Evolution, Ecology and Game Theory
86-546-01

Lecturer: Prof. David Kessler
Course type: Lecture
Year: 2018-2019  Semester: A  Number of Hours: 3

A. Class Objectives:

To provide a basic introduction to three major sub-fields in the dynamics of populations: Evolution, Ecology and Game Theory and in the connections between them.

B. Details of subjects to be covered:

1. Basic Evolutionary Theory
   (a) Fitness and Landscapes, Mutations
   (b) Moran and Wright-Fisher Models
   (c) Stochastic Modelling - The Master Equation, Fokker-Planck Equation and Gillespie Algorithm
   (d) Neutral Molecular Evolution and Genetic Drift
   (e) The Small Mutation Limit and Clonal Interference
   (f) Coalescence Theory

2. Basic Ecological Theory
   (a) Neutral Theory
   (b) McArthur-Wilson Theory
   (c) Lotka-Volterra Systems and the May Limit
   (d) Niche Theory
   (e) Predator-Prey and Symbiosis
   (f) Food Webs
   (g) Spatial Ecology

3. Basic Game Theory
   (a) Payoffs and the Two-Player Game
   (b) Hawk-Dove and Prisoner's Dilemma
   (c) Hamilton-May Model
   (d) Adaptive Dynamics