

**Advanced Game Theory 243B:
Evolution and Learning in Games**
Jean-Paul Carvalho
Spring 2017

Syllabus

Summary

This course will provide a rigorous introduction to learning and evolution in games. It will be divided into three parts:

- (1) Concepts and mathematical techniques for studying population games and evolutionary dynamics.
- (2) Applications of evolutionary game theory.
- (3) Exploring new applications of evolutionary game theory. Students should be able to begin writing an original paper using these tools by the end of the course.

Textbooks

The following two textbooks are essential reading for mastery of the subject:

- (Y) Young, H.P. *Individual Strategy and Social Structure*, 1998, Princeton University Press.
(S) Sandholm, W.H. *Population Games and Evolutionary Dynamics*, 2010, MIT Press.

A less advanced treatment is provided by:

- (W) Weibull, J. *Evolutionary Game Theory*, 1995, MIT Press.

My lecture notes will draw on all three texts. The lectures/presentations in weeks 7-11 will be based on published articles.

Course Outline (indicative, subject to change):

Theory

Week 1. Foundations of Evolution and Learning in Games (Y: 1-2, 5; S: 1)

Week 2. Population Games (S: 2-3, Y: 4)

Week 3. Revision Protocols and Evolutionary Dynamics (W: 3; S: 4-6)

Week 4. Global Convergence (Y: 7; S: 7)

Week 5. Local Stability and Nonconvergence (Y: 7, S: 8-9)

Week 6. Application: Cultural Transmission; Stochastic Evolution and Stationary Distributions (Y: 3-4; S: 10-12)

Week 7. Stochastic Stability; Stochastic Stability in Bargaining and Coordination Games (Y: 3-4,8-9, S: 10-12)

Week 8. Stochastic Stability with Heterogenous Agents; Experiments on Learning in Games.

Week 9. Evolution of Norms & Customs and Technology Adoption (Y: 8-9)

Weeks 10. Local Interaction on Networks (Y: 6)

Exams and Grading Policy

The final grade for the course will be determined as follows:

Class participation: 10%

Existing research paper presentation*: 20%

Final Exam (according to schedule): 70%

* A reading list will be issued in the first class for weeks 8-10. Each student will present one of these papers.

Please note that there will be NO MAKE-UP FINAL EXAM.

Contact info

My office hours are by appointment. My e-mail address is jpcarv (at) uci.edu.