

**Behavioral Neuroeconomics
PSY 398 / ECON 443
Winter 2019**

Class Days, Times: Tuesday 2:30-3:50 pm
Friday 4:00-5.20 pm

Location: Biosciences Complex 1103

Course Website: onQ

Course Instructor: Anita Tusche

E-mail: anita.tusche@queensu.ca

Office: Dunning Hall 307

Office Hours: Tuesday, 4.30-5.30 pm

Teaching Assistants (TA)

TA: Lindsey Yessick (psychology); lindsey.yessick@queensu.ca

TA: Stephanie Assad (economics); assads@econ.queensu.ca

Office Hours: By Appointment

Email address to be used for accommodations: lindsey.yessick@queensu.ca

All questions pertaining to course-related content should be addressed using the discussion board on OnQ. If you have any questions that are unsuitable for the discussion board (e.g. personal information or accommodations) email your TA or myself.

1. Course Description

The course introduces basic principles governing the emerging field of in neuroeconomics, drawing on insights and tools from economics, psychology and neuroscience. We will discuss how fundamental economic principles like risk, ambiguity, and volatility shape human decision making, and why the influence of these factors seems to vary across people and contexts. Students will learn about insights from psychology on understanding the private reasons people make the choices they do—reasons they themselves may not be aware of or even understand (e.g. emotional responses, the influence of other people, or heuristics). Finally, students will learn about the basic architecture of the decision process in the human brain, from identification of choice options, to the calculation of their utility, to selecting one for consumption, and learning from this experience.

2. Course goals/Intended Student Learning Outcomes

1. This course targets students from the fields of economics and psychology. Working together in “mixed” groups facilitates interaction and communication across students with different backgrounds. At the end of the course, students should become aware that both disciplines study conceptually related choice phenomena, be able to describe contributions of the respective other field, and be able to

incorporate the contributions of students with different backgrounds to achieve a common goal (e.g. the final group presentation).

2. Students should become aware of neuroscience techniques that can address questions of interest in economics, psychology and other decision sciences (Note: this course is *not* intended to convince you that knowledge of how the brain works is useful in testing all hypotheses in economics or psychology). At the end of this course students should be able to name and describe choice phenomena of interest to both economics and psychology that are studied using neuroscience techniques.
3. Students should gain a general understanding of how the brain learns about rewards and punishment in its environment and evaluates stimuli (i.e. estimates value or utility) in order to make choices. At the end of this course students should be able to identify brain areas involved in choice phenomena, to describe cognitive processes in the brain, and apply this knowledge to new choice scenarios and contexts.
4. Be able to *critically* evaluate empirical studies using neuroscience techniques to address questions related to neuroeconomics (assessed in the final project presentation).

3. Textbooks/Readings

There is one required text for the course, “**Neuroeconomics: Decision making and the brain,**” *2nd edition (!)*, edited by **Glimcher & Fehr, 2014, Elsevier Academic Press**. Relevant chapters (Ch.) are specified in the course outline (see table below). There are also a number of additional reading materials (especially for the final group presentations), including primary scientific articles and popular media, which will be posted on the course website (onQ). Students are responsible for all assigned readings as they contain more material than can be covered directly in lecture. Similarly, some material covered in lectures will not appear in the assigned readings. *Students are responsible for this material as it will appear on exams.*

4. Online Materials and Course Notes

Online Materials: Students are advised to consult OnQ on a regular basis for supplemental materials, updates, and announcements.

Course Notes: Partial lecture slides will be provided for this course (you will need to attend lectures to fill in some of the gaps).

5. Contacting the Course Instructor

Students requiring assistance are encouraged to speak with me either before or after lectures. I will arrive/leave lectures approximately 10-15 minutes before/after lecture and will be more than happy to answer any questions during this time. This will happen outside of the lecture room to allow the preceding/following class to exit/enter smoothly. Should you wish to meet with me outside of this time, please email me (or the class TA) to make an appointment. Email, while commonly used, does limit the effectiveness of communications and may not be the best way for me to answer your question(s). In such instances, I may suggest a personal meeting during office hours or at a mutually agreed upon time. I will do my very best to answer emails as soon as possible; however, emails can be expected to be replied to within 2 working days (i.e., a reply to a 1 am Saturday night email may not arrive before Tuesday). To

facilitate my responses, please include the course ID (i.e., “PSYC 398” or “ECON 443”) in the subject line of the email. Thanks!

6. Grading Scheme

Midterm Exam (in-class)	30%	Tuesday, February 12, 2 pm – 3.50 pm
Final Exam	30%	TBA
Team Project Presentation	25%	Tuesday, March 25; Friday March 29; Tuesday, April 2; or Friday, April 5
Presentation Feedback/Critique	5%	Tuesday, March 25; Friday March 29; Tuesday, April 2; or Friday, April 5 (10 in total)
Weekly MC Questions	10%	1 per session/lecture (20 in total)

Details on Course Assignments

(i) Midterm and Final Exams (30% and 30%, respectively; 60% of final mark):

The midterm and final exam will each consist of multiple choice and short-answer questions, respectively, and will be assessing a combination of factual and conceptual issues related to the content of the course.

- ***Missed Test and Accommodation Policies:*** See below for specific details regarding the University’s Regulations on these items. Specific to Psych 398/Econ 443, if the Midterm is missed for a ***valid and approved reason PRIOR to the test***, a make-up date will be arranged at a mutually agreed upon time with the course TA. ***All make-up test arrangements must be made by direct contact with the Instructor (please always cc both TAs to ensure an effective information flow).***

(ii) Weekly Multiple Choice (MC) Questions (10% of final mark):

For each lecture, students will have the opportunity to create one multiple-choice question on the topic of the lecture and/or the assigned reading material that could, in principle, be used on an exam (Midterm or Final). **You must upload these questions**, along with the corresponding **correct response to these questions**, using OnQ, **prior to every Tuesday lecture date (i.e. by 2 pm, Tuesday)**. Each question will have a value of 0.5% on your final mark. Students will receive a 0.5% grade for producing a viable question (with correct answer) that could be used in an exam (i.e., it must require that one knows the course material to answer it correctly and it must be of average difficulty). Otherwise, students will receive a 0% grade for that particular question. **Students can produce 20 of these questions** over the term, **and not more than one question per lecture**. Questions can include the material covered in the “Team Project Presentations” (see below, Session 20-23) and the readings of the self-study session on January 15th. Out of the total of 24 sessions (19 lectures, 4 Team Project Presentations, 1 self-study session), students can choose which to cover. The purpose of this assignment is to encourage students to reflect on and apply the course material.

- **Note 1:** particularly thoughtful and well-formed MC questions ***may actually be used on either the Midterm or Final Exam***. Thus, not only will the student who creates these questions receive a 0.5%

grade, but they will know the answer to that particular question on the exam, and thus also get another guaranteed 1%!

- **Note 2:** although they carry a small percentage, they can often determine whether you end the course with an 89% versus a 90%, or a 79% versus 80% grade)
- **Missed Test and Accommodation Policies: LATE MCs WILL NOT BE ACCEPTED.**

(iii) Team Project Presentations (25% of final mark):

For this assignment, self-assemble into teams of 3-4 students (this number is subject to change depending on total course enrollment). ***Teams of 3 students have to consist of at least one psychology student and one economics student, teams of 4 students should include two students with a background in psychology and economics, respectively*** (again, this might be subject to change depending on total course enrollment or students dropping the course over the first weeks).

You and your team will choose a research article in a particular content area. A list of potential research articles will be uploaded to onQ in the week of January 22nd to January 25th. Students can suggest any research article on a topic covered in the lecture (see lecture overview below) or the assigned reading material (Note: suggested article have to present *empirical evidence* (i.e. can't be a review or opinion piece) and have to *bridge at least 2 research disciplines* (e.g. psychology and neuroscience, economics and neuroscience, psychology and economics). ***Research articles cannot be duplicated between groups. Therefore, topics will be selected on a first-come first-serve basis and must be approved by me.*** The purpose of this assignment is threefold: first, it will foster cross-disciplinary work and cooperation among econ and psych students, working towards a common goal (i.e. 25% of your final mark). Second, it will train students to read empirical articles in the field of neuroeconomics. Third, students are encouraged to think critically and apply the knowledge that they have acquired from the entire course in an applied context. Such a task is highly relevant to many of the possible career paths associated with a university degree in psychology, economics, the Life Sciences in general, and related disciplines.

You and your team will be required to complete this project outside of class time; however, to help facilitate progress, there will be one lecture in which time will be allotted for you to work collectively with your group. During this time, I will be available to help answer any questions related to the Team Project. The team project is worth 25% of your final grade and all group members will receive the same mark, so choose your group wisely!

- **Video Content:** Your team will be required to read one of the research articles provided and produce a (hopefully) creative video presentation that addresses each of the following (this is not meant to be an exhaustive list of aspects you can include):
 - What was known before your selected research article and what particular gap in knowledge did the experiment(s) address? (note that providing this adequate background for the viewer may require you to read a few key papers from previous work cited in the article)
 - What was the specific research question asked and why (at the time) was it important, timely or novel?
 - What specific task and analysis methods were used?
 - What did the authors find?
 - Why are these results important in this particular research area? How do they fit within the larger literature on this topic?
 - What are some of the limitations in the methods used and/or conclusions drawn?

Note that visual aids, including diagrams, article figures, and/or animations etc. should be incorporated into your video so as to effectively convey your understanding of the article. You will also be graded on your ability to take complex ideas, research questions and approaches, and distill them so that they are easy-to-follow and readily comprehensible to non-experts in this area (this will require some thought on your part).

- **Format Guidelines:** Each video should be 8-10 minutes in length (no shorter or longer) and *all groups members must talk in the video at least once*. There are lots of free video editing programs to allow you to finalize your video presentation (most computers include a program capable of doing this) and most of you, I am assuming, have smart phones with video recording capability.
- **Submission Guidelines:** Each team’s video presentation will need to be uploaded prior to the lecture on the day of the preceding class (i.e., if your group’s video presentation is on Friday, your video must be uploaded to OnQ prior to the Tuesday class, 2 days earlier). On the date of your class presentation, one member from your group will need to transfer your 5 video presentation to a designated computer. Time will be provided for this at the start of lecture.
- **Grading:** Your total grade (25%) for this team project will be made up of the following: (1) 20% will be determined by the TA and the course instructor, based on how well the criteria in #1 are met, and, (2) 5% will be derived from an average of peer evaluations (i.e., grades received by your classmates). Note that *content derived from the video presentations is fair game for the Final Exam and thus, attending the video presentations of your peers will prove to be in your benefit*.

(iv) Presentation Feedback (5% of total mark)

For each of the four “Team Project Presentations” sessions, students will be asked to fill out extended feedback sheets. Students can fill out *up to 10 of extended feedback sheets, but not more than 3 per session*. Each extended feedback sheet will have a value of 0.5% on your final mark. This assignment is designed to train students ability to critically evaluate the presentations of their fellow students and to provide feedback to the presenters about the effectiveness of their “teaching”. Extended feedback sheets will be uploaded on onQ prior to the first Team Project Presentation and will also be handed out as printed versions prior to each team presentation session.

7. Grading Systems

All components of this course will receive numerical percentage marks. The final grade you receive for the course will be derived by converting your numerical course average to a letter grade according to Queen’s Official Grade Conversion Scale as shown below:

Grade	Numerical Course Average (Range)
A+	90-100
A	85-89
A-	80-84

B+	77-79
B	73-76
B-	70-72
C+	67-69
C	63-66
C-	60-62
D+	57-59
D	53-56
D-	50-52
F	49 and below

8. Course Outline *Tentative lecture schedule (Subject to modification)*

	Date	Title	Reading
1	Tuesday, Jan. 8, 2019	Introduction	Loewenstein et al. 2008. "Neuroeconomics". <i>Ann. Rev. Psychol.</i> 59:647-72.
Fundamental Tools of Neuroeconomics			
2	Friday, Jan. 11, 2019	Normative and descriptive models of choice	Ch.1. Basic Methods from Neoclassical Economics
3	Tuesday, Jan. 15, 2019	Cognitive limitations, biases & shortcuts in decision-making	Ch. 3. Computational and Process Models of Decision Making in Psychology and Behavioral Economics
4	Friday, Jan. 18, 2019	Methods in Cognitive Neuroscience	Ch. 5. Introduction to Neuroscience Ch. 6. Experimental Methods in Cognitive Neuroscience
Foundations of Economic Preferences			
5	Tuesday, Jan. 22, 2019	Value in simple choice	Ch. 8. Computation of Stimulus Values in Simple Choice

			https://www.youtube.com/watch?v=D6CQjaP98Ew
6	Friday, Jan. 25, 2019	Risk preferences	Ch. 9. Valuation for Risky and Uncertain Choices
7	Tuesday Jan. 29, 2019	Utility over time: intertemporal choice	Ch. 10. Valuation, Intertemporal Choice and Self-Control
8	Friday Jan. 31, 2019	Context-Dependent Choice	Ch. 24. The Neurobiology of Context-Dependent Valuation and Choice
9	Tuesday, February 5, 2019	Value Comparisons and Integration: Costs and Benefits	Ch. 22. Integrating Benefits and Costs in Decision-Making
10	Friday, February 8, 2019	Special Topics (TBA)	
11	Tuesday, February 12, 2019	**Midterm Exam** (in class)	
	Friday, February 15, 2019	No Class (self-study)	
	Tuesday, February 19, 2019	No Class (Winter mid-term break)	
	Friday, February 22, 2019	No Class (Winter mid-term break)	
Social Choice			
12	Tuesday, February 26, 2019	Behavioral Game Theory Guest Lecture: Colin Camerer	Ch. 2. Experimental Economics and Experimental Game Theory Ch. 25. The Neural Basis of Strategic Choice
13	Friday, March 1, 2019	Social Preferences 1	Ch. 11. Social preferences in the Brain
14	Tuesday, March 5, 2019	Social Preferences 2	Ch. 27. Understanding Others: brain Mechanisms of Theory of Mind and Empathy

15	Friday, March 8, 2019	Pharmacology of Social Preferences	Ch. 14. Pharmacology of Economic and Social Decision-Making
16	Tuesday, March 12, 2019	Emotion in Choice	Ch. 12. Neuroeconomics of Emotion and Decision Making
Formation of Preferences - Learning and Valuation			
17	Friday, March 15, 2019	Learning Values and Rewards	Ch. 15. Value Learning through Reinforcement
18	Tuesday, March 19, 2019	Reinforcement Learning	Ch. 16. Advanced Reinforcement Learning
19	Friday, March 22, 2019	Wrap-up & Preparation of Team Project Presentations	
Team Project Presentations			
20	Tuesday, March 25, 2019	Team Project Presentations	
21	Friday March 29, 2019	Team Project Presentations	
22	Tuesday, April 2, 2019	Team Project Presentations	
23	Friday, April 5, 2019	Team Project Presentations	
	<i>Date to be determined</i>	**Final Exam**	

9. Location and Timing of Final Examinations

Students should delay finalizing any travel plans until after the examination schedule for the final exam has been posted. Final exams will not be moved or deferred to accommodate employment, travel/holiday plans or flight reservations. Also, as indicated in Academic Regulation 9.3, students must write all final examination in all on-campus courses on the Kingston campus.

Regulations and Policies

10. Statement on Academic Integrity

Academic Integrity is constituted by the six core fundamental values of honesty, trust, fairness, respect, responsibility and courage (see www.academicintegrity.org). These values are central to the building, nurturing and sustaining of an academic community in which all members of the community will thrive. Adherence to the values expressed through academic integrity forms a foundation for the "freedom of inquiry and exchange of ideas" essential to the intellectual life of the University (see the Senate Report on Principles and Priorities <http://www.queensu.ca/secretariat/policies/senate/report-principles-and-priorities>).

Students are responsible for familiarizing themselves with the regulations concerning academic integrity and for ensuring that their assignments conform to the principles of academic integrity. Information on academic integrity is available in the Arts and Science Calendar (see Academic Regulation 1 <http://www.queensu.ca/artsci/academic-calendars/regulations/academic-regulations/regulation-1>), on the Arts and Science website (see <http://www.queensu.ca/artsci/academics/undergraduate/academic-integrity>), and from the instructor of this course. Departures from academic integrity include plagiarism, use of unauthorized materials, facilitation, forgery and falsification, and are antithetical to the development of an academic community at Queen's. Given the seriousness of these matters, actions which contravene the regulation on academic integrity carry sanctions that can range from a warning or the loss of grades on an assignment to the failure of a course to a requirement to withdraw from the university.

11. Copyright of Course Materials

All course created material is copyrighted and is for the sole use of students registered in Psyc 398 / Econ 443 (Winter 2019) at Queen's University. This material shall not be distributed or disseminated to anyone other than students registered in this course. Materials generated by instructors of this course may not be posted to commercial course material sites without permission. Failure to abide by these conditions is a breach of copyright, and may also constitute a breach of academic integrity under the University Senate's Academic Integrity Policy Statement. Third party copyrighted materials (such as journal articles) have either been licensed for use in this course or fall under an exception or limitation in Canadian Copyright law.

12. Accommodations for Disabilities

Queen's University is committed to achieving full accessibility for people with disabilities. Part of this commitment includes arranging academic accommodations for students with disabilities to ensure they have an equitable opportunity to participate in all of their academic activities. The Senate Policy for Accommodations for Students with Disabilities was approved at Senate in November 2016 (see <https://www.queensu.ca/secretariat/sites/webpublish.queensu.ca.uslclwww/files/files/policies/senateandtrustees/ACADACCOMMPOLICY2016.pdf>). If you are a student with a disability and think you may need academic accommodations, you are strongly encouraged to contact the Queen's Student Accessibility Services (QSAS) and register as early as possible. For more information, including important deadlines, please visit the QSAS website at: <http://www.queensu.ca/studentwellness/accessibility-services/>

13. Academic Consideration for Students with Extenuating Circumstances

Queen's University is committed to providing academic consideration to students experiencing extenuating circumstances that are beyond their control and are interfering with their ability to complete academic requirements related to a course for a short period of time, not to exceed three months. Students receiving academic consideration must meet all essential requirements of a course. The Senate Policy on Academic Consideration for Students in Extenuating Circumstances was approved at Senate in April, 2017 (see

<http://www.queensu.ca/secretariat/sites/webpublish.queensu.ca.uslclwww/files/files/policies/senateandtrustees/Academic%20Considerations%20for%20Extenuating%20Circumstances%20Policy%20Final.pdf>)

Each Faculty has developed a protocol to provide a consistent and equitable approach in dealing with requests for academic consideration for students facing extenuating circumstances. Arts and Science

undergraduate students can find the Faculty of Arts and Science protocol and the portal where a request can be submitted at: <http://www.queensu.ca/artsci/accommodations>. Students in other Faculties and Schools who are enrolled in this course should refer to the protocol for their home Faculty.

If you need to request academic consideration for this course, you will be required to provide the name and email address of the instructor/coordinator. Please use the following:

Instructor/Coordinator Name: ***Anita Tusche***

Instructor/Coordinator email address: anita.tusche@queensu.ca