

Evolutionary Dynamics

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Syllabus

| # | Date | Topic |
|----|-------------|--|
| 0 | 19-Sep-2019 | <i>no lecture</i> |
| 1 | 26-Sep-2019 | What is evolution? |
| 2 | 3-Oct-2019 | Quasispecies |
| 3 | 10-Oct-2019 | Stochastic models of finite populations |
| 4 | 17-Oct-2019 | Evolutionary dynamics of cancer |
| 5 | 24-Oct-2019 | Cancer progression: the speed of adaptation |
| 6 | 31-Oct-2019 | Diffusion theory |
| 7 | 7-Nov-2019 | Evolutionary game theory I |
| 8 | 14-Nov-2019 | Evolutionary game theory II |
| 9 | 21-Nov-2019 | Spatial models for the evolution of solid tumors |
| 10 | 28-Nov-2019 | Branching processes |
| 11 | 5-Dec-2019 | Evolutionary escape |
| 12 | 12-Dec-2019 | Coalescent theory |
| 13 | 19-Dec-2019 | Tumor evolution |

Theory and computational exercises

- All exercises will be available online (Polybox).
- 11 exercise sheets in total
 - Handed out after each lecture
 - Due one week later
 - Discussed during the tutorial the following week.
- Problems may be worked on in small groups (2-3 students).
- Exercises must be emailed (as a single pdf per group) for marking to: evolutionary.dynamics@bsse.ethz.ch.
- During the tutorials, each student who has handed in a solution should be prepared to present their solution.

Grading

- Exercise sheets
 - Each sheet is worth 10 points in total
 - Will count 30% of the final grade.
- Oral exam (20 min)
 - Will count 70% of the final grade.
- Questions:
 - evolutionary.dynamics@bsse.ethz.ch
 - Katharina Jahn, +41 61 387 33 06
 - Rob Noble, +41 61 387 33 05
- <https://www.bsse.ethz.ch/cbg/teaching.html> (Log in!)



Bibliography

- **Martin A. Nowak, *Evolutionary Dynamics*, Harvard University Press, 2006**
- Josef Hofbauer and Karl Sigmund, *Evolutionary Games and Population Dynamics*, Cambridge University Press, 1998
- Sean H. Rice, *Evolutionary Theory*, Sinauer Associates Inc., 2004
- Sarah P. Otto and Troy Day, *A Biologist's Guide to Mathematical Modeling in Ecology and Evolution*, Princeton University Press, 2007

