

WEC 30306

Animal Ecology

Period 6, Academic Year 2023-2024

Contact person

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Animal Ecology (WEC 30306)

Language	English
Credits	6
Period	6, second half
Contact person	Pim van Hooft, pim.vanhooft@wur.nl , ae.wec@wur.nl
Lecturer(s)	Femke Broekhuis Pim van Hooft Frank van Langevelde Janneke Troost
Examiner(s)	Pim van Hooft
Secretariat	Patricia Meijer

Profile of the course

The course will provide a deeper understanding of animal-animal, animal-food and animal-environment interactions at various levels. At the lowest integration level we will deal with the characteristics of food and foragers, especially herbivores with their feeding adaptations. Attention will be paid to the role of body size as an important determinant in many foraging traits. Optimal foraging theory lies at the heart of foraging decisions of animals and therefore ample attention will be given to the factors shaping functional response curves, diet selection, patch choice and habitat selection. Movement ecology deals with searching for resources. Interspecific interactions are thought to play a major role in shaping animal communities and focus will be on competitive, facilitative and predatory interactions. At the highest level of integration, the structure and functioning of animal communities will be discussed. Which factors determine species richness, resource partitioning; space use and activity patterns, what is the role of social interactions, which assembly rules apply? These issues will be addressed during the lectures, practical modelling and field practical.

The main target student groups (restricted optional) are students from MFN and MBI, with other students interested in ecology (e.g., MAS).

Assumed prerequisite knowledge

Plant-animal interactions, Animal-animal interactions, Predator-prey interactions, Animal population dynamics: Ecology I and II (PEN-10503 and PEN-20503), Introduction to Animal Ecology (WEC-21306).

Learning outcomes

After successful completion of this course students are expected to be able to:

- understand the major physiological and behavioural adaptations of animals to search for food and habitat;
- apply current theories about animal-animal, animal-food and animal-habitat interactions at various integration levels;
- analyse and evaluate models of the effect of foraging animals on ecosystem dynamics;
- set up and carry out an experiment to test hypotheses about animal foraging behaviour, analyse the collected data, and present the results.

Course materials and resources

The course Brightspace page will provide:

- All hand-outs of the lectures;
- Live lectures (and recordings the day after);
- Additional literature as background information;
- Explanations, articles and rubrics for the practical modelling and field practical;
- Example questions for the exam.

Educational (=teaching and learning) activities

- Attending lectures
- Carrying out a modelling study on the effect of foraging animals on ecosystem dynamics
- Designing and carrying out a field experiment on foraging behaviour and patch selection by animals
- Analysing data collected during a field practical
- Presentation of results in a scientific paper (practical modelling) and a live presentation (field practical).

Assessment strategy

The final mark is the average of the marks (with equal weight) for

1. Report of peer-reviewed draft paper + report of own model
2. Presentation of the field practical
3. Exam

The minimum mark for each of these three course components = 5.50.

	<i>Exam</i>	<i>Report of practical modelling</i>	<i>Oral presentation field practical</i>
Learning outcomes\where assessed			
1 Student can summarize the major physiological and behavioural adaptations of animals to search for food and habitat.	x	x	x
2 Student can apply current theories about animal-animal, animal-food and animal-habitat interactions at various spatial and temporal scales.	x	x	x
3 Student can set up an experiment to test hypotheses about animal foraging behaviour and analyse and present the collected data.			x
4 Student can analyse and evaluate models of the effect of foraging animals on ecosystem dynamics and write a scientific paper about the findings.		x	
Contribution to mark	33.3%	33.3%	33.3%
Type of questions/examination			
Multiple Choice + open questions	x		
Other criteria (explained during lectures)		x	x
Assessed by			
Frank van Langevelde	x	x	x
Pim van Hooft	x	x	x
Janneke Troost	x	x	x
Femke Broekhuis	x		x
Time Schedule, week nr	3	2	4

- Marks of exam will be available within 4 weeks after the test.
- The assessment of the modelling reports will be presented to the student during the (before) last day of the course.
- Marks of fieldwork presentation will be available within 2 weeks after the presentation.
- The marks of the individual parts will remain valid for 3 academic years.
- Minimum mark of each component (exam, modelling report, fieldwork): 5.50

Course schedule

During the first two weeks, 12 lectures (and some introductory lectures) are scheduled, mostly in the afternoon). On some days in the first and second week there will be a Q&A session on the lectures until then (see schedule). A practical on modelling animal - ecosystem interactions takes part during the first two weeks in the morning. Here students work in small groups of 3. At the end of these two weeks, a report has to be submitted. The last two weeks start with an exam on the lectures, and contain the field practical on foraging ecology, where students work in a group of 6 people on one of the broad topics that follow from the lecture content (and perhaps modelling practical and own inspiration). The groups first write a proposal, and then proceed to collect the data. At the end of these two weeks, collected data is analysed, and a live presentation is given by each group.

The course thus consists of lectures (week 1+2, exam in week 3), a modelling practical (week 1+2), and an ecological field practical (week 3+4), see schedule.

Lectures (of the 2022-2023 academic year; content updates and re-ordering may be possible)

Animal – food interactions

Lecture 1 Digestion & diet
 Lecture 2 Foraging theories & patch selection
 Lecture 3 Body size & resource use
 Lecture 4 Food webs

Animal – animal interactions

Lecture 5 Competition & facilitation
 Lecture 6 Predation

Animal – environment relations

Lecture 7 Activity patterns
 Lecture 8 Adaptation to stress
 Lecture 9 Space use
 Lecture 10 Sociality & group living
 Lecture 11 Species diversity
 Lecture 12 Migration & movement

Each of the lectures is 40 minutes long. Assessment: multiple choice + open questions exam.

Modelling practical

During the modelling practical, students model dynamic interactions between vegetation and animals. Students develop a simulation model for these interactions using the web-based modelling and simulation tool Insight Maker (<https://insightmaker.com/>). The final model is based on the paper of Van Langevelde et al. (Ecology, 2003) "Effects of fire and herbivory on the stability of savanna ecosystems".

- The practical on modelling takes 9 mornings of around 4 hours.
- Students work on campus, in small groups of 3 students.
- Staff provides feed-back on the modelling performance by the small student groups
- Assessment: peer review effort + report on extended dynamic model.

Field practical

During the field practical students will set up an experiment and collect data on the grazing behaviour of (1) cattle and sheep, or (2) snails, to be carried out at the experimental farm Nergena. The focus is on patch selection and feeding behaviour, with the possible inclusion of food attractants or deterrents, personality, movement pattern, and other topics covered in this course (a list of suggestions is provided on Brightspace).

- Staff provide 15 pasture enclosures for livestock (1 per group, holding area and experimental part with 3 different grass heights), or *Helix pomatia/aspersa* snails (around 50 or so per group) on the Nergena experimental farm.
- Other objects may be available in the storage, or could – after discussion and approval, be arranged.
- Students will go through the stages of conducting a research project: literature analysis, frame and design research questions, methodology, fieldwork, data analysis, and presentation of results.
- Students work in groups of 6 individuals.
- Staff assists with the proposal, set-up of the experimental design, and – in as far as possible - with the execution of the field/snail experiment.
- The field practical takes 9 full days of hours (including data analysis and preparing a presentation)
- Assessment: live presentation, presented on campus on the final day of the course.