האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

The Hebrew University of Jerusalem

Syllabus

Evolution Systematics and Ecology of arachnids - 90889

Last update 15-02-2016

HU Credits: *4.5*

Degree/Cycle: *2nd degree (Master)*

Responsible Department: *ecology, evolution & behavior*

Academic year: *0*

Semester: *2nd Semester*

Teaching Languages: *Hebrew*

Campus: *E. Safra*

Course/Module Coordinator: *Dr. Efrat Gavish-Regev*

Coordinator Email: *efrat.gavish-regev@mail.huji.ac.il*

Coordinator Office Hours: *Monday 16:00-17:00*

Teaching Staff:
Dr. Efrat Gavish-Regev
Mr.

Course/Module description:
This course deals with diversification patterns of the different arachnid orders and the current theories of the evolutionary and ecological mechanisms responsible for the development of this diverse class.

Course/Module aims:
1. To become familiar with the arachnid orders, emphasizing orders and families found in Israel.
2. To understand basic concepts in systematics, such as species, diversification, homology, evolutionary relationship, phylogeny.
3. to understand to relationship between function and structure (functional morphology) and its importance to systematics.
4. To become familiar with evolutionary and ecological mechanisms that allows speciation and diversification.
5. To become familiar with the current theories and hypothesis regarding arachnid phylogeny (both molecular and morphological).

Learning outcomes - On successful completion of this module, students should be able to:
During the course, different tools for the study of diversity patterns and processes of speciation will be presented. The students will be acquainted with all arachnid orders and will learn to identify the important orders and families of arachnids. In addition the course will provide basic methodological tools for understanding general evolutionary trends in arachnids and their consequences for functional morphology.

Attendance requirements(%):
100%

Teaching arrangement and method of instruction: Lecture, lab, tutorial, excursion

Course/Module Content:
1) Introduction to Arachnids: differences from other arthropods, Who are the ancestral arachnids? Body plans, feeding, appendages, relatives and common

ancestor hypotheses.
2) Functional morphology, homology, convergent evolution and its importance in systematics and phylogeny.
3) Evolution, phylogeny and monophyly of arachnids based on morphological and molecular data. Different hypotheses regarding internal phylogeny of arachnids. Arachnid orders: morphological, biological and ecological general trends and special characteristics (e.g. venom, silk, parasitism, sociality).
4) Araneae - second place in species richness? diversification hypotheses, special characteristics and ecological, morphological and evolutionary trends (e.g. venom, silk, sociality, reproduction). Who are the ancestral spiders? How many times viscid silk and orb-web evolved? Medical and agricultural significance.
5) Species concepts (e.g. biological, phylogenetic), species as an hypothesis to be tested about evolutionary relationships.
6) Mechanisms of speciation, examples from arachnids: reproductive isolation, biogeography, natural selection, sexual selection. How many arachnids are there? What are the causes for their diversity? Are all arachnid orders divers? General diversification hypotheses.
7) Field excursion at the botanical gardens and identification laboratory - we will see examples that will demonstrate the importance of the relation between morphology and function, the need to delaminate homologies from analogies and synapomorphies from symplesiomorphies and convergent evolution for spider identification.
8) Scorpiones: The ancestors of all arachnids? What can we learn from their body plan? Morphological and ecological trends, biogeography, habitat preferences and medical significance.
9) Sociality in Arachnids.
10) Why some orders are less diverse then others? Minor (by species richness) Arachnid orders (Solifugae, Pseudoscorpiones, Opiliones): morphological and ecological trends, sociality, life forms and special characteristics.
11) Acarina (Acariformes/ mites and Parasitiformes/ ticks) - the most species diverse order of arachnids? Why are they so successful? life forms and feeding (parasitic, carnivores and herbivores). Economical medical and agricultural significance.
12) Field excursion: Habitats and adaptations.
13) Minor (by species richness) Arachnid orders (Amblypygi, Opilioacariformes, Palpigradi, Ricinulei, Schizomida, Uropygi): morphological and ecological trends, sociality, life forms and special characteristics.
14) Agroecology and Biodiversity.

<u>Required Reading:</u>
in the course

<u>Additional Reading Material:</u>
ARACHNIDS -
Jan Beccaloni

Biology of Spiders 3rd Edition - Rainer Foelix

Scorpions of the World - Roland STOCKMANN & Éric YTHIER

Scorpion Biology and Research - Philip Brownell & Gary Polis

Spider Research in the 21st Century: Trends and Perspectives - David Penney (Editor)

Course/Module evaluation:
End of year written/oral examination 50 %
Presentation 0 %
Participation in Tutorials 15 %
Project work 0 %
Assignments 15 %
Reports 20 %
Research project 0 %
Quizzes 0 %
Other 0 %

Additional information:
20% of the grade - based on excursion reports