

Evolutionary Game Theory WS14/15

Syllabus and Tentative Schedule

Lecturers:

Gita Benadi <http://www.biom.uni-freiburg.de/mitarbeiter/benadi/Benadi>

Judith Korb <http://www.bio1.uni-freiburg.de/oeko-en>

Florian Hartig* <http://www.biom.uni-freiburg.de/mitarbeiter/hartig>

* please direct questions regarding organizational issues to FH

Objective: this elective course is concerned with understanding when and why cooperative behavior between organisms (including humans) can evolve. This is interesting from an ecological and philosophical perspective, but it also has important practical applications, for example for understanding when and why sharing a resource will lead to the tragedy of the commons. Our targets for the course are to

- 1) Understand the now classical works of evolutionary game theory that explain when and why organisms such as plants or animals including humans can evolve cooperative strategies
- 2) Learn the technical skills for describing the competition of alternative strategies under evolution with mathematical and computer models.
- 3) Reproduce the result of classical modeling studies in evolutionary game theory (project work)

Language: English on request, which probably means English.

Course format: 1 week of introductory lectures in evolutionary game theory and programming in NetLogo. Expect homework for the afternoon. The following two weeks are project work for reproducing a classical EGT study (a list of suggestions will be provided in the course).

Prerequisites: We start teaching the NetLogo programming language from scratch, so in principle all skills needed for the assignment are taught. Still, experience shows that students with some prior experience in other programming languages do better with the programming tasks.

Grading: Students may work on the assignment in pairs (recommended), but they can also work alone if they chose to do so. We will assign compulsory, but ungraded homework in the first week; the final grades will be based on the written report of the project work that has to be handed in at the end of the course.

ILIAS course website: Lecture material and homework will be distributed/collected via ILIAS on the course website https://ilias.uni-freiburg.de/goto.php?target=crs_291492&client_id=unifreiburg

Join either via this link https://ilias.uni-freiburg.de/goto.php?target=crs_291492_rcodeNV3hWeyQ9X&client_id=unifreiburg or with the password GT1415!

Software: All software needed for the course is free and can be installed on personal laptops. We recommend installing the following programs

- Netlogo (Modelling environment) <http://ccl.northwestern.edu/netlogo/>
- R for Plots and Stats <http://www.r-project.org/>
- JabRef, or another literature DB <http://jabref.sourceforge.net/>
- And either word, libre office or Latex as text processing software

Timetable

	Monday 1.12.	Tuesday 2.12.	Wednesday 3.12.	Thursday 4.12.	Friday 5.12.
9.15 till 12.45	Introduction EGT, 2-player games, ESS FH Introduction NetLogo FH	Mechanisms for cooperation I Kin selection, Group selection, Reciprocity GB Programming in NetLogo I FH	Mechanisms for cooperation II Punishments, Social norms, multi-level selection FH Programming in NetLogo II FH	Examples of cooperation (and altruism) in nature JK Evolution in NetLogo I GB	Summary and project ideas GB Evolution in NetLogo II GB
Lunch					
afternoon	Exercises: GT and Netlogo	Exercises: GT and Netlogo	Exercises: GT and Netlogo CIP3 occupied	Exercises: GT and Netlogo	Exercises: GT and Netlogo

GB = Gita Benadi, **FH** = Florian Hartig, **JK** = Judith Korb (if you need to contact us, see our websites)

Lectures start at 9 c.t., in room 210 (this means 9.15). We will switch between room 210 and CIP 3. In Computer exercises, help with the homework, and project work will be generally in CIP3.