Høgskolen i Innlandet

Studieplan 2017/2018

Master in applied ecology

Studiepoeng: 120

Studiets nivå og organisering

The master in applied ecology is a full time study over 2 years, consisting of 120 ECTS credits according to § 3 in 'The regulation of requirement to a master degree appointed by the Ministry of Education and Research July 2nd, 2002 ("Forskrift om krav til mastergrad" fastsatt av Utdannings- og Forskningsdepartementet den 2. juli 2002). Half of the study (60 credits) consists of a master thesis in applied ecology. The course load consists of 45 ECTS credits of compulsory and 15 ECTS credits of optional courses.

Bakgrunn for studiet

Background

Through evolutionary time species have gone extinct, sometimes in the form of mass extinctions. The background or 'natural' extinction rate is, however, negligible compared to the impact of man on species survival. The extinction of species today is estimated to be 100-1 000 times higher than the background extinction rate, estimated as the average extinction rate over the last 100 million years. There is good evidence that we are now approaching another mass extinction which would be solely due to human activity and surpass in extent any previous mass extinction.

Of the 13 million species assumed to be present in the world today, only 1.8 million have been scientifically described and named. The eradication of species, even before they have ever been described, is one of the major environmental threats today. In Norway alone, ca 15 000 species have been assessed as threatened, and as many as 3 000 species exist in the national 'red list' of species most vulnerable to extinction. Among the larger, most conspicuous species in Norway, 30 and 25 % of all mammals and birds, respectively, belong to the red list.

Extinction of species reduces biodiversity and its inherent value. More concretely the instrumental, or utilitarian, value of biodiversity is reduced by decreasing humans'

possibilities to acquire goods (e.g. food, fuel, fibre and medicines), services (e.g. pollination, recycling, nitrogen fixation, homeostatic regulation), information (e.g. genetic engineering, pure science) and psycho-spiritual values (aesthetic beauty, religious awe, scientific knowledge) [1].

The extinction of species also contravenes human intentions for sustainable development as agreed in international conventions [2]. Even though the understanding of extinction of species is highly dependent on evolutionary and ecological processes, there is a need today to incorporate such knowledge with an understanding of human impacts on ecosystems. In the present program we will focus on the biological processes and the scientific tools needed to understand and acquire knowledge about sustainable development of ecosystems, aiming to provide the competence needed among the many practitioners in the professional areas of education, management and research who will influence the sustainable development of our future.

Applied ecology

Ecology is the scientific study of the interactions that determine the distribution and abundance of organisms [3]. The 'applied' perspective often refers to how ecological knowledge can be used to achieve specific aims. The aims may be associated with the exploitation of natural resources, for instance as a sustainable harvest, or equally with the protection of the biodiversity of ecosystems. Human impacts such as habitat destruction and fragmentation, harvesting, biological control, the introduction of alien species, and discharge of environmental poisons or climatic gasses all contribute to changes in the environment. Today these changes are occuring at a much faster rate and to a greater extent than species are able to adapt to. However, ecological knowledge may be used to reduce the detrimental effects. For instance, remedial actions such as specific harvesting strategies or a landscape approach to areas of expansion may allow sustainable development between man and the environment. Sustainable development does, however, demand specific methods for monitoring the natural environment to identify deviations from the aims of management. Hence, in the present master program in applied ecology we focus on:

1) The ecological effects of human impact in nature;

2) The ecological effects of remedial actions;

3) Sustainable utilisation of natural resources; and

4) Wildlife- and habitat monitoring.

'Applied' in the present study program also refers to the ability to carry to completion a delimited piece of research. We aim to train students to be able to plan, conduct, analyse and present results from ecological studies with management applications. Besides a strong foundation in the discipline of ecology, this requires knowledge of novel technology, mathematical and statistical skills, as well as a good command of English which is the scientific language. We attach importance to the students' ability to acquire information and be critical of the sources referred to. Seminars and discussions enhance students' abilities to evaluate 'accepted truths in ecology', and results and interpretations from other studies.

Despite the discipline of ecology being neutral in value, several topics in ecology touch on areas of conflicting values. Knowledge of the development of human ethical principles and attitudes is important to be able to communicate with various social groups that need ecological results. Hence, to complete the 'applied' perspective, a knowledge of social sciences as well as the development of communication skills, will run like a connecting thread throughout the study.

Why a master in applied ecology?

International conventions require a continuously higher level of consciousness regarding the use of

natural resources and wildlife- and habitat monitoring. Norway, and the Nordic countries in general, hold a unique position in this context with large, relatively intact, wildlife areas which we have a special responsibility to utilise in a sustainable way. As far as we know, we are the first educational institution in Norway, and among the Nordic countries, to offer a master degree in applied ecology. Except for the University of Stavanger, all the universities in Norway either offer a master in ecology, or offer ecology as a major area of study within a master in biology. Characteristic of the master in ecology offered at the other institutions in Norway, is the focus on ecology as a basic science.

The master in applied ecology is also unique in Norway because it is taught in English to give it an international perspective, and because theory and practice follow each other continuously during the study. The emphasis of the research program is on empirical research addressing questions relevant to regional wildlife management.

[1] See e.g. Meffe, GK and Carroll, CR 1997. Principles of conservation biology. Sinauer Associates Inc. Publishers, Massachusetts.

[2] See e.g. http://sustainabledevelopment.un.org/index.html

[3] Krebs, CJ. 2009. Ecology. Benjamin Cummings.

Læringsutbytte

The learning outcome is a result of the master thesis, participation in the educational component and participation in an active research environment. By completing the master program in Applied Ecology the candidate...

Knowledge

- is acquainted with advanced topics in applied ecology
- has an in-depth knowledge of ecological topics at scales from individuals to global systems
- has a profound understanding of human impacts on organisms, populations, communities and ecosystems

Skills

- is able to conceive, plan and carry to completion a delimited piece of research under the supervision of a professional in the field
- is able to apply ecological methodology such as study design, statistical modeling, ecological technologies and analysis of wildlife and habitat monitoring

Competence

- is able to design and carry out monitoring, management and minor research projects in the field of applied ecology
- is able to communicate applied ecological research through national or international publishing channels, and to policy makers, stakeholders and the general public
- is able to present and debate important topics in the field of applied ecology in regional and national forums
- is ready to participate in discussions on current controversial issues in ecology and the application of the science

Målgruppe

Our aim is to target students and professionals who have a dedicated interest in wildlife, and the interaction between man and the environment. Herein we target professionals within wildlife management who want to extend their competence in the field of ecology above the level of a bachelor.

Primarily we target students with a bachelor in ecology, (wildlife) biology, evolution, environmental sciences or such like. However, we encourage applicants with other bachelor degrees, or who can show an interdisciplinary bachelor degree, as long as they fulfill the entrance requirements.

Relevans for arbeidsliv og videre studier

The master degree in applied ecology qualifies the student to:

- Work as a research assistant, for instance with environmental impact assessment or wildlife- and habitat monitoring
- Work in decision making in private and public wildlife management at all levels from licensees, local authorities and ministries.
- Work at educational institutions. Additional pedagogic background may be needed dependent on institutional requirements
- Enter a PhD-program in biology or likewise for a further career in Research

Opptakskrav og rangering

Requirements for admission

To enter the programme, students are required to confirm the achievement of either:

- A Norwegian bachelor degree, or an education recognized as being equivalent to a Norwegian bachelor degree
- An education recognized as three years of higher education in Norway
- Education approved as equivalent to the above-mentioned degrees according to university law § 3-4.

Students must have achieved an average weighted (ECTS credits) mark of at least C for the bachelor study or equivalent education. In cases where all or parts of the programme were approved with the use of the marks Pass / Fail, the applicants are admitted after individual assessment.

The degree from higher education has to include the equivalent of at least 80 ECTS credits of the following subjects:

- Minimum 7.5 ECTS-credit equivalents in statistics or similar topics
- Minimum 72.5 ECTS-credit equivalents in ecology, biology, zoology, botany, evolution, wildlife biology, environmental sciences, or other relevant topics

The study may be limited to a certain number of students decided yearly. In this case the ranking of students will follow the average weighted (ECTS credits) marks from their degree in higher education.

English language requirements:

All non-native English speakers must provide official documentation of English language proficiency at a high level.

We require one of the following English language tests with a minimum of the following scores:

- Toefl internet based: 80
- Toefl paper based: 550
- IELTS: 6

No exceptions are made to this requirement. Scores lower than 550/80 (TOEFL) or 6.0 (IELTS) will not be accepted. The TOIC test will not accepted.

Arbeids- og undervisningsformer

Lectures followed by practical exercises both in the field and in the computer-lab. There will also be extensive use of seminars by student presentations and discussions as well as presentations by invited external Professionals.

Praksis

Vurderingsformer

See description of courses below.

Forskningsbasert undervisning

Internasjonalisering

The master in applied ecology is taught in English. This to allow for international applicants, and to create an international student environment that will improve the quality of the study, not least through discussions of various 'schools' in ecology and human attitudes. We will encourage and make allowances for students who wish to study abroad for part of their degree. Such an international stay is recommended to take place during the second and/or third semester of the study depending on the courses the student may achieve abroad. In addition, we will accept qualified external supervisors of the master thesis from international universities and university colleges. Hence, an international stay may be used to carry out part of the master thesis.

Hedmark University of Applied Sciences has several international agreements of collaboration. Specific to the Faculty of Applied Ecology and Agricultural Sciences, there are active student exchange programs with many partners in Nordic and Baltic countries through the network Nordnatur (www.nordnatur.net), in most European countries through Erasmus agreements, and in North-America, Africa (Tanzania, Namibia, Zambia, South Africa) and Asia (Nepal, India) through bilateral agreements.

Studiets oppbygging og innhold

Kull

2011/2012

Courses

Emnekode	Emnets navn	S.poeng	O/V *)	Studiepoeng pr. semester			
				S1(H)	S2(V)	S3(H)	S4(V)
6EV310	Concepts in ecology	7,5	O	7,5			
6EV320	Human impacts on ecological systems	15	O	15			
6EV311	Study design and statistical modelling	7,5	O	7,5			
6EV322	Human dimension in ecosystem management	7,5	O		7,5		
6EV325	Topics in applied ecology	7,5	O			7,5	
6EV399	Master thesis in applied ecology	60	O				60
6EV328	Population monitoring using Distance sampling	2,5	V				2,5
6EV321	Advanced statistical modelling	2,5	V			2,5	
6EV323	Multivariate statistics in community ecology	2,5	V				2,5
6EV327	Population monitoring using Capture Mark Recapture	2,5	V				2,5
6EV324	Analysis of spatial animal data	2,5	V				2,5
6EV315	Chemical and physical capture of Scandinavian Mammals	2,5	V				2,5
6EV314	Population monitoring using radiotracking	2,5	V				2,5
6EV332	Specialisation in applied ecology	5	V				
6EV333	Specialisation in applied ecology	2,5	V				
6EV331	Specialisation in applied ecology	7,5	V				
			Sum:	0	0	0	0

*) O - Obligatorisk emne, V - Valgbare emne

Emneoversikt

6EV310 Concepts in ecology

Emnekode: 6EV310

Studiepoeng: 7,5

Semester

Høst
1

Språk

English

Krav til forkunnskaper

None

Læringsutbytte

A student with fulfilled qualifications will have the following learning outcome:

Knowledge:

Student

- has a broad understanding of central concepts in ecological theory, with emphasis on evolution, behavioural ecology, population biology and community ecology.

Skills:

Student

- is familiar with the process of reading, understanding and writing scientific literature.

General **competence:**

Student

- is able to evaluate ecological research.
- is able to communicate and participate in discussions on the application of ecological theory in practical conservation and management.

Innhold

Central topics in ecological theory, with focus on evolution, behavioural ecology, population biology and community ecology. Extensive training in analyzing research publications and reports, and critically reviewing the aim, methods and conclusions. Thereby learning the process of scientific writing. The students will be introduced to study design and learn how to analyse and discuss data from ecological studies by producing two shared reports with the course in Study design and statistical modelling. This course establishes the basis needed for the subsequent course Human impacts on ecological systems.

Arbeids- og undervisningsformer

Lectures, seminars and exercises. Some exercises will be given in combination with the course Study design and statistical modelling. The introduction and discussion part of these reports from these exercises counts for the course Consepts in ecology. The methods and results counts for the course Study design and statistical modelling. Seminars will include presentations and discussions by student groups.

Eksamen

- Two written reports (count 20% each)
- Individual written exam (60%).

Grading according to ECTS-system on scale A-E for passed and F for failed. Both exams must be passed in order to pass the course.

Ansvarlig fakultet

Avdeling for anvendt økologi og landbruksfag

6EV320 Human impacts on ecological systems

Emnekode: 6EV320

Studiepoeng: 15

Semester

Høst
2

Språk

English

Krav til forkunnskaper

The following courses of the master in applied ecology or equivalent courses from other universities: Concepts in ecology; Study design and statistical modelling

Læringsutbytte

A student with fulfilled qualifications will have the following learning outcome:

Knowledge:

Student

- has a broad understanding of how humans modify ecological systems including impacts on animal populations, communities, ecosystems, and landscapes. Students will also gain an understanding of global change and how it may impact ecological systems

Skills:

Student

- is able to present and discuss current issues of applied ecology

General competence:

Student

- has an in-depth understanding of the role of humans in ecosystem dynamics
- is familiar with key terms of conservation biology and natural resource management

Innhold

Applying basic theory to the conservation and management of ecological systems. Students will gain additional exposure to reading and understanding scientific articles and scientific writing. The students will gain additional exposure to study design, data analysis and interpretation with a focus on applied ecology.

Arbeids- og undervisningsformer

Lectures, seminars, and computer exercises. Seminars will include presentations and discussions by student groups and outside speakers.

Obligatoriske krav som må være godkjent før eksamen kan avlegges

Portfolio including oral presentation and written reports

Eksamen

Written exam - 5 hours.

Grading according to ECTS-system on scale A-E for passed and F for failed.

Ansvarlig fakultet

Avdeling for anvendt økologi og landbruksfag

6EV311 Study design and statistical modelling

Emnekode: 6EV311

Studiepoeng: 7,5

Semester

Høst
1

Språk

English

Krav til forkunnskaper

None

Læringsutbytte

A student with fulfilled qualifications will have the following learning outcome:

Knowledge:

Student

- has a good understanding of basic statistical concepts and terminology.

Skills:

Student

- can apply statistical models in ecology and interpret model outcomes and predictions.
- is able to present statistical results in scientific publications.

General **competence:**

Student

- is familiar with the use and limitations of statistics in ecology.

Innhold

The course starts with basic statistics and progresses towards (more) advanced concepts and methods in statistical modelling.

The following topics are covered:

- Basic statistical concepts and terminology (sampling, variation, probability, modelling, inference etc.)
- Descriptive and exploratory data analysis (data manipulation, graphics, use of the R environment etc.)
- Basics of study design and connexion with statistical modelling.
- Null Hypothesis Scientific Testing
- Presentation of statitical results
- More advanced concepts used in modern statistics (e.g., parsimony, likelihood, model selection)
- Linear and Generalized Linear Models (as the foundation for many statistical methods used in ecology)

Arbeids- og undervisningsformer

Lectures and exercises / assignments

Obligatoriske krav som må være godkjent før eksamen kan avlegges

Complete additional exercises

Eksamen

- Assessment of a portfolio including two written reports and one exercise (45%).
- Oral exam (55%).

Grading according to ECTS-system on scale A-E for passed and F for failed. Both exams must be passed in order to pass the course.

Ansvarlig fakultet

Avdeling for anvendt økologi og landbruksfag

6EV322 Human dimension in ecosystem management

Emnekode: 6EV322

Studiepoeng: 7,5

Semester

Vår

Språk

English

Krav til forkunnskaper

The following courses of the master in applied ecology or equivalent courses from other universities: Concepts in ecology; Human impacts on ecological systems; Study design and statistical modelling

Læringsutbytte

A student with fulfilled qualifications will have the following learning outcome:

Knowledge:

Student

- understands general concepts in human dimensions, such as values, attitudes, norms and behaviour
- has an understanding of different management systems, their ability to include interest goups, and their adaptiveness through a formal or informal learning process
- is acqauinted with basic principles of risk assessment and conflict resolution in natural resource management

Skills:

Student

- is able to construct and analyse questionnaires including the use of Likert scales
- knows when to use alternatives to questionnaires
- is able to read and summarize scientific literature on natural resource management focusing on other disciplines than ecology

General competence:

Student

- is able to set up interdisciplinary groups to develop management strategies, and understand the most important pitfalls in such a process
- uses knowledge of attitudes and norms to advise on strategies for management implementation and conflict avoidance
- is able to use information, communication and education to increase support for management decisions

Innhold

Human values, attitudes and norms. The use and misuse of questionnaires, incl. the snowball method. Different management concepts, their pros and cons. Adaptive management, Threshold Management, Integrated management, Ecosystem management. Decision analysis, conflicts, winners and losers.

Arbeids- og undervisningsformer

Lectures, seminars, computer labs and excursions

Obligatoriske krav som må være godkjent før eksamen kan avlegges

Minimum attendance at 2/3 of seminars + excursions.

Eksamen

One written report on the construction, data collection and analysis of a questionnaire.

A final written exam with both shorter questions and an essay assignment.

The report and the written exam will be weighed together.

Grading according to ECTS-system on scale A-E for passed and F for failed.

Both exams must be passed in order to pass the course.

Ansvarlig fakultet

Avdeling for anvendt økologi og landbruksfag

6EV325 Topics in applied ecology

Emnekode: 6EV325

Studiepoeng: 7,5

Semester

Høst

Språk

English

Krav til forkunnskaper

The following courses of the master in applied ecology or equivalent courses from other universities:

Læringsutbytte

A candidate with fulfilled qualifications will have the following learning outcome:
Knowledge:
To gain updated knowledge with regard to current topics in applied ecology, and better understand
what kind of scientific evaluations that can be used to describe a given article with regard to quality.
Skills:
Students will gain experience in presenting and criticising (and arguing in open debates) published
literature in the field of applied ecology as if they were acting as referees in a scientific journal.
General competence:
The idea is that students should gain a better understaning of what measures one can use for evaluating

scientific quality – both orally and written. Also, students will obtain competence in communication
and participation in discussions related to scientific publications in relevant fields.

Innhold

Recent international publications in the following four topics of applied ecology: (i) The ecological effects of human impact in nature; (ii) The ecological effects of remedial actions; (iii)
Sustainable utilisation of natural resources; and, (iv) Wildlife and habitat monitoring. (V)) Related and
informative DNA methods.

Arbeids- og undervisningsformer

Seminars with students presenting, criticising and discussing scientific papers.

Obligatoriske krav som må være godkjent før eksamen kan avlegges

- Be present on at least 80% of the seminars
- Presenting and functioning as a referee of one or more publications throughout the seminar 2 / 2 series
- Active participation in discussion of papers presented by other students in the whole seminar series.

Eksamen

Oral exam

Ansvarlig fakultet

Avdeling for anvendt økologi og landbruksfag

6EV399 Master thesis in applied ecology

Emnekode: 6EV399

Studiepoeng: 60

Semester

Vår / Høst / Vår

Språk

English

Krav til forkunnskaper

Required prerequisites: 6EV310 Concepts in ecology, 6EV311 Study design and statistical modelling, 6EV320 Human impacts on ecological systems or equivalent courses on master level from other universities must be passed before the candidate can sign the contract for the master thesis with the supervisor.

Læringsutbytte

Learning outcomes

A student with fulfilled qualifications will have the following learning outcome:

Knowledge:

Student

- has advanced knowledge on the theories, methods and research as well as extensive knowledge on the most updated scientific literature within a specific topic in applied ecology chosen by the student

Skills:

Student

- can plan and design scientific activities, and collect and analyze data for scientific research
- can analyze and deal critically with various sources of information and use them to structure and formulate arguments
- can carry out an independent research or development project of considerable size
- can present the results from own research in a scientific community.

General competence:

Student

- can communicate own scientific research as well as other important research findings from peer-reviewed publications to researchers as well as to students, stakeholders and the general public
- can analyze and discuss relevant research ethical problems

Innhold

Course content

The thesis is an independent scientific investigation into a topic within the broad concept of applied ecology. The thesis will be in the form and structure of a manuscript intended to be submitted to an international scientific journal. It is preferably written in English, but any Scandinavian language is accepted.

Arbeids- og undervisningsformer

Teaching and working methods

Organization and methods of instructionIndependent work by the student under the supervision of a professional in the Field.

Obligatoriske krav som må være godkjent før eksamen kan avlegges

Coursework requirements

Oral presentation of the research project to peers and scientific staff.

Eksamen

Examination

One grade for the written thesis, adjusted by an oral presentation and a closed defense after thesis submission.

Grading according to ECTS-system on scale A–E for passed, and F for failed.

Ansvarlig fakultet

Fakultet for anvendt økologi, landbruksfag og bioteknologi

6EV328 Population monitoring using Distance sampling

Emnekode: 6EV328

Studiepoeng: 2,5

Semester

Vår

Språk

English

Krav til forkunnskaper

The following courses of the master in applied ecology or equivalent courses from other universities: Concepts in ecology; Study design and statistical modelling.

Læringsutbytte

A candidate with fulfilled qualifications will have the following learning outcome:
Knowledge:
The student knows the applications and limitations of the distance sampling method.
Skills:
The student can design and apply a monitoring study based on distance sampling. The student is able to process collected data in the software DISTANCE, and to interpret the results.
General competence:
The student has a good understanding of population monitoring.

Innhold

The course will start with an introduction to wildlife population assessment methods, and demonstration of how line and point transect methods is generalizations of sample count methods (strip counts and point counts respectively). The underlying theory and assumptions of both line and point transect sampling will be covered, and the relative merits of the two approaches in different circumstances discussed. The course will contain one day with exercise in the field to collect data than then will be analysed during the start of the course. Good survey design is an essential ingredient of a successful survey so design issues and field methods will be covered in detail. More complex issues will be addressed after the introduction to distance sampling. Special methods are required to avoid size bias when animals occur in clusters and methods for adjusting for this bias will be given. Other parts of the course will cover how and when to use stratification to improve the precision of estimates when animal abundance, detection probability or clustering varies over time or space will be covered and how to incorporating covariates in detection function modelling.

Arbeids- og undervisningsformer

Class will be taught using lectures and discussion with and computer lab exercises involving analysis of actual and simulated datasets. One half day in the beginning of the course will be collecting data during an exercise in the field.

Obligatoriske krav som må være godkjent før eksamen kan avlegges

Two lab exercises and one written final report.

Eksamen

- Lab exercises (20%)
- Final report (80%)

Grading according to ECTS-system on scale A-E for passed and F for failed.

Ansvarlig fakultet

Avdeling for anvendt økologi og landbruksfag

6EV321 Advanced statistical modelling

Emnekode: 6EV321

Studiepoeng: 2,5

Semester

Høst

Språk

English

Krav til forkunnskaper

The following course of the master in applied ecology or equivalent courses from other universities: Study design and statistical modelling

Læringsutbytte

A student with fulfilled qualifications will have the following learning outcome:

Knowledge:

Student

- has a good understanding of statistical modeling approaches and tools which are widely used in Ecology

Skills:

Student

- can apply advanced statistical models in ecology and interpret model outcomes and predictions

General **competence:**

Student

- is familiar with the use and limitations of statistical models in ecology

Innhold

- Review of Generalized Linear Models
- Overdispersion,
- Zero-truncated and zero-inflated models
- Generalized Additive Models
- Mixed Models and Hierarchical modelling

Arbeids- og undervisningsformer

Lectures and practical exercises

Obligatoriske krav som må være godkjent før eksamen kan avlegges

Lectures and practical exercises

Eksamen

Individual report

Grading according to ECTS-system on scale A-E for passed and F for failed.

Ansvarlig fakultet

Avdeling for anvendt økologi og landbruksfag

6EV323 Multivariate statistics in community ecology

Emnekode: 6EV323

Studiepoeng: 2,5

Semester

Vår

Språk

Norsk

Krav til forkunnskaper

The following courses of the master in applied ecology or equivalent courses from other universities: Concepts in ecology; Study design and statistical modelling.

Læringsutbytte

A student with fulfilled qualifications will have the following learning outcome:

Knowledge:

Student

- has in-depth knowledge of the advantages and limitations of the main multivariate methods used in ecology

Skills:

Student

- has a basic knowledge on the application and interpretation of different ordination and classification methods to ecological data, using the R environment

General competence:

Student

- knows how to carry out multivariate data analysis to describe ecological communities and their relations to environmental predictors

Innhold

The course provides an introduction to the use of multivariate statistics in ecology and to the main analytical methods such as ordination, cluster analysis or classification. The course starts with some theoretical background but then focuses on the analysis and interpretation of multivariate ecological data using the R environment.

Arbeids- og undervisningsformer

Lectures and practical exercises using R.

Obligatoriske krav som må være godkjent før eksamen kan avlegges

Participation in introductory lectures, presentation (oral and written) of a report.

Eksamen

Individual report

Grading according to ECTS-system on scale A-E for passed and F for failed

Ansvarlig fakultet

Avdeling for lærerutdanning og naturvitenskap

6EV327 Population monitoring using Capture Mark Recapture

Emnekode: 6EV327

Studiepoeng: 2,5

Semester

Vår

Språk

English

Krav til forkunnskaper

The following courses of the master in applied ecology or equivalent courses from other universities: Concepts in ecology; Study design and statistical modelling.

Læringsutbytte

A student with fulfilled qualifications will have the following learning outcome:

Knowledge:

Student

- knows the applications and limitations of the monitoring method Capture Mark Recapture

Skills:

Student

- can design and apply a monitoring study based on Capture Mark Recapture
- is able to process collected data in the software MARK, and to interpret the results

General competence:

Student

- has a good understanding of population monitoring

Innhold

The course will give an introduction to different methods to estimate population densities, survival and reporoduction.

It will focus on the method Capture Mark Recapture and introduce students to the software package MARK as well as similar solutions in R.

Arbeids- og undervisningsformer

Lectures, practical exercises

Obligatoriske krav som må være godkjent før eksamen kan avlegges

Participation in the lab exercises

Eksamen

One written report

Grading according to ECTS-system on scale A-E for passed and F for failed.

Ansvarlig fakultet

Avdeling for anvendt økologi og landbruksfag

6EV324 Analysis of spatial animal data

Emnekode: 6EV324

Studiepoeng: 2,5

Semester

Vår

Språk

English

Krav til forkunnskaper

The following courses of the master in applied ecology or equivalent courses from other universities: Population monitoring using radiotracking; Study design and statistical modelling

Læringsutbytte

A student with fulfilled qualifications will have the following learning outcome:

Knowledge:

Student

- has a basic understanding of the application of GIS in wildlife ecology
- has thorough knowledge about the applications and limitations of different home range estimators
- understands the concept of habitat selection and resource selection modelling

Skills:

Student

- can apply different home range estimators

- can extract habitat information from GIS-maps
- is able to conduct resource selection modelling

General competence:

Student

- has a thorough understanding of spatial data and analyses
- can apply simple mixed models in ecology
- can work with advanced spatial analyses in GIS

Innhold

Different analyses methods of spatial point data in GIS and R: movement parameters, home range analyses, resource selection models.

Arbeids- og undervisningsformer

Lectures, computer exercises

Eksamen

Written scientific report

Grading according to ECTS-system on scale A-E for passed and F for failed.

Ansvarlig fakultet

Avdeling for anvendt økologi og landbruksfag

6EV315 Chemical and physical capture of Scandinavian Mammals

Emnekode: 6EV315

Studiepoeng: 2,5

Semester

Vår

Språk

English

Krav til forkunnskaper

None. Masters students will have priority for places in the course although open places can be filled by PhD students. Limited to 15 students.

Læringsutbytte

A student with fulfilled qualifications will have the following learning outcome:

Knowledge:

Student

- has an advanced knowledge and understanding of the types of capture methods used for mammals of the world, with emphasis on Scandinavian species
- has thorough knowledge of the relevant physiology and pharmacology when capturing large mammals
- has thorough knowledge of the factors that must be considered for choosing capture methods, the legal aspects of capturing animals in Scandinavia, response to emergency situations and safety of field workers

Skills:

Student

- can deal critically with various methods for choosing what type of capture methods to implement in common situations in Scandinavia
- is able to perform record-keeping and basic monitoring during anesthesia
- is able to analyze and critically discuss existing theories and dart-projecting systems and under which circumstances particular equipment is preferred
- is able to explain the course of action required for human exposure to capture drugs
- can carry out an independent limited research project under supervision with applicable norms for research ethics

General competence:

Student

- has acquired the ability to safely participate in captures, evaluate methods used and to discuss the advantages and disadvantages of different types of captures
- can analyze relevant academic professional and research ethical problems
- can communicate extensive independent work on master language and terminology of chemical and physical capture of large mammals in Scandinavia

Innhold

Physiology and pharmacology as relevant for wildlife captures, drugs used for wildlife capture, anesthesia monitoring techniques and dealing with common emergencies, principles of physical restraint, safety for capture personnel, important diseases and short and long term concerns related to capture.

Arbeids- og undervisningsformer

Lectures, seminars and exercises. Generally lectures will be in the morning, with practical sessions in the afternoon

Obligatoriske krav som må være godkjent før eksamen kan avlegges

Practical exercises have required attendance (alternatives are possible if agreed on before the exercises). Some exercises may require attendance at the relevant lectures before participating.

Eksamen

Individual written exam (2 hrs)
Grading according to ECTS-system on scale A-E for passed and F for failed.

Ansvarlig fakultet

Avdeling for anvendt økologi og landbruksfag

6EV314 Population monitoring using radiotracking

Emnekode: 6EV314

Studiepoeng: 2,5

Semester

Vår

Språk

English

Krav til forkunnskaper

None

Læringsutbytte

A student with fulfilled qualifications will have the following learning outcome:

Knowledge:

Student

- has thorough knowledge of the application, possibilities and limitations of the most commonly used radiotags and biosensors in wildlife research
- is acquainted with the procedures and permissons used to apply radiotags to wildlife
- knows the most important geographic projections and coordinate systems

Skills:

Student

- can apply triangulation in the field to track VHF-tags
- is able to set up and organize databases to store location data
- can organize and analyse radiotracking and GPS-data using database and statistics programs

General competence:

Student

- is aware of the animal welfare law applied to wildlife monitored with radiotags
- has an in-depth insight into different tracking methods and the advantages and disadvantages of these methods
- has some basic understanding of spatial data and their applications in applied ecology

Innhold

Radiotracking techniques and applications, design of radiotelemetry studies, laws and permits needed, animal welfare, radiotelemetry in practice, triangulation, GPS use and GPS measurement errors, storage and management of spatial data in databases, organisation and visualization of radiotelemetry data in Excel, basic movement analyses.

Arbeids- og undervisningsformer

Lectures, field tests, seminars

Obligatoriske krav som må være godkjent før eksamen kan avlegges

Oral presentation

Eksamen

Written scientific report.

Grading according to ECTS-system on scale A-E for passed and F for failed.

Ansvarlig fakultet

Avdeling for anvendt økologi og landbruksfag

6EV332 Specialisation in applied ecology

Emnekode: 6EV332

Studiepoeng: 5

Semester

Høst / Vår

Språk

English

Krav til forkunnskaper

The following courses of the master in applied ecology or equivalent courses from other universities: Concepts in ecology; Human impact in ecological systems.

Læringsutbytte

A student with fulfilled qualifications will have the following learning outcome:

Knowledge:

Student

- has an in-depth understanding of a selected topic in applied ecology

Skills:

Student

- is able to read and critically evaluate scientific publications concerning the specialisation topic
- can apply this knowledge to other ecological or societal systems

General competence:

Student

- can discuss recent challenges of human impacts on ecological systems based on a profound knowledge in applied ecology

Innhold

Individual readings as agreed by the student and the supervisor of the master thesis consisting of 300-600 pages depending on the nature of the readings (less pages for very technical chapters and/or scientific publications than for general book chapters)

Arbeids- og undervisningsformer

Individual readings.

Obligatoriske krav som må være godkjent før eksamen kan avlegges

None

Eksamen

Oral exam

Grading according to ECTS-system on scale A-E for passed and F for failed.

Ansvarlig fakultet

Avdeling for anvendt økologi og landbruksfag

6EV333 Specialisation in applied ecology

Emnekode: 6EV333

Studiepoeng: 2,5

Semester

Høst / Vår

Språk

English

Krav til forkunnskaper

The following courses of the master in applied ecology or equivalent courses from other universities: Concepts in ecology; Human impact in ecological systems.

Læringsutbytte

A student with fulfilled qualifications will have the following learning outcome:

Knowledge:

Student

- has an in-depth understanding of a selected topic in applied ecology

Skills:

Student

- is able to read and critically evaluate scientific publications concerning the specialisation topic
- can apply this knowledge to other ecological or societal systems

General competence:

Student

- can discuss recent challenges of human impacts on ecological systems based on a profound knowledge in applied ecology

Innhold

Individual readings as agreed by the student and the supervisor of the master thesis consisting of 150-300 pages depending on the nature of the readings (less pages for very technical chapters and/or scientific publications than for general book chapters)

Arbeids- og undervisningsformer

Individual readings.

Obligatoriske krav som må være godkjent før eksamen kan avlegges

None

Eksamen

Oral exam

Grading according to ECTS-system on scale A-E for passed and F for failed.

Ansvarlig fakultet

Avdeling for anvendt økologi og landbruksfag

6EV331 Specialisation in applied ecology

Emnekode: 6EV331

Studiepoeng: 7,5

Semester

Høst / Vår

Språk

English

Krav til forkunnskaper

The following courses of the master in applied ecology or equivalent courses from other universities: Concepts in ecology; Human impact in ecological systems.

Læringsutbytte

A student with fulfilled qualifications will have the following learning outcome:

Knowledge:

Student

- has an in-depth understanding of a selected topic in applied ecology

Skills:

Student

- is able to read and critically evaluate scientific publications concerning the specialisation topic
- can apply this knowledge to other ecological or societal systems

General competence:

Student

- can discuss recent challenges of human impacts on ecological systems based on a profound knowledge in applied ecology

Innhold

Individual readings as agreed by the student and the supervisor of the master thesis consisting of 450-900 pages depending on the nature of the readings (less pages for very technical chapters and/or scientific publications than for general book chapters)

Arbeids- og undervisningsformer

Individual readings.

Obligatoriske krav som må være godkjent før eksamen kan avlegges

None.

Eksamen

Oral exam

Grading according to ECTS-system on scale A-E for passed and F for failed.

Ansvarlig fakultet

Avdeling for anvendt økologi og landbruksfag