

Syllabus

ECON 508: NEUROFINANCE

Fall 2024

Schedule: Mon-Wed 2:00 – 3:20 p.m.

Class Location: **WPH B28**

Instructors:

Prof. **Giorgio Coricelli**

Office Hours: Wed 1:00 p.m.

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TA: **Jerry Shen**

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Office Hours: Tue 4:00-5:00 p.m

Textbook: *Neuroeconomics*, Decision Making and the Brain, 2nd Edition, Edited by Glimcher and Fehr, 2014. Additional readings (see list below) will be uploaded online.

Throughout the course, the primary goals are to:

- Learn about the academic field of neurofinance, its major theories, results, and debates
- Become a critical consumer of research findings by learning the methodological standards for evaluating the soundness of such studies
- Develop the ability to effectively write and speak about decision theories, results, and debates
- Acquire some practical skills for designing and analyzing an experimental study on the field of neurofinance

Description of the course:

We will focus primarily on studies of the neural basis of human behavior, such as saving, investing, and trading behavior. The course will be divided into two main parts. The first part of the course will focus on neuroscience as a new lens on financial decision-making. This part will include a special focus on (i) the neural basis of choice under risk and uncertainty; (ii) asset pricing; (iii) intertemporal choices; (iv) the role of emotion in financial decision-making. The second part will focus on specific topics on behavioral and neuro-finance: (i) The disposition effect; (ii) the Repurchase effect; (iii) the Home bias; and (iv) financial bubbles.

Exams: Two midterms, and a final exam

Class presentation: Students will be divided into groups. Students in each group will be assigned a specific topic to be presented in class.

Problem sets: Due at the beginning of class on the due date

Grading:

Problem sets and class presentation	20%
Midterm 1	20%
Midterm 2	20%
Final exam	40%

Grade Determination and Final Examination Details:

Tests and final exams are marked on a numerical (percentage) basis, and then converted to letter grades.

A+ 95 - 100	B+ 80 - 84	C+ 65 - 69	D+ 50 - 54
A 90 - 94	B 75 - 79	C 60 - 64	D 45 - 49
A- 85 - 89	B- 70 - 74	C- 55 - 59	F 0 - 44

Course Outline:

The objective of this course is to introduce basic and advanced elements of Neurofinance. The topics to be covered and the required readings (Chapters from the Textbook *Neuroeconomics (CH)* and *Readings (R)*) are:

August

- Mon 26 Lecture 1: Introduction to Neuroeconomics and Neurofinance (CH 1)
- Wed 28 Lecture 2: Experimental methods in Cognitive Neuroscience (CH 5)

September

- Mon 2 Labor Day
- Wed 4 Lecture 3: The computation of stimulus values in a simple choice I (CH 8)

- Mon 9 Lecture 4: The computation of stimulus values in a simple choice II (CH 8)
- Wed 11 Lecture 5: Neural foundation of economic preferences I (CH 8)

- Mon 16 Lecture 6: Neural foundation of economic preferences II (CH 8)
- Wed 18 Lecture 7: Reward processing mechanisms I (CH 15) **Problem set 1 assigned**

- Mon 23 Lecture 8: Reward processing mechanisms II (CH 15)
- Wed 25** Lecture 9: Summary of lectures 1-8. **Problem set 1 due before class.** Discussion

- Mon 30 **Midterm 1**

October

- Wed 2 Lecture 10: Decision Theory: Risk and uncertainty I (CH 9)

- Mon 7 Lecture 11: Decision Theory: Risk and uncertainty II (Appendix Prospect theory)

- Wed 9 Lecture 12: Neural correlates of Risk and uncertainty (CH 9, R)
- Mon 14 Lecture 13: Neurofinance of Emotion (CH 12, R)
- Wed 16 Lecture 14: Neural basis of intertemporal choice (CH 10) **Problem set 2 assigned**
- Mon 21 Lecture 15: Decision Biases in the Brain (CH 24).
- Wed 23 Lecture 16: Summary of lectures 10-15. **Problem set 2 due before class.** Discussion
- Mon 28 Midterm 2**
- Wed 30 Lecture 17: The social brain. Social interaction in financial decision making.

November

- Mon 4 Lecture 18: The neural Basis of Strategic Choice (CH 25, R)
- Wed 6 Lecture 19: Neural basis of social comparison and social conformity and their impact in financial decision-making (CH 11, R)
- Mon 11 Lecture 20: Investor psychology and Asset pricing I (R)
- Wed 13 Lecture 21: Investor psychology and Asset pricing II (R)
- Mon 18 Veteran Day
- Wed 20 Lecture 22: Disposition effect and Repurchase effect (R)
- Mon 18. Lecture 23: Overconfidence, Herding and Financial bubbles (R)
- Wed 20 Lecture 24: The biology of financial instability (R)
- Mon 25 Lecture 25: CLASS PRESENTATION **Problem set 3 assigned**
- Wed 27 Thanksgiving

December

- Mon 2 Lecture 26: CLASS PRESENTATION
- Wed 4 Lecture 27: Summary of lectures 17-24. **Problem set 3 due before class.** Discussion

Final exam

Friday, December 13 2-4 p.m.

List of readings (R):

- R1. Fiorillo CD, Tobler PN, Schultz W (2003) Discrete coding of reward probability and uncertainty by dopamine neurons. *Science* 299 (5614), 1898
- R2. Tom et alii (2007). "The neural basis of loss aversion in decision making under risk". *Science*. 26 January 2007: Vol. 315 no. 5811 pp. 515-518
- R3. Preuschoff, P Bossaerts, and S R Quartz. Neural differentiation of expected reward and risk in human subcortical structures. *Neuron*, 51(3):381–390, 2006.
- R4. Ming Hsu et alii (2006). Neural Systems Responding to Degrees of Uncertainty in Human Decision-Making. *Science*. 9 December 2005: Vol. 310 no. 5754 pp. 1680-1683
- R5. David Hirshleifer (2012). "Investor Psychology and Asset Pricing", *The Journal of Finance*.
- R6. The somatic marker hypothesis: A neural theory of economic decision, by Bechara and Damasio, *Games and Economic Behavior*, 2002
- R7. Coricelli G, Dolan RJ, Sirigu A (2007). Brain, emotion and decision-making: the paradigmatic example of regret. *Trends in cognitive sciences* 11 (6), 258-265

- R8. Coricelli, G., and Nagel, R. (2009). "Neural correlates of depth of strategic reasoning in medial prefrontal cortex". *Proceedings of the National Academy of Sciences USA*, 106, 23, pp. 9163-8.
- R9. Guarino, A. "Herd Behavior in a Laboratory Financial Market", *American Economic Review*, 2005
- R10. Bault, N., Joffily, M., Rustichini, A., Coricelli, G. (2011). "Medial prefrontal cortex and striatum mediate the influence of social comparison on the decision process". *Proceedings of the National Academy of Sciences USA*. PNAS Sep 20;108(38):16044-9.
- R11. *In the Mind of the Market: Theory of Mind Biases Value Computation during Financial Bubbles*, by DeMartino et al, 2013 *Neuron*
- R12 *The Psychology and Neuroscience of Financial Decision Making*, Frydman and Camerer, *Trends in Cognitive Science*, 2016
- R13 *Psychology-based Models of Asset Prices and Trading Volume*, Barberis 2018
- R14 *Irrational exuberance and neural crash warning signals during endogenous experimental market bubbles*, Smith et al., *Proceedings of the National Academy of Science*, 2014