Evolutionary Game Theory WS13/14

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 has also important practical applications, for example for understanding when and why a shared resource will be subject 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.

**Prerequisites:** All necessary technical skills will be taught in the course, computer affinity is a bonus, but no prior knowledge of programming or special mathematical skills are required.

**Course format:** 1 week of introductory lectures in evolutionary game theory and programming in NetLogo. Expect homework for the afternoon, we have to get you all on the same level! Thereafter, two weeks equivalent of project work for reproducing a classical paper of evolutionary game theory (a list of paper suggestions will be provided in the course). We will probably schedule a meeting for the whole group with presentation of the work in progress on Friday, 13.12. (second week).

**Grades:** 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 based on the written report of the project work only.

**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_133457&client_id=unifreiburg> . To join the course on ILIAS, use this link <https://ilias.uni-freiburg.de/goto.php?target=crs_133457_rcodeLX28VCnrGT&client_id=unifreiburg>

or navigate to the course page and use password “GT1314!”

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

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

Timetable

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Monday 2.12.** | **Tuesday 3.12.** | **Wednesday 4.12.** | **Thursday 5.12.** | **Friday 6.12.** |
| 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 | Exercises:  GT and Netlogo | Exercises:  GT and Netlogo |

**PLUS, keep Friday 13th free for presentations!**

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

Lectures start at 9 c.t., we will switch between seminar room 310 and CIP 4.