KLADDE

AFLYST F23: Molecular Methods in Ecology

Title	AFLYST F23: Molecular Methods in Ecology
Semester	F2023
Master programme in	Miljø biologi / Environmental Science
Type of activity	Course
Teaching language	English
Study regulation	Read about the Master Programme and find the Study Regulations at ruc.dk Læs mere om uddannelsen og find din studieordning på ruc.dk

REGISTRATION AND STUDY ADMINISTRATIVE

Registration	Sign up for study activities at stads selvbetjening within the announced registration period, as you can see on the Studyadministration homepage. When signing up for study activities, please be aware of potential conflicts between study activities or exam dates. The planning of activities at Roskilde University is based on the recommended study programs which do not overlap. However, if you choose optional courses and/or study plans that goes beyond the recommended study programs, an overlap of lectures or exam dates may occur depending on which courses you choose.
Number of participants	The Master Programme/Institute reserves the right to cancel the course if fewer than 8 studentes are registered for the course.
ECTS	5
Responsible for the activity	Benni Winding Hansen (bhansen@ruc.dk)
Head of study	Per Meyer Jepsen (pmjepsen@ruc.dk)
Teachers	
Study administration	INM Studieadministration (inm-studieadministration@ruc.dk)
Exam code(s)	U60098

ACADEMIC CONTENT

Overall objective	This course will provide students with knowledge from the interphase between environmental and molecular biology with a specific focus on the use of modern molecular methods in environmental biology. The course focusses on how environmental and anthropogenic stressors (e.g., drought, heat, chemicals) affect organisms at the physiological and molecular levels and on the molecular tools that can be applied in order to conduct such assessments. Students will learn how to identify and quantify selected stress responses (e.g. photosynthetic and respiratory rate, oxidative stress, DNA-damage, gene expression of stress proteins) and genetic changes in populations.
Detailed description of content	This course will provide students with knowledge from the interphase between environmental and molecular biology with a specific focus on the use of modern molecular methods in environmental biology. The course focusses on basic physiological phenomena besides how environmental and anthropogenic stressors (e.g., drought, heat, chemicals) affect organisms at the physiological and molecular levels and on the molecular tools that can be applied in order to conduct such assessments. Students will learn how to identify and quantify selected natural and man generated stress responses (e.g. photosynthetic and respiratory rate, oxidative stress, DNA-damage, gene expression of e.g. biosynthesis of structural componens and stress proteins) and genetic changes in populations.
Course material and Reading list	Primary literature available in the Moodle folder. The literature will often be scientific articles or reports published by international publishers or governmental organisations.
Overall plan and expected work effort	The course consists of 18 lectures/exercises, each 2hours (=2*45 minutes). Two of the lectures are optional and will only be used if some subjects require extra attention and/or if we have had to cancel previous lectures. The course is a 5 ETCS credit course, corresponding to an expected student work-load of 135 hours; ● lectures and exercises: 32-36 hours ● preparation (including preparation for the exam): 96-100 hours ● exam: 1 hour. We expect thus that students will spend at least 3-4 hours for preparation for a 2-hour lecture.
Format	
Evaluation and feedback	The course includes formative evaluation based on dialogue between the students and the teacher(s). Students are expected to provide constructive critique, feedback and viewpoints during the course if it is needed for the course to have better quality. Every other year at the end of the course, there will also be an evaluation through a questionnaire in SurveyXact. The Study Board will

handle all evaluations along with any comments from the course responsible teacher.

Furthermore, students can, in accordance with RUCs 'feel free to state your views' strategy through their representatives at the study board, send evaluations, comments or insights form the course to the study board during or after the course.

Programme

The course is composed of 2h teaching slots. These are typically composed of a lecture given by local or external scientists, often followed by exercises, calculations and simulations, or colloquials where selected literature is discussed. Sometimes virtual learning technologies are used.

ASSESSMENT

Overall learning outcomes

After completing the course, students will be able to:

- demonstrate knowledge on how various environmental and anthropogenic stressors may affect organisms at the physiological, molecular and genetic levels
- compare and evaluate relevant measurable physiological and molecular responses to stress in plants and animals
- analyse scientific literature on relevant test methods and endpoints including the significance of controllable and standardized laboratory conditions for eco-physiological and toxicological tests
- select examples of how mathematical models and software for genomic and transcriptomic data can be used in an ecological context
- design eco-physiological experiments and measurements that can quantify expected response(s) to environmental stressors
- apply simple techniques to detect stress responses in cells and individuals, as well as software to analyse genetic data
- link responses at lower organizational level to their effects at higher organizational level (ranging over genetic and molecular level responses, physiological responses, population level effects and responses at ecosystem level)
- analyse, interpret, evaluate and communicate results on organismal stress responses at a scientifically competent level.

Form of examination

Individual oral exam with time for preparation.

Time for preparation including time to pick a question by drawing lots: 30 minutes.
Time allowed for exam including time used for assessment: 30 minutes.

Permitted support and preparation materials: All.

Assessment: 7-point grading scale.
Moderation: Internal co-assessor.

Form of Re-examination

Samme som ordinær eksamen / same form as ordinary exam

Type of examination in special cases

Examination and assessment criteria	Exam form: The student draw their exam question and spent approximately 30 min preparing their answers followed by a 30 min examination and votation. The student is expected to initiate the oral exam by a presentation of approximately 10 min covering the subject drawn by lot. This is followed by an interactive discussion between the student and the assessor and internal co-assessor. During this all sub-questions in their exam question will be covered. Evaluation criteria: ● demonstrate knowledge on how various environmental and anthropogenic stressors may affect organisms at the physiological, molecular, biochemical and genetic levels ● compare and evaluate relevant measurable physiological and molecular responses to stress in plants and animals ● analyse scientific literature on relevant test methods and endpoints including the significance of controllable and standardized laboratory conditions for eco-physiological and toxicological tests ● select examples of how mathematical models and software for genomic and transcriptomic data can be used in an ecological context ● design eco-physiological experiments and measurements that can quantify expected response(s) to environmental stressors ● discuss the application of simple techniques to detect stress responses in cells and individuals, as well as software to analyse genetic data ● link responses at lower organizational level to their expected effects at higher organizational level (ranging over genetic, molecular and biochemical level responses, physiological responses, population level effects and responses at ecosystem level) ● analyse, interpret, evaluate and communicate results on organismal and ecosystem stress responses at a scientifically competent level.
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