with a minimum average grade B (or its international accepted equivalence) or better.

Industry and public funded candidates can apply for admission, provided they have the necessary qualifications. International self-financed students are normally not accepted, but applicants with documented funding from governmental or non-governmental bodies will be considered for admission. Such candidates should contact the faculty's PhD administration for further information regarding their eligibility for admission.

#### 2. Financial Capacity

In order to be admitted to the PhD programme applicants must be able to source financing for the entire period of the doctoral studies (3 years). Possible funding sources may be a PhD fellow position financed by the Faculty of Biosciences and Aquaculture, if available, and other external sources, e.g. from the home country. Private funding (e.g. own or family's financial resources) does not normally qualify for admission to the PhD programme. Documented funding from research fellowship positions, scholarships or governmental/business bodies is required. Particularly about PhD fellowship positions:

PhD research fellow positions at our faculty are generally fully funded for three years. These PhD positions are linked to a specific research project. Successful applicants for this position will be offered employment to enter the PhD programme in Biosciences. Available research fellow positions funded by the Faculty of Biosciences and Aquaculture will be announced on the university's website: <u>www.nord.no/en/about/vacancies</u>

Please check the Regulations for the doctor of philosophy degree at Nord University, including the Supplementary guidelines for the PhD in Biosciencesfor more detailed information on admission requirements for the PhD programme.

#### Career possibilities

Research projects are designed to advance the science and provide training in professional skills and theoretical knowledge that would ultimately enable a PhD candidate to work in research, academia, government, industry and private sector. The degree holders can contribute to the society either theoretically, methodologically or contextually, taking advantage of the knowledge and transferable skills acquired through the programme. A doctoral degree in Biosciences enables the graduate to be attractive for positions within academic or non-academic research environments, relevant knowledge-based sectors in the industry, or in administration and decision-making bodies, which confirms the societal relevance of the programme.

#### Further education

PhD is the highest form of academic education offered, and signifies the conclusion of studies.

#### Study abroad

Doctoral education at the Faculty of Biosciences and Aquaculture is internationally oriented. Candidates are expected to contribute to international conferences and publish in international peer-reviewed journals.

Based on the nature of the research project, you will complete part of your studies abroad, either in the form of prolonged research stays/visits at international institutions or by completing some of your courses abroad.

#### Costs

Running costs are generally covered by the funds of the project related to the research theme of the candidate.

#### Assessment methods

Course component: Pass/Fail

Students have to successfully complete the obligatory and elective courses, recommended as part of this programme.

Further, they have also to fulfill other academic requirements stipulated in the PhD contract.

Research component: Approved/Not approved, wherever applicable

Presentations, Publications, PhD thesis, Trial lecture and Defense

The students will have to compile their research in the form of a PhD thesis that will be evaluated by an external committee. They will also have to publicly present a trial lecture and defend their PhD thesis successfully.

#### Graduation requirements

Successful completion of the training and research components followed by successful delivery of the trial lecture and defence of the PhD thesis.

#### Programme evaluation

Dialogue meetings are conducted between students and the study programme coordinator every year.

Qualifications requirements and regulations

Here we refer to "Regulations pertaining to studies and exams at Nord University " as well as local regulations and directives, see University Rules and Regulations.