COGS 269-01   Spring 2017
Modeling Social Behavior
Instructor: Paul Smaldino (CIS)
CRN: 15678
Time: Wednesday, 1:30–4:15pm
Location: COB 270

Understanding complex dynamics in social, ecological, and evolutionary systems is challenging. Verbal models are often ambiguous, and statistical models rarely establish causal origins of phenomena of interest. Formal mathematical and computational models can act as 'prostheses for the imagination,' to quote Murrary Gell-Mann. Such *generative* models are important for developing theory and forming intuitions about the behavior of complex social systems. This course will take a broad approach to understanding and using formal models to study social behavior and organization.

The course will be taught seminar style. We will attempt to simultaneously develop students' technical skills and also build understanding for the interpretation, analysis, and critique of models. The course will emphasize student-led discussion. Derivation or replication of models under discussion will be encouraged when feasible. Course topics and readings will be chosen partly based on student interests. Students looking for a slower paced, more structured approach to learning *NetLogo* might consider taking/auditing COGS 122.

Technical prerequisites. If you have ever had calculus, you are in good shape mathematically. You won't need to do calculus here, but you should understand calculus concepts. If you've ever written a computer program, even a little script, you are in good shape computationally. We will be doing some programming, and it will help to have a good understanding of basic concepts like loops and conditional statements. Familiarity with object-oriented approaches will come in handy if you have it. If you are interested in the course but worried you don't have the technical chops, please contact me. You may know more than you think you do.
All students are expected to have a laptop computer and to bring it to class. If this is not possible for you, contact me and we will make arrangements.

Conceptual topics <u>will</u> include:
- Conceptual approaches to model development
- Building agent-based models with *NetLogo*
- Combining mathematical and computational approaches
- Model analysis: robustness, sensitivity, and optimization

Modeling topics <u>may</u> include:
- Cooperation
- Coordination
- Social learning
- Collective problem solving
- Polarization
- Social networks
- Foraging
- Signaling
- Norms and institutions
- Resource management
- Combining theoretical models with empirical data