Introduction to Molecular Ecology (2 credits) 1-2-3090
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Course Description:

Molecular Ecology is an emerging area of research that uses molecular genetic technique to investigate ecological processes and interactions. The course aims to demonstrate the power and enormous potential of molecular ecology as a research tool using practical evidence.
The course aims to provide-

1. A background information, central questions of interest and the underlying theory of various molecular ecology approaches.
2. Examples of case studies, including projects carried out in Israel.

The course consists of lectures and students' seminars.

Course structure and grade components:

Lectures are held weekly. Students are asked to present a seminar on concepts and topics studied during the course. Grading will be based on the student seminar (35%); a research proposal, i.e. how one can use molecular techniques in order to gain insights into a specific research question, preferably within the student's research topics (55%); and the student's participation in class (10%).

Topics of Lectures and Seminars:

Introduction: Molecular Genetics in Ecology:
What is molecular ecology? The emergence of molecular ecology; sources of data; an overview of molecular techniques; molecular markers and their modes of inheritance.

Molecular identification:
Species (DNA barcoding), individuals and sex identification using molecular techniques.

Behavioral Ecology:
Why to use molecules to study behavior? How to use molecular-genetic/genomic tools to infer species behavior? Relevant examples are: the inference of mating systems, reproductive success and kinship, foraging (predators and prey, trophic ecology); dispersal; sex-biased dispersal.

Population Genetics:
Genetic diversity of natural populations; population structure; gene flow and migration rate; landscape genetics/genomics.

Molecular and adaptive variation:
Comparison of neutral and adaptive variation; genomics and the study of adaptation.

Genetically-modified organisms:
Effects of GMOs on natural communities.

Environmental DNA:
Tool for genetic/genomic monitoring of wild populations, e.g. the case of the painted frog in the Hula Valley.

Molecular Ecology in the service of conservation:
Monitoring of wild populations (e.g. population size, wildlife diseases); identification of hybrids; conservation units; genetic management of captive populations.

Prerequisite:
A basic course in genetics or Molecular biology.

Relevant textbooks:
Beebee, T. J. C. and G. Rowe. 2008. An introduction to molecular ecology. Oxford University Press, Oxford; New York.
Freeland, J. R., H. Kirk, and S. Petersen. 2011. Molecular ecology. Wiley-Blackwell, Oxford.

Relevant articles will be given during the course.