The Hebrew University of Jerusalem

Syllabus

INSECT ECOLOGY - 71521

Last update 25-12-2023

HU Credits: 3

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Agroecology & Plant Health

Academic year: 0

Semester: 1st Semester

Teaching Languages: English

Campus: Rehovot

Course/Module Coordinator: Moshe Coll

Coordinator Email: moshe.coll@mail.huji.ac.il

Coordinator Office Hours: By appointment

Teaching Staff:

Prof Moshe Coll,
Ms. mai hamburg

Course/Module description:

Introduction to the ecological processes that shape the distribution and abundance of animals, using insects as a model: Insect-plant and predator-prey interactions; competition; population dynamics; behavioral ecology; communities and bio-geography. The course emphasizes the ecological processes in agro-ecosystems, such as plant resistance to insect pests, biological pest control, landscape structure and ecosystem services.

Course/Module aims:

To teach the basic processes that shape the structure and function of ecological systems; Present the principles of hypothesis testing and the scientific method; Practice scientific writing; Demonstrate the importance of ecological principles to processes in agroecosystems.

Learning outcomes - On successful completion of this module, students should be able to:

- *Define different organization levels in ecosystems.*
- *Describe spatial and temporal patterns of interactions in ecological systems.*
- *Distinguish between the structure and function of ecological communities.*
- *Formulate ecological hypotheses.*
- *Carry out a simple experiment to test a hypothesis.*
- *Summarize experimental results in a scientific report.*
- *Contrast ecological processes in managed and unmanaged ecosystems.*

Attendance requirements(%):

100%, excluding drop-add-course period

Teaching arrangement and method of instruction: Lecture, practice

Course/Module Content:

Lesson and Practice Content
1: Introduction – Why ecology of insects? Insects in the ecosystem; the scientific method
Practice 1: Formulation of testable scientific hypotheses
2: Behavioral ecology – foraging, mating systems, sexual selection, parental care
3: Sociality in Insects – degree of sociality, evolution of sociality, kin selection

Practice 2: Estimating population size I – computer simulation: mark-release-recapture
4: Insect-plant interactions I – the plant as an heterogeneous resource, the chemical basis to insect-plant interactions
Practice 3: Estimating population size II – patterns of distribution; computer simulation: sampling
5: Insect-plant interactions II – theories in plant defense, plant adaptation to plant defenses
Practice 4: Developing population sampling protocols
6: Exam – practices 2-4; Insect-plant interactions III – coevolution of insect-plant interactions; induced resistance; host range and speciation; effects of vegetation structure
7: Predator-prey interactions I – prey defense; predator influence on prey distribution
8: Predator-prey interactions II – Functional & Numerical responses; predator-prey dynamics
9: Predator-prey interactions III – Ecological basis for biological control; predation vs. parasitism
10: Demography & population dynamics – rate of population increase, survival curves, life-table analysis, dynamics in time and space, metapopulations.
11: Life history – resource allocation, reproduction, migration, diapause; Competition – ecological niche, mutualism
12: Insect communities – structure and function
13: Complex trophic interactions; Species diversity and insect conservation; insect as providers of ecosystem services
14: Scientific writing
Practice 5: Research methods in insect ecology

Required Reading:
None

Additional Reading Material:
Gutierrez AP. 1996. Applied population ecology: a supply-demand approach. John Wiley & Sons.
Hassell MP. 1978. The dynamics of arthropod predator-prey systems. Monographs in population biology, 13. Princeton University Press.
Huffaker RL & Rabb RL. 1984. Ecological entomology. John Wiley & Sons.
Jolivet P. 1986. Insects and plants: parallel evolution and adaptations. Flora & Fauna Handbook no. 2.
Kogan M. 1986. Ecological theory and integrated pest management practice. John Wiley & Sons.
Miller JR & Miller TA. 1986. Insect-plant interactions. Springer-Verlag.
Price PW. 1975. Evolutionary strategies of parasitic insects and mites. Plenum Press.

Price PW, Denno RF, Eubanks MD, Finke DL & Kaplan I. 2011. Insect Ecology: Behavior, Populations and Communities. Cambridge Univ. Press, Cambridge, UK 801pp.
Schowalter TD. 2006. Insect Ecology: An Ecosystem Approach. 2nd ed. Academic Press.
Speight MR, Hunter M & Watt AD. 1999. Ecology of Insects: Concepts and Applications. Blackwell.
Strong DR, Lawton JH & Southwood R. 1984. Insects on plans: community, patterns and mechanisms. Harvard University Press.
Valery GC, Gradwell GR & Hassell MP. 1975. Insect population ecology: an analytical approach. Blackwell Scientific Pub.

Grading Scheme:

Written / Oral / Practical Exam 25 %
Essay / Project / Final Assignment / Home Exam / Referat 30 %
Active Participation / Team Assignment 5 %
Mid-terms exams 25 %
Personal Guide / Tutor / Team Evaluation 15 %

Additional information:

To receive a passing grade in the course, the student must pass the exams as well as the practice (project & participation).