

Syllabus

ECON 508: NEUROFINANCE **Fall 2022**

Schedule: Mon-Wed 2:00 – 3:50 p.m.

Class Location: **WPH B28**

Instructors:

Prof. **Giorgio Coricelli**

Office Hours: Wed 1:00 p.m.

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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 22	Lecture 1: Introduction to Neuroeconomics and Neurofinance (CH 1)
Wed 24	Lecture 2: Experimental methods in Cognitive Neuroscience (CH 5)
Mon 29	Lecture 3: The computation of stimulus values in a simple choice I (CH 8)
Wed 31	Lecture 4: Neural foundation of economic preferences (CH 8)

September

Mon 5.	Labor Day
Wed 7	Lecture 5: Reward processing mechanisms I (CH 15)
Mon 12	Lecture 6: Reward processing mechanisms II (CH 15) Problem set 1 assigned
Wed 14	Lecture 7: Multiple systems for value learning (CH 21)
Mon 19	Lecture 8: Summary of lectures 1-7. Problem set 1 due before class. Discussion
Wed 21	Midterm 1
Mon 26	Lecture 9: Decision Theory: Risk and uncertainty I (CH 9)
Wed 28	Lecture 10: Decision Theory: Risk and uncertainty II (Appendix Prospect theory)

October

Mon 3	Lecture 11: Neural correlates of Risk and uncertainty (CH 9, R)
Wed 5	Lecture 12: Neurofinance of Emotion (CH 12, R)

Mon 10 Lecture 13: Neural basis of intertemporal choice: Time in financial decision making (CH 10).

Problem set 2 assigned

Wed 12 Lecture 14: Decision Biases in the Brain (CH 24).

Mon 17 Lecture 15: Summary of lectures 9-14. **Problem set 2 due before class.** Discussion

Wed 19 Midterm 2

Mon 24 Lecture 16: The social brain. Social interaction in financial decision making.

Wed 26 Lecture 17: The neural Basis of Strategic Choice (CH 25, R)

Mon 31 Lecture 18: Neural basis of social comparison and social conformity and their impact in financial decision making (CH 11, R)

November

Wed 2 Lecture 19: Investor psychology and Asset pricing I (R)

Mon 7 Lecture 20: Investor psychology and Asset pricing II (R)

Wed 9 Lecture 21: Disposition effect and Repurchase effect (R)

Mon 14 Lecture 22: Overconfidence, Herding and Financial bubbles (R)

Wed 16 Lecture 23: The biology of financial instability (R)

Mon 21 Lecture 24: CLASS PRESENTATION **Problem set 3 assigned**

Mon 28 Lecture 25: CLASS PRESENTATION

Wed 30 Lecture 26: Summary of lectures 16-25. **Problem set 3 due before class.** Discussion

Final exam

Friday December 9, 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