

**Neuroeconomics**  
Spring 2010  
Mondays 3-5pm  
815 Meyer Hall

Instructor: Nathaniel Daw  
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### **Overview:**

This seminar will survey the emerging field of neuroeconomics, the interdisciplinary study of the brain's mechanisms for decision evaluation and choice. We will approach these issues from multiple perspectives, drawing on theoretical, behavioral, and neural data from economics, psychology, and neurobiology. Major topics include: decision under risk and uncertainty; multiplayer interactions and social preferences; the role of learning in evaluating options; and choice mechanisms.

### **Format:**

The course will follow a traditional journal-club-like discussion-oriented seminar format, interspersed with sporadic short background lectures from the instructor to introduce relevant background. For the discussions, *everyone will be expected to have read the readings and come prepared to discuss them*. Students will switch off responsibility for leading the discussion; this will involve, first, a structured (roughly half-hour) presentation of the material and, more importantly, asking questions and facilitating discussion for the remaining time. *Students auditing the class will also be expected to both participate and present*; how many presentations per student (or students per presentation) will depend on the size of the enrollment.

*Background:* It is expected that students may come from any of a number of backgrounds, and we will try as much as possible to keep the course self-contained. In particular, we will not assume a quantitative or technical background (and we will not have problem sets or the like), though of course one of our goals will be to develop a familiarity and facility with formal approaches to decisions, and this will occupy us for the first few days of class. Similarly, we will not expect students to have biological or psychological background; and again will devote some time in the second half of the semester to introducing this material.

### **Course requirements:**

33% for presentations and leading discussions.

33% for participation in discussions.

33% for the final paper.

*Final paper:* Students enrolled in the class will be expected to write a final paper, due on the last day of class. The paper can be either in the format of an NRSA application (Specific Aims, Background & Significance, Preliminary Data if applicable, Research Design and Methods) proposing some experiment designed to address one of the issues considered during the term; a broad review; or a primary research article. Students should check with the instructor as to the topic, but the intent is to construe the possibilities quite broadly so as to enable you both to pursue a topic and approach of interest, and if possible to enable you to devote your efforts to an application or article that will be of additional use to you in your ongoing graduate studies. Students will briefly

present their final papers on the last day of class.

### **Readings:**

Textbook: Glimcher, Camerer, Poldrack, and Fehr (eds.) *Neuroeconomics: Decision Making and the Brain*

We will concentrate on working through this volume, augmented with some articles from the primary literature as necessary.

### **Preliminary schedule:**

1/25: Preliminaries & intro: theory  
2/1: Risk, decision theory, prospect theory: chs 10-11  
2/8: Axiomatic decision theory & formalisms: chs 3-4  
2/15: Decision theory & movement: ch. 8; Wu et al PNAS  
2/22: Game theory & behavior: chs 5,6,13  
3/1: Games & social preferences: chs 15,17  
3/8: Primatology of choice & social preferences: chs. 7, 18, 19  
3/15: *No class (spring break)*  
3/22: Intro: neuroscience, readings TBA  
3/29: Psychological foundations: emotion, aversion, & conditioning: chs 12, 16  
4/5: Neural value representations: chs 25, 29, 30  
4/12: Value & Choice: chs 28, 31, 32  
4/19: Value learning and dopamine: chs 22, 23  
4/26: Other approaches to valuation: chs 23, 24  
5/3: The debate about neuroeconomics: ch 9; Gul & Pesendorfer in *The Foundations of Positive and Normative Economics*