Linnæus University

Jnr: 2010/2713

Programme syllabus

Faculty Board of Science and Engineering
School of Natural Sciences

Akvatisk ekologi, masterprogram, 120 högskolepoäng
Aquatic Ecology, Master Programme, 120 credits

Level
Second Level

Establishment of Programme
Established by Organisational Committee 2009-03-26

Date of Ratification
Approved by Faculty of Health and Life Sciences 2009-09-15
The programme syllabus is valid from autumn semester 2010

Revised 2010-11-08

Prerequisites
General entry requirements for second-cycle studies and specific entry requirements:

- 90 credits in Biology/Ecology/Microbiology, including an independent project/degree project worth at least 15 credits or the equivalent.
- English B/6 or equivalent.

Description of Programme

The Master of Science in aquatic ecology is a programme at the advanced level, equivalent to 120 higher education credits. The programme is designed to prepare professionals interested in the field of aquatic ecology and sustainable environmental strategies for future careers as researchers, educators, decision makers and consultants. The programme is international, multidisciplinary and oriented towards current topics in aquatic microbiology, marine ecology and environmental policies.

Objectives

Knowledge and understanding

For a Degree of Master (Two Years) students must

- demonstrate knowledge and understanding in their main field of study, including both broad knowledge in the field and substantially deeper knowledge of certain parts of the field, together with deeper insight into current research and development work; and
- demonstrate deeper methodological knowledge in their main field of study.

Skills and abilities

For a Degree of Master (Two Years) students must

- demonstrate an ability to critically and systematically integrate knowledge and to analyse, assess and deal with complex phenomena, issues and situations, even when limited information is available;
- demonstrate an ability to critically, independently and creatively identify and formulate issues and to plan and, using appropriate methods, carry out advanced tasks within specified time limits, so as to contribute to the development of knowledge and to evaluate this work;
- demonstrate an ability to clearly present and discuss their conclusions and the knowledge and arguments behind them, in dialogue with different groups, orally and in writing, in national and international contexts; and
- demonstrate the skill required to participate in research and development work or to work independently in other advanced contexts.

Judgement and approach

For a Degree of Master (Two Years) students must

- demonstrate an ability to make assessments in their main field of study, taking into account relevant scientific, social and ethical aspects, and demonstrate an awareness of ethical aspects of research and development work;
- demonstrate insight into the potential and limitations of science, its role in society and people's responsibility for how it is used; and
- demonstrate an ability to identify their need of further knowledge and to take responsibility for developing their knowledge.

Students will have achieved the following learning outcomes after successfully completing the programme:

- Understand and apply the principles of Aquatic Ecology including the dynamic processes that affect aquatic organisms in coastal ecosystems
- Knowledge of water systems from freshwater streams to marine areas
- Explain and predict ways of using analytical methods and tools to help answer scientific questions and to solve practical problems
- Know how to perform laboratory and field work
- Use appropriate methods to critically interpret scientific data including original research
- Develop and report secondary research based on literature search of published resources (Seminars/Current topics/Workshops)
- Use the terms and concepts of Aquatic Ecology effectively in oral and written presentations
- Integrate the perspectives and knowledge of Aquatic Ecology with those of other disciplines to analyse a specific problem and contribute to the development of environmentally sustainable technologies and values
- Select, apply and interpret appropriate techniques (including statistics) and computer applications to resolve biological issues and problems in the student's written presentations
- Formulate, implement and perform original research to completion .
- Report the results of original research using professionally appropriate academic formats at national and international level
- Interact and collaborate with other biologists, including researchers, administrators/managers, teachers and students.

Content

Organisation

The Programme Board of Aquatic Ecology includes a coordinator, a study

counsellor and secretary, student representatives, and a reference group including representatives from the Marine Science Centre in Kalmar, and both the public and private sector.

Programme overview
The programme spans over two years, including a set of core courses in research methodology common to the Faculty of Natural Sciences and Technology at Linnaeus University.These core courses aim to foster interdisciplinary thinking among students, expose students to different aspects of natural sciences, to promote the development of communication and networking skills, as well as deepen historical perspectives of science and ethics. During the first year, students are introduced to the latest research in the field of aquatic ecology/marine ecology and will deepen their knowledge of marine microbiology, advanced systematics, and resources and ecology of marine waters. The function and evolution of different aquatic systems ranging from polar to tropical and from coastal to deep ecosystems are discussed in the light of the newest molecular advances in the field. Students are also introduced to simulation modelling and ecological applications that can offer solutions to complex management problems of water resources. Relevant both for research and management, the introduction to powerful techniques for designing ecological investigations and analysing ecological data sets enables the students to tackle environmental issues within the field. Optional courses offer a wide range of introductory or in depth courses on advanced techniques (eg. application of GIS to fisheries management, practicals in molecular ecology), management issues (overview of the application of the EU directives in Sweden and other countries around the Baltic , coastal resources management and applications including fisheries) or global change and climate related topics (ecology, toxicology and socioeconomic impact of harmful algae, spreading of pathogens, bioenergy). During the two years, students participate in a series of seminars on current topics within the field of aquatic ecology with leading scientists in the field and decision makers from both the public and private sector.
The second year is focused on a research project including a written thesis (30-60 higher education credits) with an appropriate advisor. The Masters thesis is carried out in fields related to research interests at the Marine Science Centre at Linnaeus University, including practicals giving the opportunity to apply acquired knowledge. The Masters thesis can also be carried out at partner universities, or at a third part (e.g. Board of Fisheries, national/regional environmental planning agencies, private sector) or as a Minor Field Study. The Masters thesis can partly be carried out abroad after agreement between the student, the advisor and the Programme Advisory Board.

Course content

Year one
Research Methodology (A1N) 15 higher education credits
Introduction to Research in Aquatic Ecology (A1N) 5 higher education credits*
Advanced Aquatic Ecology (A1N) 5 higher education credits*
Microbial Ecology (A1N) 5 higher education credits*
Marine Ecology and Biodiversity (A1N) 5 higher education credits*
Ecological Modeling (A1N) 5 higher education credits*
Current topics in Aquatic Ecology (A1N) 5 higher education credits*
Environmental Statistics (A1F) 5 higher education credits*

To complete year one, an additional 10 higher education credits must be chosen after advice and approval by the Program Coordinator.

Year two
Master Thesis (A2E) 30-60 higher education credits*

To complete year two, 60 higher education credits must be achieved. 30 higher education credits can be selected freely, but courses should be chosen after advice and approval by the Program Coordinator.

Course content will continuously improve to meet the demands of new research findings, students and decision makers.

*main field course (Biology)

Practical Training/Community Contacts
In the Masters Programme Advisory Board, the presence of external members from both the public and the private sector ensures that education and preemployment training programmes are relevant.

Studies abroad
Students have the possibility to replace mandatory courses with courses of equivalent content at foreign universities. Optional courses can be chosen from foreign courses after agreement with the programme manager. The Masters thesis can be carried out at a foreign institution after agreement between the student and the advisors.

Scope of the programme
The Masters in Aquatic Ecology is organized according to the principles of sustainability (integration, community involvement, gender and generation equity, ecological integrity and continual improvement). The theoretical training in the programme favours ecological integrity, by protecting biological diversity and maintaining ecological processes and life-support systems in aquatic environments. Practical training takes into account concrete aspects of ecological integrity (learning environment, travelling, materials, e-learning).
The programme introduces the students to a cooperative academia-whole community approach through early stages of a project (hypotheses testing) to its implementation (application) within coastal management or fisheries, for example.
The Masters in Aquatic Ecology also introduces the students to the concept of fairness and equal access to opportunities both in our life time and for future generations. Equity within (gender) and between generations implies maintaining ecological integrity and water resources to provide for a safe quality of life, both for short and long term. The programme incorporates both global and multicultural perspectives on aquatic systems and water resources, on new technology and development, and on internationalisation and employability.

Quality Development

Ongoing assessment of the Master of Science in Aquatic Ecology programme will help to evaluate the quality and the effectiveness of the learning environment in supporting student learning and development. Ongoing assessment will inform Faculty members, students, administrators and other stakeholders. Assessment review follows best practices defined by the Faculty of Natural Sciences and Technology, and the School of Pure and Applied Natural Sciences. The Programme Coordinator is responsible for thorough documentation of data related to student learning (e.g. changes in knowledge, skills and behavior).
These data will be collected using both quantitative (attendance, projects, performances) and qualitative (individual feedback, survey, questionnaires) methods. Assessment will include recommendations made by a review panel based on previous years.
The Programme Advisory Board evaluate the assessment findings continuously and present the findings to the Board of Directors of the School and the Faculty Committee for Education once a year for review. Based on the final review of the assessment, changes will be made to the curriculum, the activities, supporting services, student learning outcomes and goals in the programme accordingly.

Degree Certificate

After completing programme studies, corresponding to the requirements expressed in the Higher Education Ordinance degree order as well as Linnaeus University degree order, the student may apply for a degree. Those who have completed the Study Programme Master of Science in Aquatic Ecology may obtain the following degree:

Filosofie masterexamen med inriktning mot Akvatisk Ekologi.
Huvudområde: Biologi.
Master of Science (120 credits) with specialization in Aquatic Ecology.
Main field of study: Biology.

The degree certificate is bilingual (Swedish/English). The Degree Certificate is accompanied by a Diploma Supplement (English).