Høgskolen i Innlandet

Studieplan 2019/2020

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 30 ECTS credits of compulsory and 30 ECTS credits of optional courses. The choice of the topic for the master thesis and choice of optional courses determines the specialization within applied ecology as:

- forestry
- fish- and wildlife management
- conservation biology.

Bakgrunn for studiet

Background

Through evolutionary time species have gone extinct, sometimes in the form of mass extinctions. 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.

The management of our ecosystems to halt the loss of biodiversity and to handle climate change is a major task regionally, nationally and internationally. In the present program we will focus on the biological processes, on management, and on the scientific tools needed to understand and acquire knowledge about sustainable

development of ecosystems. We aim at providing 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.

In this program Applied Ecology means sustainable production, use and management of biological resources (mainly wildlife, fish, forest. cultivated plants and livestock). '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, analyze and present results from ecological studies with management applications. The 'applied' perspective also requires knowledge of the human dimension in nature resource management which 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 biological resources. The last decade there has been a strong focus on bioeconomies worldwide. Bioeconomy is based on biomass and its conversion to food, feed, fibre, bio-based products and bio-energy. This is the main strategy to covert from fossil fuel to biological resources to halt climate change. However, increased demands for biomass will require more intensive production of biomass which will compete for biodiversity. Hence, future sustainable development will require an optimization of the trade-off between the bioeconomy and biodiversity. To manage this huge challenge needs the application of sound ecological knowledge.

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 management in an international setting.

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 will obtain the following learning outcomes:

Knowledge

The candidate:

- 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
- is able to critically acquire information and be critical of the sources referred to

Skills

the candidate:

- 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 relevant scientific methods of study design, statistical modeling, scientific technologies to solve scientific or management problems

Competence

the candidate:

- is able to design and carry out 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 with an average weighted (ECTS credits) mark of at least C
- 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.

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

- Minimum 4 ECTS-credit equivalents in statistics or similar topics
- Minimum 76 ECTS-credit equivalents in ecology, forestry, biology, zoology, botany, evolution, wildlife biology, environmental sciences, additional statistics or other relevant topics

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 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

Applicants must document their proficiency in English at a certain level.

The English language requirements applies to all except applicants native to UK, Canada, Ireland, New Zealand, Australia or the nordic countries, who do not require to document any language proficiency.

You will find the list of accepted courses and minimum scores accepted here.

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.

Inland Norway University of Applied Sciences has several international agreements of collaboration. Specific to the Faculty of Applied Ecology, Agricultural Sciences and Biotechnology, 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

2019

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
6EV316	Tropical wildlife - ecology, managemnet and utilisation	7,5	V				2,5
6EV328	Population monitoring using Distance sampling	2,5	V				2,5
6EV324	Analysis of spatial animal data	2,5	V				2,5
6EV323	Multivariate statistics in community ecology	2,5	V				2,5
6EV315	Chemical and physical capture of Scandinavian Mammals	2,5	V				2,5
6EV327	Population monitoring using Capture Mark Recapture	2,5	V				2,5
6EV321	Advanced statistical modelling	2,5	V			2,5	
6EV333	Specialisation in applied ecology	2,5	V				
6EV332	Specialisation in applied ecology	5	V				
6EV331	Specialisation in applied ecology	7,5	V				
			Sum:	0	0	0	0

*) O - Obligatorisk emne, V - Valgbare emne

Courses forestry

Emnekode	Emnets navn	S.poeng	O/V *)	Studiepoeng pr. semester			
				S1(H)	S2(V)	S3(H)	S4(V)
MAOK4115	Forest inventory and modeling	7,5	O		7,5		
MAOK4116	International Forest Policy and Economics	7,5	O		7,5		
6EV310	Concepts in ecology	7,5	O	7,5			
6EV311	Study design and statistical modelling	7,5	O	7,5			
6EV320	Human impacts on ecological systems	15	O	7,5			
6EV325	Topics in applied ecology	7,5	O	7,5			
6EV399	Master thesis in applied ecology	60	O				
			Sum:	0	0	0	0

*) O - Obligatorisk emne, V - Valgbare emne

Emneoversikt

6EV310 Concepts in ecology

Emnekode: 6EV310

Studiepoeng: 7,5

Semester

Høst
Block 1

Språk

English

Krav til forkunnskaper

Required prerequisites: None

Læringsutbytte

Learning outcomes

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

Course content

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

Teaching and working methods

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

Examination

- 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

Fakultet for anvendt økologi, landbruksfag og bioteknologi

6EV320 Human impacts on ecological systems

Emnekode: 6EV320

Studiepoeng: 15

Semester

Høst
2

Språk

English

Krav til forkunnskaper

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

Læringsutbytte

Learning outcomes

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

Course content

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

Teaching and working methods

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

Coursework requirements

Portfolio including oral presentation and written reports

Eksamen

Examination

Written exam - 4 hours.

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

Ansvarlig fakultet

Fakultet for anvendt økologi, landbruksfag og bioteknologi

6EV311 Study design and statistical modelling

Emnekode: 6EV311

Studiepoeng: 7,5

Semester

Høst
Block 1

Språk

English

Krav til forkunnskaper

Required prerequisites: None

Læringsutbytte

Learning outcomes

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

Course content

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

Teaching and working methods

Lectures and exercises / assignments

Obligatoriske krav som må være godkjent før eksamen kan avlegges

Coursework requirements

Complete additional exercises

Eksamen

Examination

- 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

Fakultet for anvendt økologi, landbruksfag og bioteknologi

6EV322 Human dimension in ecosystem management

Emnekode: 6EV322

Studiepoeng: 7,5

Semester

Vår
Blokk 3

Språk

English

Krav til forkunnskaper

Required prerequisites: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

Learning outcomes

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 behavior.
- has an understanding of different management systems, their ability to include interest groups, and their adaptiveness through a formal or informal learning process

- is acquainted with basic principles of risk assessment and conflict resolution in natural resource management

Skills:

Student

- is able to construct and analyze questionnaires including the use of Likert scales
- knows when to use alternative data collection method other than 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

Course content

Concepts important to human dimension in ecosystem management, such as human values, attitudes, norms, behavior and trust, as well how we can measure them. Heberlein's proposed fixes to environmental problems. The value of social science in nature conservation. Theories of environmental attitudes. Different management concepts, including Adaptive management, Integrated management, and Community-based management. Conflicts, and important aspects therein, such as stakeholders and governance.

Arbeids- og undervisningsformer

Teaching and working methods

Lectures, group work, group presentations, and project work.

Obligatoriske krav som må være godkjent før eksamen kan avlegges

Coursework requirements

- Group presentation on chapters from the course literature.
- One written report on the construction, data collection and analysis of a questionnaire done in groups, with a following group presentation.
- Group presentation of a chosen scientific paper within the field of Human Dimension in Ecosystem Management.

Eksamen

A final written 3 hours exam with both shorter questions and an essay assignment.

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

Ansvarlig fakultet

Fakultet for anvendt økologi, landbruksfag og bioteknologi

6EV325 Topics in applied ecology

Emnekode: 6EV325

Studiepoeng: 7,5

Semester

Høst

Språk

English

Krav til forkunnskaper

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

Læringsutbytte

Learning outcomes

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

Knowledge:

Studetnt

- knows how to gain updated knowledge with regard to current topics in applied ecology
- understands what kind of scientific evaluations that can be used to describe a given article with regard to quality

Skills:

Student

- is able to present and criticize (and argue in open debates) published literature in the field of applied ecology as if they were acting as referees in a scientific journal

General competence:

Student

- has an in-depth understanding of what measures one can use for evaluating scientific quality – both orally and written
- has competence in communication and participation in discussions related to scientific publications in relevant fields

Innhold

Course content

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; (iv) Wildlife and habitat monitoring; (v) Related and informative DNA methods.

Arbeids- og undervisningsformer

Teaching and working methods

Seminars with students presenting, criticising and discussing scientific papers.

Obligatoriske krav som må være godkjent før eksamen kan avlegges

Coursework requirements

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

Eksamen

Examination

Oral exam

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

Ansvarlig fakultet

Fakultet for anvendt økologi, landbruksfag og bioteknologi

6EV399 Master thesis in applied ecology

Emnekode: 6EV399

Studiepoeng: 60

Semester

Høst /Vår/ Høst

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

Assessment

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

6EV316 Tropical wildlife - ecology, managemnet and utilisation

Emnekode: 6EV316

Studiepoeng: 7,5

Semester

Vår

Språk

English

Krav til forkunnskaper

Required prerequisites: None

Læringsutbytte

Learning outcomes

A candidate with fulfilled qualifications will have the following learning outcome:
Knowledge: The student knows and understands the most important principles and theories on the ecology of tropical mammals with different functional traits, their interactions with each other and with food resources and constraints, and how this knowledge can be used in management, mitigation of conflict and for sustainable consumptive and non-consumptive utilisation. Skills: The student is familiar with some basic methods of ecological studies of tropical wildlife. General competence: The student has a basic competence in using knowledge on ecology of tropical wildlife in management, mitigation of conflict and for sustainable consumptive and non-consumptive utilisation.

Innhold

Course content

Functional properties of tropical large mammals with emphasis on African species, general theories and hypotheses on the significance of such properties for wildlife ecology and for management and utilisation of wildlife.

Arbeids- og undervisningsformer

Teaching and working methods

Lectures and literature seminars at Evenstad; excursion to Tanzania with demonstrations of African wildlife ecology, management and utilization and with data collection for a personal “microproject”; after the excursion writing-up and presentation of the microprojects and a written exam.

Obligatoriske krav som må være godkjent før eksamen kan avlegges

Coursework requirements

Participation in literature seminars and in the excursion.

Eksamen

Examination

- Activities in literature seminars and during the excursion (20%)
- Project report (oral and written) (40%)
- Written exam (40%).

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

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

Læringsutbytte

Learning outcomes

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

Knowledge:

Student

- knows the applications and limitations of the distance sampling method

Skills:

Student

- can design and apply a monitoring study based on distance sampling

- is able to process distance sampling data using the DISTANCE software or the equivalent Distance package, and to interpret the results

General competence:

Student

- has a good understanding of population monitoring

Innhold

Course content

The course starts with an introduction to wildlife population assessment methods, and shows how distance sampling builds upon and generalizes sample count methods.

The course includes a field exercice and covers topics ranging from survey design to data analysis, moving from simple approaches to more complex cases (eg clustering of animals, heterogeneity of detection etc.)

Arbeids- og undervisningsformer

Teaching and working methods

Mixture of lectures and exercises to analyse real and simulated data. Half a day in the beginning of the course will be devoted to a field exercise to collect real data.

Obligatoriske krav som må være godkjent før eksamen kan avlegges

Coursework requirements

Lab exercises

Eksamen

Examination

Final report.

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

Ansvarlig fakultet

Fakultet for anvendt økologi, landbruksfag og bioteknologi

6EV324 Analysis of spatial animal data

Emnekode: 6EV324

Studiepoeng: 2,5

Semester

Vår

Språk

English

Krav til forkunnskaper

Required prerequisites: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

Learning outcomes

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

Course content

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

Arbeids- og undervisningsformer

Teaching and working methods

Lectures, computer exercises

Eksamen

Examination

Written scientific report

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

Ansvarlig fakultet

Fakultet for anvendt økologi, landbruksfag og bioteknologi

6EV323 Multivariate statistics in community ecology

Emnekode: 6EV323

Studiepoeng: 2,5

Semester

Vår

Språk

English

Krav til forkunnskaper

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

Læringsutbytte

Learning outcomes

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

Course content

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

Teaching and working methods

Lectures and practical exercises using R.

Obligatoriske krav som må være godkjent før eksamen kan avlegges

Coursework requirements

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

Eksamen

Examination

Individual report

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

Ansvarlig fakultet

Fakultet for anvendt økologi, landbruksfag og bioteknologi

6EV315 Chemical and physical capture of Scandinavian Mammals

Emnekode: 6EV315

Studiepoeng: 2,5

Semester

Høst

Språk

English

Krav til forkunnskaper

Required prerequisites: 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

Learning outcomes

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

Course content

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

Teaching and working methods

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

Coursework requirements

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

Examination

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

Ansvarlig fakultet

Fakultet for anvendt økologi, landbruksfag og bioteknologi

6EV327 Population monitoring using Capture Mark Recapture

Emnekode: 6EV327

Studiepoeng: 2,5

Semester

Vår

Språk

English

Krav til forkunnskaper

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

Læringsutbytte

Learning outcomes

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

Innhold

Course content

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

Teaching and working methods

Lectures, practical exercises.

Obligatoriske krav som må være godkjent før eksamen kan avlegges

Coursework requirements

Participation in the lab exercises

Eksamen

Examination

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

Ansvarlig fakultet

Fakultet for anvendt økologi, landbruksfag og bioteknologi

6EV321 Advanced statistical modelling

Emnekode: 6EV321

Studiepoeng: 2,5

Semester

Høst

Språk

English

Krav til forkunnskaper

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

Læringsutbytte

Learning outcomes

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

Course content

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

Arbeids- og undervisningsformer

Teaching and working methods

Lectures and practical exercises

Obligatoriske krav som må være godkjent før eksamen kan avlegges

Coursework requirements

One exercice

Eksamen

Examination

Individual report

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

Ansvarlig fakultet

Fakultet for anvendt økologi, landbruksfag og bioteknologi

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

Fakultet for anvendt økologi, landbruksfag og bioteknologi

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

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

MAOK4115 Forest inventory and modeling

Emnekode: MAOK4115

Studiepoeng: 7,5

Semester

Høst
Blokk

Språk

English

Krav til forkunnskaper

None

Læringsutbytte

Learning outcomes

After successful completion of this course, students will have the following learning outcome:

Knowledge:

- Students will have good understanding of forest inventory (measurements, techniques, calculation) and working knowledge of forest growth models.

Skills:

- Students should develop their skills in collection and analysing forest inventory data of various complexity and size (includes use of various measuring equipment)
- Develop skills of incorporating, projecting and analysing datasets using forest

growth and yield models.

General competence:

The student will gain competence in:

- Ability to collect and analyse datasets
- Ability to solve problems independently and in groups
- Professional knowledge useful for carrying out forestry inventory measurements (using equipment)
- Ability to run forest growth/simulation models
- Report writing

Innhold

Course content:

The course begins will layout of forest plots, collection and analysis of data from plots and leads into analysis and projection of collected dataset using forest growth models.

The following contents in the course are covered

- Layout of forest sample plots (Fixed area and point plots)
- Collection and analysing individual tree- and stand level variables of forest (e.g. DBH, height, basal area, volume)
- Forest stand structure and composition, its representation and effects on growth, ingrowth and mortality
- Introduction to different forest simulation model types (empirical, process).
- Set up and functioning of forest growth model: hands on experience on applicability of inventory data in forest growth and yield models.

Arbeids- og undervisningsformer

Lectures, presentation, reports (based on data collection and analysis) and field work (presentation, report and fieldwork is mandatory)

Eksamen

- 2 report writing (40%)
- 2 Quizzes (20%)
- Presentation on selected topic (10%)
- Final written exams (30%)

Each component of the course examination should be passed to qualify for the overall grade.

Ansvarlig fakultet

Fakultet for anvendt økologi, landbruksfag og bioteknologi

MAOK4116 International Forest Policy and Economics

Emnekode: MAOK4116

Studiepoeng: 7,5

Semester

Vår

Språk

English

Krav til forkunnskaper

None

Læringsutbytte

Learning outcomes

The course will give knowledge about international forest policies and economics, related to forestry/wood production and forest industries.

Ved bestått emne har studenten oppnådd følgende læringsutbytte:

Knowledge

The student

- Insight into theories and emirical findings of forest owner behavior
- Understand how prices are set in a market and how they are affected by policies
- Understand optimal rotation in forestry, and how this may be affected by external factor
- Has knowledge of the main patterns of forestry and forest industries across the

globe, and with more in-depth knowledge of the boreal forest sector
- Has insight into markets and market forces for wood and wood products, like sawnwood, pulp and paper, bioenergy and new products
- Understand important policies relevant for the forest sector
- Know about ownership types in different countries and parts of the world, and has insight into how that impact the sector
- Know about a wide range of tools for forest sector analyzes

Skills:

Studenten

- Modeling and analyzing forest owner behavior
- Can explain the main patters of the global forest sector
- Can discuss how policies and changes in economic factors may affect the forest sector, competitiveness and ecosystem services
- Can discuss trade-offs and synergies in different ecosystem services
- Has hands-on experience in using some tools for forest sector analyses
- Can discuss, and draw, impacts of policies on markets
- Can calculate optimal rotation in forestry

General competence:

The student

- Can formulate important questions related to the forest sector
- Can discuss a wide range of topics related to the forest sector, written and orally
- Can reflect upon strengths and shortcomings of scientific papers and methods
- Can participate in discussions (defending and opposing) of scientific findings

Innhold

Content

Basic microeconomics will be covered, together with environmental economics and forest and resource economics. Students will learn about the global nature of the forest sector, where international trade is a pillar. Furthermore, students will gain insight into the main value chains in different parts of the world, with emphasis on the boreal

forestry. Forest policies vary widely across countries, and students will understand how they are important for shaping the sector in different countries/parts of the world, the competitiveness as well as other values (ecosystem services). The same is also true for type of ownerships, that varies a lot across countries. Ownership behavior will be covered. The course will also cover the important changes the international forest sector is currently going through, due to shifts in technologies, costs, demand and environmental policies and the society's expectations. Certification systems will be gone through.

Arbeids- og undervisningsformer

- Lectures
- Reading and discussing scientific papers
- Group work

Obligatoriske krav som må være godkjent før eksamen kan avlegges

- Participation in discussions of scientific papers, by presenting and be an opponent to others presenting
- Presence on at least 80% of the seminars
- Term paper
- Assignments

Eksamen

- Term paper (30 %)
- Written final exam (70 %)

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

Ansvarlig fakultet

Fakultet for anvendt økologi, landbruksfag og bioteknologi