



Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

SLUkurs

Syllabus

PFS0164 Ecology for non-ecologists, 5.0 credits

Syllabus approved

2019-07-12

Subjects

Biology

Education cycle

Third cycle

Grading scale

Pass / Failed

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

Language

English

Prior knowledge

Admitted to a postgraduate program. The course is suitable for all graduate students who do not specialize in ecology.

Objective, including learning outcomes

The aim of the course is to introduce basic knowledge on a broad spectrum of ecological concepts, such as resources, competition and trophic interactions, in a

multidisciplinary framework. Furthermore, it introduces the ecological basis for environmental issues and the interconnectedness of human actions and the natural world. Because of the multidisciplinary focus, we will have a large emphasis on applied ecology, and more specifically conservation ecology. The final goal of the course is for the participants to link ecology and ecological processes to their research topic.

Learning outcomes: Upon completion of the course, the student should be able to:

- Apply basic knowledge on a broad spectrum of ecological concepts to their own research
- Describe how natural selection shapes individuals and populations
- Summarize key processes in population ecology
- Outline how communities are intimately linked with the abiotic environment by fluxes of energy and matter
- Demonstrate the different ways through which organisms may interact over resources, and the effects of these interactions
- Understand the importance of direct and indirect effects and distinguish between bottom-up and top-down control of food webs
- Identify a variety of mechanisms through which humans affect the environment
- Compare several conservation ecological paradigms, such as strict protection, conservation through sustainable use, and rewilding
- Evaluate how species traits and environmental factors cause species to be endangered
- Apply theory on ecosystem services to quantify the loss caused by degraded habitats

Content

The course starts with an introduction to ecology and the fundamental understanding of evolution to understand processes at the population, community and ecosystem scale. We will continue with the concept of populations, discussing how the concepts of birth, death and movement shape populations over time. After this, we will scale up to communities and cover the variety of ways through which organisms interact, including: mutualism, competition, facilitation, and predation. We will then continue with the concept of consumer-resource interactions within a food web, working on the concepts of resources, competition and predation. We will explore bottom-up and top-down control in food webs and discuss the concept of trophic cascades. The last fundamental topic in the course are ecosystems, where we will elaborate on how biotic and abiotic aspects jointly shape ecosystems and discuss key aspects of ecosystem theory such as energy fluxes.

After this, we will look at the application of ecology in conservation. We will start with introducing how humans influence the environment, physically as well as chemically (pollution, climate change). We will continue with showing how the field of conservation ecology aims to provide the science to mitigate these negative anthropogenic effects by developing conservation measures based on theoretical understanding of populations, communities and ecosystems. This includes, among other things, use of knowledge of food webs and species interactions to sustainably manage pests and pollutants, and knowledge on population and community ecology to protect and conserve species and their habitats. We will show how conservation ecology has gone through several paradigm shifts and changing approaches towards conservation; strict protection during the early days of conservation, conservation based on sustainable use of resources, including the concept of ecosystem services, and more recently, conservation focused on restoring ecosystems and their functioning such as the concept of rewilding.

Requirements for examination

Marking scale: Passed / Failed

Pass grade requirements: In order to pass this course each participant has to:

- Present the group assignment which will focus on one of the learning outcomes, showing a collective mastering of the learning goal.
- Present an individual essay in which at least three of the following ecological concepts are linked to the PhD research topic of the participant.

Concepts:

Natural selection

Birth and death rate

Energy fluxes

Competition

Facilitation

Predation

Resources

Parasites

Optimal foraging

Trophic cascades

Bottom-up vs top-down control

Human effects on the environment

Strict protection

Conservation through sustainable use

Rewilding

Threats to species
 Ecosystem services
 Science-based conservation

Additional information

Pedagogical form: The course consists of lectures, an interactive group assignment (in pairs or groups of three), an individual essay, and self-study as the course aims at providing theoretical understanding of concepts in ecology and applying these to the participants own research. Flipped classroom will be used to increase participant involvement in the course. The course will also include an excursion to field sites outside of Umeå to see described theory in the field. The gained knowledge will be tested with a presentation of the group assignment and the individual written essay.

Preliminary time schedule:

Day 1: 9:00 – 10:00h Introduction to the course
 10:00 – 12:00h Basic ecology lecture
 13:00 – 15:00h Introduction to group assignment
 15:00 – 16:00h Group discussion on assignment
 Day 2-4: 9:00 – 11:00h Guest lecture on a specific topic
 11:00 – 12:00h Working on group assignment
 13:00 – 15:00h Guest lecture on a specific topic
 15:00 – 16:00h Working on group assignment
 Day 5: 9:00 – 12:00h Introduction to final essay
 13:00 – 16:00h Working on group assignment
 Day 6: 9:00 – 16:00h Excursion to field sites outside of Umeå
 Day 7: 9:00 – 16:00h Working on group assignment
 Day 8: 9:00 – 16:00h Presentation of group assignments as final symposium
 Day 9-17: 9:00 – 16:00h Working on individual essay
 Day 18: 17:00h Deadline for handing in individual essay

The Department reserves the right to cancel the course if there are not more than 5 students who have applied for the course. There is no tuition fee. The student is responsible for any housing and travel costs. Students belonging to the ECOS research school have priority to the course.

Part of research school: ECOS, Ecology & Society
 Education Cycle: Third
 Scope: Basic course, aimed at students with non-ecology background

Location: Umeå

Responsible department

Department of Wildlife, Fish, and Environmental Studies