UNIVERSITY OF GOTHENBURG

DEPARTMENT OF MARINE SCIENCES

NMAR311 Landscape and seascape genomics, 2.5 credits

Landskaps- och havslandskapsgenomik, 2,5 högskolepoäng

Third-cycle level / Forskarnivå

Confirmation

This syllabus was confirmed by the Department of Marine Sciences on 2023-05-31, and is valid from Spring semester 2023.

Responsible Department
Department of Marine Sciences, Faculty of Science

Entry requirements

For admission to the course, the applicant has to be registered as a doctoral student (third cycle education) or have a doctoral degree.

Learning outcomes

The course deals with how spatial data describing characteristics of terrestrial and marine environments can be combined with genomic data to understand species' population structure, distribution patterns and dispersal routes, as well as understanding how the use of natural resources (e.g. land use, habitat exploration) affects the longterm survival of populations and species.

The course contains practical laboratory elements where data is collected and then analyzed. The students will also use methods covered in the course to analyze their own data.

After completion of the course the Ph.D. student is expected to be able to:

Knowledge and understanding

- Demonstrate basic knowledge in combining spatially resolved environmental data and genetic data.
- Demonstrate basic understanding of the relationship between landscape genomic components, such as dispersal, genetic divergence, genotype-environment interactions..

Competence and skills

- Ability to apply landscape genomic methods and approaches.
- Acquaintance with analysis tools, such as, RDA, GDA, clustering analysis, likelihood based models and ABC models.

Judgement and approach

Formulate one's own research questions, identify data and tools needed to answer these questions and critically evaluate and analyse the results.

Course content

This course aims at detailed understanding and hands-on experience of using landscape genomic approaches for one's own biological research questions. The students will be presented for and trained in landscape genomic concepts and methods showing how genomic data combined with spatially resolved environmental data can be applied to address and answer research questions related to management and conservation. A first day (voluntary) will contain introduction and training in using basic R and bash commands for those that are unfamiliar with these tools. The course will demonstrate how landscape genomics relate to population genetic concepts and approaches, how spatial environmental data is retrieved and analysed, how biophysical models are used to assess dispersal, and how genetic differentiation can be analysed. The course introduces bioinformatics software for population genomic analysis, likelihood based models and ABC models. The course corresponds to 6 days of full time studies and is composed of lectures, demonstrations and computer labs.

Types of instruction

Instructions are given through a combination of lectures introducing topics, followed by hands-on data analysis exercises. Participants will also be offered the opportunity to present their own research projects.

Language of instruction

The course is given in English.

Grades

The grade Pass (G) or Fail (U) is given in this course.

Types of assessment

All course elements are exam-based and active participation in exercises, discussions and presentations normally leads to a passed course.

Course evaluation

The course evaluation will be carried out through an online questionnaire.