NROD60: Current Topics in Neuroscience
Fall 2022

Professor Ravi Thiruchselvam
Course Email: thiruchselvam.nrod60@gmail.com
Seminar Time: Mondays 1 – 3pm
Location: IC 328

This course will focus on current topics in the affective neuroscience of pleasure and reward. The ability to feel pleasure and reward is one of the most fundamental capacities we humans have, and we share it to a large extent with many other species. What are the brain processes that underlie this capacity? How do these processes contribute to our social life, including humour, altruism, and attachment? How do they become dysfunctional in specific forms of psychopathology, such as psychopathy, addiction, and depression? We will explore current scientific debates and emerging findings about the brain bases of pleasure and reward and their role in human psychology.

Course Objectives

It is my hope that, by the end of this course, students would be able to:

1) Understand current scientific debates in the affective neuroscience of pleasure/reward and their connection to foundational theories and findings in the field.
2) Learn how to read and carefully decipher primary scientific articles in affective neuroscience, discerning the meaning and significance of both the core elements and finer details of the articles.
3) Develop critical thinking skills by identifying important weaknesses and limitations in current affective neuroscience research (e.g., in conceptual foundations, methodology, and data analysis or interpretation) and reflecting on potential ways to improve the state of the field.
4) Strengthen oral communication skills by actively engaging with peers and the instructor in thoughtful class dialogue and presentations.
5) Learn to write more effectively by completing reflection papers on assigned readings and a two-stage APA-style research proposal.
6) Identify the broader relevance of the content covered in the class to other academic disciplines (e.g., the arts, political science).

Course Email

All course-related emails must be sent to the following address:
thiruchselvam.nrod60@gmail.com

Messages sent to other addresses (e.g., to Quercus or the instructor's individual email account) may not be answered. Please ensure that the correct email address is used in all of your course-related communications.

Course Webpage/Quercus

The website associated with this course is accessible on Quercus via http://q.utoronto.ca. The syllabus, relevant course documents, and announcements will be posted there. I strongly recommend that you check Quercus regularly.

Office Hours

Office hours will be held over Zoom during Wednesdays 10:30-12pm or by appointment. If you have questions about course content, performance in the class, or neuroscience and psychology more broadly, feel free to schedule a meeting. To do so, please email me at: thiruchselvam.nrod60@gmail.com

Course Evaluation/Marking Scheme

Seminar participation: 15%
Discussion questions: 8%
Article reflections: 25% (two reflections worth 12.5% each)
Student-led seminar discussion: 15%
Research proposal: 37% (12% outline and 25% final paper)

Below, I offer a high-level summary of each of the evaluation components in the course. A more detailed rubric, including the grading scheme, for each of these assessments will be shared separately as the course progresses.

Seminar Participation (15%)

Seminar classes offer an invaluable space to interact directly with your peers and instructor – to openly ask questions, share thoughts, and to ultimately learn from each other. For seminars to be most meaningful, it is important that students actively participate by contributing to class discussions. I invite you to view seminar discussions as an ongoing opportunity to develop and refine your oral communication skills – to learn how to ask better questions, express ideas more clearly, challenge arguments and offer alternative views. In addition to bringing us towards the ideas of *other people*, seminars can also be a helpful vehicle with which to investigate *our own* thinking carefully by inviting real-time feedback from peers and the instructor. To this end, we will aim to cultivate an atmosphere where respectful, non-judgmental dialogue is promoted and self-inquiry is valued. I understand that students may sometimes find it difficult to actively participate for different reasons (e.g., technical issues, shyness). If that is the case, please feel free to schedule office hours meetings with me to discuss potential solutions. Seminar participation will be graded based on regularity of attendance (you are expected to attend all

classes on time) and the thoughtfulness of questions and comments raised during the class discussion.

Discussion Questions (8%)

Prior to every seminar meeting, students will submit two discussion questions for each of the two assigned articles each week, for a total of 4 discussion questions per week. In each case, you are asked to clearly describe the question and add a brief (i.e., 3-5 sentence) explanation about why you believe this specific question is interesting or important. Student discussion questions for each week's assigned readings should be submitted sometime before our seminar meeting, by Monday at 10am at the latest on Quercus. Where possible, I will try to integrate students' questions into the seminar discussion for that meeting.

In addition, I will be posting my own set of discussion questions for the assigned readings each week on Quercus prior to every seminar meeting. You are encouraged to reflect on these questions as you read the assigned articles, as they will help orient your attention to aspects of the readings that will become the focus of our seminar discussions.

Article Reflections (25%)

Throughout the term, students will write two reflection pieces (each worth 12.5%) on a chosen article from our set of assigned readings. Each reflection piece should be between 800-1000 words. The articles you select must come from two different weeks of the course, and they must not fall within the topic you will be presenting on for your student-led seminar discussion. The first and second article reflections are due on October 17th at 11:59pm and November 14th at 11:59pm, respectively.

In the first half of the article reflection, you are asked to summarize the article clearly and succinctly by highlighting the core elements of the article (e.g., the central rationale, methods, and findings for empirical papers, or the key arguments advanced for theoretical papers). In the next half of the reflection piece, you are encouraged to view the article through an independent lens by *going beyond* what the article already describes (and if a seminar has been held, what we have covered in the class discussion). In other words, this latter half of the reflection piece serves as an opportunity to offer novel ideas and perspectives on the article. For instance, you can consider questions such as: *Have the authors (or we the class) failed to consider something important in their article or the discussion thereof? How do you think future research on the topic can be informed by this article? How do ideas and/or findings from this article relate to academic fields outside of neuroscience?* Article reflections will be graded for clarity, depth of understanding, insightfulness, and originality.

Student-led Seminar Discussions (15%)

Working in small groups, you will lead a class discussion for one seminar session to be held in Weeks 9-13 in the course. Your task will be to first summarize and present to the class the assigned readings for that week, and then to elicit and facilitate thoughtful seminar discussion about these readings. Group composition and topic selection will be based on a student

preference survey completed within the first two weeks of the course, and it is expected that each group will consist of 3-4 students (although this may vary based on final course enrollment).

Following some introductory remarks from me about the topic, each group of students will first make a 30-minute presentation to the class summarizing each of the two assigned readings. For empirical articles, the presentation should cover the theoretical background and research strategy (e.g., the rationale for the research question, experimental methods, core findings, and broader implications). If the article being covered is theoretical, the presentation should strive to summarize the core features of the authors' arguments and reasoning clearly and succinctly. During the presentation, the content should be divided up such that each group member speaks for approximately the same amount of time. Groups should practice together to ensure that the necessary information will fit into the allotted time.

The group will then devote the next 45 minutes in the session to generate class discussion about the presented articles. Specifically, the group's goal will be to ask the class questions and elicit their thoughts and insights about important features of the articles. You are encouraged to meet as a group with me prior to the presentation date to clarify outstanding questions and to solicit feedback about strategies to promote thoughtful class discussion about your assigned readings.

Research Proposal (37% total: 12% proposal outline and 25% final paper)

One goal of the course is to generate new hypotheses for research in the affective neuroscience of pleasure and reward. Since the field is relatively young, the possibilities for novel research questions are vast, and you are asked to think creatively to identify new questions and predictions. You will choose a specific topic within affective neuroscience that we cover in the course, review the relevant literature on it, construct novel predictions, design a study to test these predictions, and outline expected findings. This will culminate in an APA-style research proposal.

The research proposal will have two components: a proposal outline (due October 24th at 11:59pm) and a final paper (due December 5th at 11:59pm). The purpose of the initial proposal outline is to help you receive feedback that can then be integrated into the final paper. For the proposal outline, you are asked to submit a brief (i.e., 2-3 page, double-spaced) summary of your planned proposal. This will include a justification of your research question based on a review of the literature and an overview of the research methods, including the study design and key measures. The final research proposal (expected to be 10-12 pages in length, double-spaced) should strive to elaborate on the core elements in your outline and integrate my feedback where possible. Additional details will be provided in class.

Class Format

We will meet in-person on Mondays 1–3pm in IC 328. Class will begin promptly at 1:10pm. In general, I will begin most sessions with a brief lecture, offering context for our discussion of the assigned readings for that week. We will then open the session for class discussion, focusing on the discussion questions that I had posted online for that week. I will also aim to weave together into our discussion the questions that students have submitted prior to the seminar meeting.

Course Outline

I have tried to make the schedule as comprehensive as possible. However, I reserve the right to make minor adjustments as necessary. I will inform you of these changes as soon as possible.

DATE	TOPIC	ASSIGNED READINGS
Week 1 September 12th	Introduction to the course	No Readings
Week 2 September 19th	An overview of pleasure systems in the brain	Berridge & Kringelbach (2008); Lau et al. (2020)
Week 3 September 26th	Pleasure in self-disclosure *Group assignments posted for student-led seminars*	Tamir & Mitchell (2012); Tchalova & MacDonald (2020)
Week 4 October 3rd	Pleasure in humour and music	Mobbs et al. (2003); Salimpoor et al. (2015)
Week 5 October 10th	Reading Week – No Class October 8th – 14th	No reading
Week 6 October 17th	Pleasure in social influence ***Article Reflection #1 Due***	Zaki et al. (2011); Campbell-Meiklejohn et al. (2012)
Week 7 October 24th	Pleasure and pain: Rivals or cousins? ***Research Proposal Outline Due***	Leknes & Tracey (2008); Rozin et al. (2013)
Week 8 October 31st	Pleasure in altruism	Fareri et al. (2012); Harbaugh et al. (2007)
Week 9 November 7th	Pleasure in maternal attachment *Student-led seminar discussion*	Strathearn et al. (2009); Strathearn (2011)
Week 10 November 14th	Dysfunction of pleasure in psychopathology: Psychopathy *Student-led seminar discussion* ***Article Reflection #2 Due***	Buckholtz et al. (2010); Jones & Neria (2019)
Week 11 November 21st	Dysfunction of pleasure in psychopathology: Addiction *Student-led seminar discussion*	Berridge & Robinson (2016); Wand et al. (2007)

Week 12 November 28th	Dysfunction of pleasure in psychopathology: Depression *Student-led seminar discussion*	Schlaepfer et al. (2008); Bewernick et al. (2012)
Week 13 December 5th	Beyond pleasure: Emerging approaches in affective neuroscience *Student-led seminar discussion* **Final Research Proposal Due**	Griffiths et al. (2006); Carhart-Harris et al. (2016)

Reading Assigned Articles

A core aim in the course is to delve deeply into the theoretical and empirical literature on the affective neuroscience of pleasure and reward. I have done my best to select articles that are of reasonable length and complexity. However, some of these articles are dense (as they are written with current researchers in mind) and it may be helpful to read them more than once prior to class. To facilitate a deeper understanding of the assigned readings and to prepare for a thoughtful seminar discussion, please read the articles with at least the following four **general** questions in mind:

1) What claims are being made exactly? Are the claims supported by strong reasoning and evidence? Do you see any problems or concerns?

2) What assumptions are the author(s) making? Are these assumptions reasonable or can they be challenged? In this case, *assumptions* refer to ideas or beliefs that the authors seem to be relying on that are not explicitly stated.

3) For empirical papers: What are the specific methods (e.g., experimental design, independent & dependent variables) being used to investigate the research questions? Do these methods have weaknesses, and if so, how might you have conducted the study differently?

4) How do the articles' claims fit into broader themes in affective neuroscience? How do they relate to other ideas and findings you have encountered in this course or elsewhere?

In addition to these general questions, as noted above I will also be posting **article-specific** questions for each of our readings every week on Quercus. These article-specific questions are meant to highlight important elements of the readings and orient your attention towards aspects of the papers that we will explore in seminar discussions. Please be sure to reflect on these questions as well as you read the articles. In general, both assigned articles each week should be read prior to the seminar meeting. All readings are available through UofT Libraries or Google Scholar and students are responsible for accessing and downloading them.

Assigned Readings

Week 1: Introduction to the course

No assigned readings

Week 2: An overview of pleasure systems in the brain

Berridge, K. C., & Kringelbach, M. L. (2008). Affective neuroscience of pleasure: reward in humans and animals. *Psychopharmacology*, *199*(3), 457-480.

Lau, J. K. L., Ozono, H., Kuratomi, K., Komiya, A., & Murayama, K. (2020). Shared striatal activity in decisions to satisfy curiosity and hunger at the risk of electric shocks. *Nature Human Behaviour*, *4*(5), 531-543.

Week 3: Pleasure in self-disclosure

Tamir, D. I., & Mitchell, J. P. (2012). Disclosing information about the self is intrinsically rewarding. *Proceedings of the National Academy of Sciences*, *109*(21), 8038-8043.

Tchalova, K., & MacDonald, G. (2020). Opioid receptor blockade inhibits self-disclosure during a closeness-building social interaction. *Psychoneuroendocrinology, 113*, 104559.

Week 4: Pleasure in humour and music

Mobbs, D., Greicius, M. D., Abdel-Azim, E., Menon, V., & Reiss, A. L. (2003). Humor modulates the mesolimbic reward centers. *Neuron*, *40*(5), 1041-1048.

Salimpoor, V. N., Zald, D. H., Zatorre, R. J., Dagher, A., & McIntosh, A. R. (2015). Predictions and the brain: how musical sounds become rewarding. *Trends in cognitive sciences, 19*(2), 86-91.

Week 5: Reading week – No class

Week 6: Pleasure in social influence

Zaki, J., Schirmer, J., & Mitchell, J. P. (2011). Social influence modulates the neural computation of value. *Psychological science, 22*(7), 894-900.

Campbell-Meiklejohn, D. K., Simonsen, A., Jensen, M., Wohlert, V., Gjerløff, T., Scheel-Kruger, J., ... & Roepstorff, A. (2012). Modulation of social influence by methylphenidate. *Neuropsychopharmacology, 37*(6), 1517-1525.

Week 7: Pleasure and pain: Rivals or cousins?

Leknes, S., & Tracey, I. (2008). A common neurobiology for pain and pleasure. *Nature Reviews Neuroscience, 9*(4), 314-320.

Rozin, P., Guillot, L., Fincher, K., Rozin, A., & Tsukayama, E. (2013). Glad to be sad, and other examples of benign masochism. *Judgment and Decision Making, 8*(4), 439.

Week 8: Pleasure in Altruism

Fareri, D. S., Niznikiewicz, M. A., Lee, V. K., & Delgado, M. R. (2012). Social network modulation of reward-related signals. *Journal of Neuroscience*, *32*(26), 9045-9052.

Harbaugh, W. T., Mayr, U., & Burghart, D. R. (2007). Neural responses to taxation and voluntary giving reveal motives for charitable donations. *Science, 316*(5831), 1622-1625.

Week 9: Pleasure in maternal attachment

Strathearn, L., Fonagy, P., Amico, J., & Montague, P. R. (2009). Adult attachment predicts maternal brain and oxytocin response to infant cues. *Neuropsychopharmacology, 34*(13), 2655-2666.

Strathearn, L. (2011). Maternal neglect: oxytocin, dopamine and the neurobiology of attachment. *Journal of neuroendocrinology, 23*(11), 1054-1065.

Week 10: Dysfunction of pleasure in psychopathology -- Psychopathy

Buckholtz, J. W., Treadway, M. T., Cowan, R. L., Woodward, N. D., Benning, S. D., Li, R., ... & Zald, D. H. (2010). Mesolimbic dopamine reward system hypersensitity in individuals with psychopathic traits. *Nature neuroscience, 13*(4), 419-421.

Jones, D. N., & Neria, A. L. (2019). Incentive salience & psychopathy: A bio-behavioral exploration. *Personality and Individual Differences*, *138*, 167-176.

Week 11: Dysfunction of pleasure in psychopathology – Addiction

Wand, G. S., Oswald, L. M., McCaul, M. E., Wong, D. F., Johnson, E., Zhou, Y., ... & Kumar, A. (2007). Association of amphetamine-induced striatal dopamine release and cortisol responses to psychological stress. *Neuropsychopharmacology*, *32*(11), 2310-2320.

Berridge, K. C., & Robinson, T. E. (2016). Liking, wanting, and the incentive-sensitization theory of addiction. *American Psychologist*, *71*(8), 670.

Week 12: Dysfunction of pleasure in psychopathology – Depression

Schlaepfer, T. E., Cohen, M. X., Frick, C., Kosel, M., Brodesser, D., Axmacher, N., ... & Sturm, V. (2008). Deep brain stimulation to reward circuitry alleviates anhedonia in refractory major depression. *Neuropsychopharmacology*, *33*(2), 368-377.

Bewernick, B. H., Kayser, S., Sturm, V., & Schlaepfer, T. E. (2012). Long-term effects of nucleus accumbens deep brain stimulation in treatment-resistant depression: evidence for sustained efficacy. *Neuropsychopharmacology, 37*(9), 1975-1985.

Week 13: Beyond pleasure -- Emerging approaches in affective neuroscience

Griffiths, R. R., Richards, W. A., McCann, U., & Jesse, R. (2006). Psilocybin can occasion mystical-type experiences having substantial and sustained personal meaning and spiritual significance. *Psychopharmacology, 187*(3), 268-283.

Carhart-Harris, R. L., Bolstridge, M., Rucker, J., Day, C. M., Erritzoe, D., Kaelen, M., ... & Nutt, D. J. (2016). Psilocybin with psychological support for treatment-resistant depression: an open-label feasibility study. *The Lancet Psychiatry*, *3*(7), 619-627.

Course Policy on Assessments

Disability-Related Accommodations

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the AccessAbility Services Office (http://www.utsc.utoronto.ca/ability/) as soon as possible.

AccessAbility Services staff (located in Rm AA142, Arts and Administration Building) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations. Please contact 416-287-7560 (tel/TTY) or email ability.utsc@utoronto.ca for more information. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.

University's Plagiarism Detection Tool

Normally, students will be required to submit their course essays to the University's plagiarism detection tool for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the tool's reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of this tool are described on the Centre for Teaching Support & Innovation website (https://uoft.me/pdt-faq).

Late Assignment Submission

To maintain fairness and consistency across the class, assignments submitted late that are not supported with legitimate documentation are subject to a penalty of 10% per day. If there are valid reasons warranting an accommodation (e.g., a medical illness), please follow the Missed Term Work policy outlined above.

Department of Psychology Missed Term Work Policy

For missed term work (assignments and term tests) due to illness, emergency, or other mitigating circumstances, please follow the procedures outlined below.

Note:
- The following reasons are not considered sufficient for missed term work: travel for leisure, weddings, personal commitments, work commitments, human error.
- Missed *Final* Exams are handled by the Registrar's Office and should be declared on eService.
- Instructors cannot accept term work any later than five business days after the last day of class. Beyond this date, accommodations are only possible via the Registrar's Office petition process.

> The email address to submit missed term work accommodation requests in **NROD60** is:
> **thiruchselvam.nrod60@gmail.com**

ILLNESS OR EMERGENCY accommodations:
> For missed work due to ILLNESS OR EMERGENCY, complete the following process:
> 1. Complete the Request for Missed Term Work Accommodations Form.
> 2. Declare your absence on ACORN (Profile & Settings > Absence Declaration)
> 3. Email **both** of the following items to the course email **WITHIN 2 BUSINESS DAYS** of the missed work:
>   a. the Request for Missed Term Work Accommodations Form
>   ***AND***
>   b. a screenshot of your Self-Declared Absence on ACORN

Note:
- *If you are unable to submit your request within 2 business days, you must still email your instructor within the 2 business day window to explain the nature of the delay. Exceptions to the 2 business day deadline will only be made under exceptional circumstances.*
- *If your absence is declared on ACORN, we do not require any additional supporting documentation (e.g. medical notes) to support your missed term work accommodation request.*

ACADEMIC CONFLICT accommodations:
> For missed term work due to an ACADEMIC CONFLICT (e.g. two midterms at the same time):
> 1. Complete the Request for Missed Term Work Accommodations Form.
> 2. Take screenshots of your course Quercus pages that demonstrate the conflict.
> 3. Email the form and screenshots to the course email **at least two weeks (10 business days) before the date of the activity,** or as soon as possible if it was not possible to identify the conflict earlier. Requests sent after the activity deadline may not be accommodated.

Note:

- *Multiple assignments due on the same day are <u>not</u> considered conflicts. Students are expected to manage their time effectively to meet assignment deadlines.*
- *Back-to-back tests/quizzes are <u>not</u> considered conflicts. Only overlapping activities are conflicts.*
- *Students are responsible for keeping their course timetables conflict-free. Students who register in two courses with overlapping lecture/tutorial/lab schedules will not be accommodated.*

RELIGIOUS CONFLICT accommodations:

For missed term work due to a RELIGIOUS CONFLICT:
1. Complete the Request for Missed Term Work Accommodations Form.
2. Email the form to the course **email at least two weeks (10 business days) before the date of the activity**, or as soon as possible if it was not possible to identify the conflict earlier. Requests sent after the activity deadline may not be accommodated.

ACCESSABILITY SERVICES accommodations:

For missed *TERM TESTS* due to ACCESSABILITY REASONS:
- **Contact your AccessAbility consultant** and have them email the course email detailing accommodations required.

For missed *ASSIGNMENTS* due to ACCESSABILITY REASONS:
- If your desired accommodation is **within the scope** of your Accommodation Letter (e.g. your letter includes "extensions of up to 7 days" and you need 3 days):
    1. Complete the Request for Missed Term Work Accommodations Form.
    2. Email the form ***AND*** your **Accommodation Letter** to the course email specifying how many days extension you are requesting.
- If your desired accommodation is **outside the scope** of your Accommodation Letter (e.g. your letter includes "extensions of up to 7 days" but you need more time than that):
    1. **Contact your AccessAbility consultant** and have them email the course email detailing the accommodations required.

Accommodation Procedure:

After submitting your documentation, you will receive a response from your instructor or TA. This form does not guarantee that you will be accommodated. The course instructor reserves the right to decide what accommodations (if any) will be made. Failure to adhere to any aspect of this policy may result in a denial of your request. **You are responsible for checking your official U of T email and Quercus course announcements daily**, as accommodations may be time-critical.

For missed assignments, **do not wait for the instructor's response to resume work on your assignment.** Extensions may be as short as one business day, depending on the nature of the illness/emergency. Complete your assignment as soon as you're able, and email it to your instructor.

For an **anticipated absence** (e.g. a scheduled surgery or an illness with a prolonged recovery period), if you would like to request accommodations in advance, submit a Verification of Illness Form completed by your doctor AND the Request for Missed Term Work Accommodations Form to the course email. Absences can be declared up to 14 days into the future on ACORN.

Missed Accommodations

If an accommodation is granted but a continued illness/emergency prevents you from meeting its requirements, you must <u>repeat</u> the missed term work procedure to request additional accommodations. **Please make it clear in your subject line that you are requesting a second**

accommodation. E.g. If you are given an extension but are still sick and need more time, or if you miss a <u>make-up</u> term test, you must submit *another* [Request for Missed Term Work Accommodations Form](#) and declare your extended absence on ACORN. *Note: In the case of a missed make-up test, an opportunity to write a second make-up test may not necessarily be provided.

Academic Integrity

The University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters (http://www.governingcouncil.utoronto.ca/policies/behaveac.htm) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences.

Potential offences in papers and assignments include using someone else's ideas or words without appropriate acknowledgement, submitting your own work in more than one course without the permission of the instructor, making up sources or facts, obtaining or providing unauthorized assistance on any assignment.

On tests and exams cheating includes using or possessing unauthorized aids, looking at someone else's answers during an exam or test, misrepresenting your identity, or falsifying or altering any documentation required by the University, including (but not limited to) doctor's notes.

Religious Accommodations

The University has a commitment concerning accommodation for religious observances. I will make every reasonable effort to avoid scheduling tests, examinations, or other compulsory activities on religious holy days not captured by statutory holidays. According to University Policy, if you anticipate being absent from class or missing a major course activity (like a test, or in-class assignment) due to a religious observance, please let me know as early in the course as possible, and with sufficient notice (at least two to three weeks), so that we can work together to make alternate arrangements.

Masks in the Classroom

While the mask mandate has been paused as of 1 July 2022, the use of medical masks continues to be strongly encouraged at U of T Scarborough in indoor settings where physical distancing is not possible. We ask everyone to respect each other's decisions, comfort levels, and health needs. Masks are available at all building entrances at U of T Scarborough and in all classrooms.