

Neuroeconomics and Decision Neuroscience

Instructor information

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Prerequisites

Introductory module in biological psychology or (cognitive) neuroscience

Course description

Neuroeconomics is a new interdisciplinary field of research that investigates the neural and behavioural principles underlying value-based decision making. The class will cover reward processing, the neural bases of preferences, and changes in value-based decision making in selected psychiatric disorders. To provide a background in the field, the course will start with introductory lectures. In the remaining sessions, students will discuss relevant book chapters and review papers.

Course goals

At the end of this course, students will be able to discuss and critically evaluate recent neuroeconomics research in the context of the field.

Specifically, they will be able to

- Describe the neural mechanisms underlying motivational processing
- Show how decisions emerge from preferences
- Explain the role of computational models in neuroeconomics
- Summarize and integrate the course topics in a final project

Course requirements

Presence in class is required. Two classes may be missed, but students are responsible for catching up on class content. Students are expected to read all assigned material prior to the scheduled discussion and to contribute to class discussions and group work. There will be short quizzes assessing basic content of the assigned material at the beginning of sections 2-4 and summary quizzes at the end of sections 2-4. Student groups will prepare a creative summary of the course material for the final session.

Grading

Short quizzes: 15%

Summary quizzes: 70%

Summary group work: 15%

Course outline

Section 1 – Sessions 1-4: Introductory lectures

Section 2 – Sessions 5-7: Sensory Rewards

Section 3 – Sessions 8-10: Neuroeconomics
Section 4 – Sessions 11-13: Clinical Aspects
Final Session – Session 15: Presentation of group work

Readings

Students will work in groups. Each group selects one of the following readings per block for close reading and discussion (subject to minor changes from year to year). All material will be posted on Stud.IP.

Section 2 (Sensory Rewards)

- Dolan, R.J., and Sharot, T. (2011). Neuroscience of Preference and Choice: Cognitive and Neural Mechanisms (Academic Press). Chapter 11: The Flexibility of Chemosensory Preferences
- Gottfried, J.A. (2011). Neurobiology of Sensation and Reward (Taylor & Francis). Chapter 17 – Civilized Sensory Rewards: Perfume
- Gottfried, J.A. (2011). Neurobiology of Sensation and Reward (Taylor & Francis). Chapter 19: – Civilized Sensory Rewards: Music
- Kirsch, L.P., Urgesi, C., & Cross, E.S. (2016). Shaping and reshaping the aesthetic brain: Emerging perspectives on the neurobiology of embodied aesthetics. *Neurosci Biobehav Rev* 62, 56-68

Section 3 (Neuroeconomics)

Glimcher, Fehr, eds. (2013). Neuroeconomics – Decision making and the brain (Elsevier).

- Chapter 10: Valuation, Intertemporal Choice, and Self-Control
- Chapter 11: Social Preferences and the Brain
- Chapter 12: Neuroeconomics of Emotion and Decision Making
- Chapter 14: Pharmacology of Economic and Social Decision Making
- Chapter 24: The Neurobiology of Context-Dependent Valuation and Choice

Section 4 (Clinical Aspects)

Dreher, Tremblay, eds. (2017). Decision Neuroscience: An Integrative Perspective (Academic Press).

- Chapter 21: Can models of reinforcement learning help us to understand symptoms of schizophrenia?
- Chapter 22: The Neuropsychology of Decision Making: A view from the frontal lobes
- Chapter 26: Decision-Making in Anxiety and Its Disorders
- Chapter 27: Decision-Making in Gambling Disorder: Understanding Behavioral Addictions
- Chapter 32: Appetite as Motivated Choice: Hormonal and Environmental Influences

Language

Readings will be in English; in-class discussions and group work will be in German. Foreign exchange students may take the exams in English upon request.