



Introduction to Ecology

Principles of Ecology and its relation to Human Society

Lecturer: Dr. Elli Groner

1.5 academic hours twice a week, 3 credits Undergraduate

Course purpose

Students will be taught the basic terminology, principles and ideas of ecology. The course will introduce the basic ideas and history of the science, its evolution and links to other sciences. Subsequent lectures will examine these ideas looking at different ecological scales: individuals, populations, communities and ecosystems. Human ecological issues will also be discussed where relevant within the framework of the course, with a special emphasis on ecosystem integrity and ecosystem services. Case studies will be brought from the Arava valley and 2 trips will help study the local region. A Biodiversity project will be done in pairs, teaching students the ability to deal with real data. The students will need to breed plants and beetles to study population tables.

Grade components:

- Attendance, participation, discussions 10%
- Quizzes, exercises, 20%
- Mid-term exam 5%
- Trip reports 5%
- Biodiversity or population project 20%
- Final exam 40%

Reading, assignments, exercises & practical

Q	Reading quizzes	At the beginning of each class a question will be posed based on the reading set for the coming lesson. The reading is required to understand the lesson.
E	Exercise	Homework on the material already taught. This should be done in pairs and submitted the next week. The exercise allows students to practice the material that was taught.
D	Discussion	Discussion in class on the taught topic and human impact upon it
P	Practical	Hands-on demonstration of an example from the taught topic.
BD	Biodiversity project	Done in pairs, submitted as a paper and 10 min talk
MTE	Mid-term exam	Exam in week 6 on material from weeks 1-5
FE	Final exam	Exam on material from all the semester

Textbooks for course

Ecology: Individuals, Populations and Communities / M. **Begon**, J. Harper, C. Townsend. Blackwell Science LTD, Oxford, UK 2nd edition.

Or

Ecology: Concepts and Applications / M. C. **Molles** Jr. 2002. McGraw-Hill Higher Education, NY, USA (2nd edition). Only for UG.

Recommended Reading:

- Evolution - Mark Ridley, Blackwell publishing
- Animal ecology - Charles Elton, new edition, University of Chicago press
- Human ecology – Basic concepts for sustainable development. Gerald G Marten. Earthscan Publishing, 2001.

Schedule:

Lesson 1 - Introduction to ecology,

Ecosystem integrity, ecosystem services, Definition of ecology, the history of ecology, ecology disciplines

Lesson 2 - Behavior – optimal foraging,

The theory of optimal foraging and ideal free distribution. Exercise of optimal foraging and ideal free distribution.

Lesson 3 - Evolution 1,

The mechanism of natural selection, a simulation of predation's effect on selection, how does natural selection work, sexual selection, artificial selection, human evolution

Readings: Pojta & Springer 1998

Lesson 4 - Desert Ecology 1 - The Arava

The theory of desert ecology, The Arava ecology **LTSER – Socio-ecological research at AIES**

Readings: Shanas *et al.* 2011

Lesson 5- Community Ecology 1 biodiversity 1

The biodiversity project explained

Lesson 6 - Acacia trees – Key stone species, population, distribution,

Lesson 7 - Populations 1 Life history

Life history strategies, r and K strategies, reproduction allocation, The trade-off triangle
Cohort life table cadis fly exercise

Lesson 8 - Population growth

The per capita growth rate, the logistic regression equation

Lesson 9 - Conservation ecology of the Arava – Guest lecture: Dr Tal Polak

Lesson 10 - Short field trip: Acacia at our back garden- with Rotem Nelvitsky and Amjad Hijazen

Lesson 11 - Population ecology: Carrying Capacity, population fluctuations, chaos theory, the logistic regression assumptions

Lesson 12, - Distributions

Aggregation and even distribution. The aggregation index, exercise of aggregation

Lesson 13 - Community Ecology 2 biodiversity 2

The ethical importance of biodiversity, biodiversity and resilience, biodiversity indices, similarity
Exercise: biodiversity of the Arava

Lesson 14 - Desert Ecology 2 - The Negev

Lesson 15 - Community Ecology 3 intraspecific competition

Competition: The Lotka-Volterra model, resource competition, allelopathy, apparent competition

Lesson 16 - Community Ecology 4

Predation,

Lesson 17, - Community Ecology 5

Mutualism, parasites, parasitoids

Lesson 18 - Ecosystem Ecology 1 structure and function

Energy flow, The carbon cycle, the nitrogen cycle, the water cycle

Lesson 19 - Ecosystem Ecology 2 Ecosystem Integrity

Lesson 20 - Ecosystem Ecology 3 Food webs

Trophic interactions, food webs, energy flow

Lesson 21- The Arava ecology trip

Lesson 22 - Ecosystem Services

The link between ecosystem structure and function to ES, provisions, culture and regulator services
Policy and DPSIR model

Lesson 23 - Landscape Ecology

Lesson 24 - Community Ecology - students presentations

Lesson 25 - Biogeography

Lesson 26 - Final exam

Class #	Discipline	Topic	Guests and events
1	Intro	Intro	
2	Behavior	Optimal Foraging	
3	Evolution Desert Ecology 1	Desert research at the Arava	Part #1
4	Evolution Desert Ecology 1	Desert research at the Arava	Part #2
5	Community 1	Biodiversity 1	
6	Population 1	Acacia trees	Rotem Nelvitsky & Amjad Hijazen
7	Population 2	Life History	
8	Population 3	Population Growth	
9	Desert Ecology 2	conservation challenges	Dr Tal Polak
10	Desert Ecology 3	Acacia outdoor lesson	Rotem Nelvetsky & Amjad Hijazen
11	Population 4	Carrying Capacity	
12	Population 5	Distribution	
13	Community 2	Biodiversity 2	
14	Desert Ecology 2	The Negev Ecology	
15	Community 3	Competition	
16	Community 4	Predation	
17	Community 5	Paratizism & Mutualistic	
18	Ecosystem 1	Ecosystem Ecology	
19	Ecosystem 2	Ecosystem Integrity	
20	Ecosystem 3	Food Webs	
21	Desert Ecology 4	Field trip	day trip
22	Ecosystem 4	Ecosystem Services 1	
23	Landscape Ecology	Landscape Ecology	
24	Community 6	Biodiversity Presentations	
25	Biogeography	Biomes	
26	Final Exam		