האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

Syllabus

-Introduction to Biology and Evolution of Organisms - 72128

Last update 04-11-2015

HU Credits: 5

Responsible Department: life sciences

Academic year: 0

Semester: 1st Semester

Teaching Languages: Hebrew

Campus: E. Safra

Course/Module Coordinator: Ariel Chipman

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Coordinator Office Hours: By appointment, Berman 206

Teaching Staff:
Prof
Mr. Moshe Nagari
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Mr.

Course/Module description:
An introductory to the diversity of the animal kingdom and to princiles of organismic biology. The course presents the various taxonomic groups and their characteristics, while using the different groups to demonstrate general principles of organization of the body and its systems. The full course includes a lab module which serves for practical demonstration of principles learned in the lectures.

Course/Module aims:
To give an organismic basis to the study of biology in general. To develop organismioc and evolutionary thinking.

Learning outcomes - On successful completion of this module, students should be able to:
- To identify the main animal taxa at the Phylum and Class levels.
- To predict organismic function based on morphology.
- To place various organisms on teh phylogenetic tree of teh animal kingdom.
- To appreciate the importance of understanding the whole organism in all branches of Life Sciences
- To describe histological sections of different tissues and dissections of select members of different animal taxa.

Attendance requirements(%):
lectures - 75%. Labs 90%

Teaching arrangement and method of instruction: Lectures. Computerized exercises. Practical labs. Lab reports.

Course/Module Content:
Lectures
1) Biological hierarchies. Different levels of complexity in biology. Taxonomic levels and taxonomical nomenclature. Different definitions of species. Genes are involved at different levels of complexity. Evolution acts through changes in genes at different levels.
2) Changes in species: Speciation. Phylogenetic trees structure and meaning. Basic evolutionary terminology: homology, convergence, parallelism, divergence.

3) An introduction to organismic function and basic needs. What systems does an organism need to survive? Unicellular organisms. Multicellularity. Sponges (Porifera). Sexual vs. asexual reproduction. Is sexual reproduction a good idea?
4) Germ layers. Animals with two germ layers (diploblasts). Cnidaria and Ctenophora. Integument – structure and function. Digestive system – structure and function.
5) Solitary vs. colonial organisms. Examples from cnidarians. Sessile vs. sedentary vs. motile organisms.
6) Sensory organs and nervous systems. Cephalization. The evolution of bilateral symmetry and of triploblasty. What is a worm? The Cambrian explosion. The diversity of Bilateria.
7) Progressive evolution vs. secondary simplification. The evolution of parasitism. Platyhelminthes.
8) Respiratory systems and circulatory systems. The importance of being the right size. The coelom as a major support system. Annelida and other worms. Segmentation.
9) Mollusca. Larvae vs. direct development. Life history. Internal and external skeletons. Muscles and movement.
10) Ecdysozoa. Arthropoda. The diversity of arthropods. The evolution of segmentation.
11) The move to terrestrial life. Excretory systems. Insecta – structure, diversity and evolutionary success.
12) Basic principles of embryonic development. Cleavage patterns. Gastrulation patterns. Deuterostomia – major groups and evolution.
13) Body organization in vertebrates. Vertebrate embryology and the transition to the adult body plan. Main body systems in vertebrates.
14) Vertebrate diversity. Vertebrate evolutionary history.

Labs
1) Histology. Use of a light microscope. Epithelia and connective tissues. Muscle types. Compound organs: intestine, skin.
2) Protists: Diversity, structure, behavior.
3) Simple multicellular organisms. Introduction to Porifera. Major groups in Cnidaria. Feeding behavior in Hydra. Cnidarian life cycles.
4) Lophotrochozoa I: Platyhelminthes. Parasitic groups. Regeneration in Planaria.
5) Lophotrochozoa II: Annelida. Mollusca. Earthworm dissection. Snail behavior.
6) Ecdysozoa I: Nematodes, tardigrades. Arthropod diversity.
7) Ecdysozoa II: Insects. Grasshopper dissection.
8) Deuterostomia I: Echinoderms. Fertilization and development in sea urchins.
9) Deuterostomia II: Vertebrates. Dogfish

<u>Required Reading:</u>
Invertebrates – Moore, J, "An Introduction to the invertebrates" 2nd edition (2006)

Life (9) – Sadava, Hillis, Heller & Berenbaum, "Life – The Science of Biology" 9th edition - International (2009)
Additional reading material (in Hebrew) on the course website

Additional Reading Material:
None

Course/Module evaluation:
End of year written/oral examination 50 %
Presentation 0 %
Participation in Tutorials 13 %
Project work 0 %
Assignments 14 %
Reports 13 %
Research project 0 %
Quizzes 10 %
Other 0 %

Additional information:
None