**Department of Evolutionary and Environmental Biology**

**Faculty of Natural Sciences**

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## 221.4007 – Population Genetics
## Semester A

**Time:** Monday 08:00-10:00

**Instructor:** Prof. Eran Tauber, **Email:** etauber@univ.haifa.ac.il

**Office Hours:** Meeting upon request

**Course Level:** (BA+MA)

**Course Type & Format:** Lecture

**Number of Hours/Credits:** 2

**Prerequisites:** Basic knowledge of genetics


**Course Overview (Short Abstract):**

What is common between evolutionary biologists, epidemiologists that study disease spreading and ecologists that explore nature conservation and biodiversity? They all require the understanding of population genetics! The topics that will be covered in this course include genetic variation in populations and the Hardy-Weinberg equilibrium, various measures for genetic variability, the impact of different selection types on the level of molecular diversity and heterozygosity. Different mating system and the impact on genetic variation, mutation and migration, the effect of random drift and demographic factors, the neutral theory and characterisation of wild populations.


**Learning Outcomes (What are the skills, abilities, or major concepts a student is expected to acquire in this course?) – At the end of the course students will be able to:**

1. Use rules of probability to describe the evolution of frequencies of biological traits, e.g. genes, in populations that exercise random and/or non-random mating of individuals
2. Use statistical methods to estimate parameters, test hypotheses, and assess the goodness-of-fit of various relevant models using data.
3. Use rules of probability to study the impact of genetic drift, selection, and mutation, on the evolution of biological traits in populations.


**Assessment (Assessment Method and Grade Composition):**
Pre-lecture exercises 10%,
mid-term quiz 20%,
computer lab report 10%;
final exam 60%.

**Week-by-Week Content and Assignments:**

| Week # | Topic | Assignment |
|--------|-------|------------|
| 1 | Genetic Variation | |
| 2 | Hardy – Weinberg equilibrium | Pre-lecture exercise |
| 3 | Population substructure | Pre-lecture exercise |
| 4 | Sources of variation | Pre-lecture exercise |
| 5 | Natural and sexual selection | Pre-lecture exercise |
| 6 | Genetic drift | Pre-lecture exercise |
| 7 | Computer lab (modelling) | Lab report |
| 8 | Mid-term exam | |
| 9 | Neutral evolution | Pre-lecture exercise |
| 10 | Neutral evolution (part II) | |
| 11 | Genotyping techniques | Pre-lecture exercise |
| 12 | The genetic of sociality and altruism | |

**Reading List:**

1. Gillespie J.H. 1998. Population Genetics: A concise guide. The John Hopkins University Press.
2. Asher D. Cutter. 2019. A Primer of Molecular Population Genetics. Oxford University Press (Ebook).