



Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

SLUkurs

Syllabus

PNSo169 Traditional and molecular methods to assess biodiversity. Focus on DNA (meta)barcoding & Aquatic Organisms, 7.0 credits

Syllabus approved

2018-10-04

Subjects

Biology/Environmental Assessment

Education cycle

Third cycle

Grading scale

Pass / Failed

The requirements for attaining different grades are described in the course assessment criteria which are contained in a supplement to the course syllabus. Current information on assessment criteria shall be made available at the start of the course.

Language

English

Prior knowledge

The course is directed to PhD students who wish to extend their knowledge on the paradigm shift from traditional morphology-based to novel molecular organism identification approaches with a focus on aquatic organisms. The course will take up the use of molecular tools in both basic research and for applied use in aquatic ecosystem assessment, thus we welcome students from both basic and applied fields of science. The following prerequisites apply:

PhD enrollment, at least 5 PhD students from SLU. The PhD project should be connected to biodiversity/ecology/taxonomy. If space is available, also postdocs or other researchers could participate. As a prerequisite to the course, each student will need to establish a Wikipedia edit account. Each student will also choose a specific topic prior to the course (such as barcoding of a certain organism group), and create a first draft on this topic to be used as Wikipedia page prior to the intense course week. If an optional individual project is selected, the student needs to communicate the details with the course organization prior to the course so the project can be prepared.

Objective, including learning outcomes

At the end of the course, the successful student is expected to be able to

1. Give an overview on traditional identification tools for different aquatic organisms to assess biodiversity
2. Understand how biodiversity is used for environmental assessment in environmental legislation (e.g. EU Directives such as WFD and MSFD, and national regulations).
3. Describe and comprehend the background of (meta)barcoding technology and eDNA analysis, and evaluate potential technical challenges.
4. Identify species by performing database queries with common databases and interpret results.
5. Critically evaluate studies (basic & applied) that utilized DNA-based taxonomy.
6. Develop skills to make informed decisions about molecular marker choice, sequencing platform and laboratory needs.
7. Synthesize knowledge and effectively communicate about DNA Barcoding in grant proposals and interaction with policy makers.

The aim of the course is to give an overview on identification tools and methods currently used in environmental monitoring and research, including recent advances and challenges. As an overview course, it will touch on all aquatic organisms, freshwater and marine, however giving information on where to continue to search for more information regarding certain organism groups as well as tools and methods. During the course, students will actively acquire information about the ongoing paradigm shift in identifying aquatic organisms for biodiversity and environmental assessment. Based on these information, students shall critically evaluate studies that utilized DNA-based taxonomy and judge in which contexts DNA-based taxonomy results might differ from traditional based taxonomy results. Finally, the student also will get the opportunity to work on her/his own project in an adjacent optional course part.

While the course has an aquatic focus, the methodology is universal and we welcome also interested PhD students working other ecosystems and disciplines (e.g.

bioinformatics, environmental research). First, because the general overview on (meta)barcoding is valid for organism from all habitats. Second, PhD students might not only need this knowledge in their ongoing research, but also in their future career, for example in a job within environmental assessment where they have to judge results on ecological status based on biodiversity, including aquatic biodiversity.

Wikipedia exercises are chosen in this course to ensure that the work done by the students is spread to inform others interested in the same problems. Additionally, Wikipedia exercises are a constructive way to learn to present scientific information in a popular form.

Content

Three weeks course, including one intense course week with lectures, discussions, excursions to laboratories, and Wikipedia exercises together with course participants and teachers.

Participants will be divided into smaller groups, each dealing with one organism group only, getting a more in-depth laboratory introduction in traditional identification, and then presenting this to the group (ppt, Wikipedia-side).

General part/overview on (meta)barcoding and environmental assessment, practical part on traditional identification, Wikipedia-projects, project part with own data adjacent to main course.

Requirements for examination

The course is on pass/failed level.

The student group will prepare together a Wikipedia page which will give an introduction into the course contents, i.e. Identification of Aquatic Organisms – comparison of traditional and molecular methods to assess biodiversity, including an Introduction to DNA Barcoding, Metabarcoding and Standard Operating Workflows.

Each student will prepare a certain topic/part of the course. The student will have the task to write a short overview text on that topic, prepare illustrations and/or pictures/short video clip to illustrate the topic, and give links to relevant scientific and public publications and webpages. Additionally, the student will work together with the entire student group on an overview page where each topic is explained shortly and set into a context. That page will be highlighted as Wikipedia publication and as "Single media file" in the Open Access journal Metabarcoding and Metagenomics, with all students and supervisors as coauthors. In a wider context, that page is aimed at informing the public, stakeholders and other researchers

about the ongoing paradigm shift in identifying aquatic organisms for biodiversity and environmental assessment to learn about advances and challenges.

As a prerequisite to the course, each student will need to establish a Wikipedia edit account. A list of available topics will be given in the start of the course for the students to be chosen, and will be worked on during the course. At the end of the course one session will be devoted to work on the combined website. The student has passed the course if a) she/he has attended all sessions of the intense course week*, b) prepared the separate Wikipedia page she/he was responsible for including the details given above, and c) has successfully participated in the common webpage work and linked her/his own page successfully. * While it is permissible to miss sessions, the points awarded will be downweighted according to the number of sessions missed.

Additional information

Please attach to the email-application the following information:

- 1) Your affiliation and Swedish personal number or birthday.
- 2) A one paragraph description of your PhD research project
- 3) The names and email addresses of your supervisors
- 4) A short motivation (3-5 sentences) as to why you want to take the course.

This information will be used to (1) evaluate the suitability of different applicants for the course, in the event that we receive more than 16 applications and (2) gain insight into the backgrounds of the students taking the course, to assist planning. The application period is open until 31 Jan 2019, or until all 20 places are filled. Priority to 50% of the places is given to SLU PhD students, and here to members of the co-organizing research schools. The other 50% of the places will be given to PhD students from DNAqua-Net. Applications from non-members will be considered after the application deadline.

This course is co-organized by the SLU Research Schools Focus on Soil and Waters and Ecology- basics and applications, and the EU COST Action DNAqua-Net (CA15219, Developing new genetic tools for bioassessment of aquatic ecosystems in Europe).

Responsible department

Department of Aquatic Sciences and Assessment