

PSY460H1 S

Seminar in Learning

Winter 2025 Syllabus

Course Meetings

PSY460H1 S

Section	Day & Time	Delivery Mode & Location
LEC0101 Biopsychological Approaches to Study Cognition	Tuesday, 3:00 PM - 5:00 PM	In Person: BL 113

Refer to ACORN for the most up-to-date information about the location of the course meetings.

Course Contacts

Instructor: Professor Kaori Takehara-Nishiuchi

Email: kaori.nishiuchi@utoronto.ca

Office Hours and Location: Virtual. Appointment only

Additional Notes: You can ask questions during the class. If you need to discuss any other issues and concerns, please contact me by sending an email via Quercus. I will try my best to reply to emails within three business days. Office hours will be held by appointment only. Please contact me via Quercus email to book an appointment for a meeting via Zoom or Microsoft Teams.

Course Overview

Examination in depth of a limited topic in human or animal learning. Content in any given year depends on the instructor. Course capacity is limited to 20 students and enrolment priority is given to PSY Specialists and Research Specialists.

Recent advances in research tools open the door to investigating the biological basis of various cognitive processes, such as memory, spatial navigation, decision-making, and social interaction. In this course, we will read and discuss primary research articles on biopsychological experiments using non-human animals to gain insights into how various cognitive processes are implemented in the brain.

Course Learning Outcomes

This course provides valuable opportunities 1) to learn cutting-edge tools in animal research and their applications to study biological bases of cognition and 2) to improve oral and written

communication skills to express your thoughts and ideas on important, contentious questions in comparative and physiological psychology.

Prerequisites: PSY202H1/ ECO220Y1/ SOC252H1/ STA221H1/ ECO220Y5/ PSY202H5/ STA221H5/ PSYC08H3/ STAB27H3/ STAC32H3, **and** PSY260H1/ PSYB38H3

Corequisites: None

Exclusions: None

Recommended Preparation: None

Credit Value: 0.5

It is your responsibility to ensure that you have met *all* prerequisites listed in the Psychology section of the A&S Calendar for this course. If you lack any prerequisites, you will be removed. No waivers will be granted.

Although PSY290 is not a prerequisite for this course, you would enjoy the content with some basic understanding of molecular biology and physiology. Please study a lecture slide (BasicBiology.pdf) in Quercus to ensure that you are prepared to comprehend the research articles covered in this course.

Course Materials

Weekly meeting: Before each class starts, you must read the assigned readings listed in the following section. The assigned chapter in the textbook provides the basic understanding of a topic assigned to each week. Two papers (Paper 1 and 2) are primary research articles reporting groundbreaking results on the topic. For each of the primary research articles, one of you (presenter) will give a short presentation of the content, followed by a class discussion moderated by another student (discussant). Your active participation plays an important part in making the class experience valuable and enjoyable.

Class discussion starts with specific questions on the findings of the assigned article and their implications in the context of other related research (>70% of the time). Subsequently, it moves on to general questions about their relation to real-life examples and implications in mental disorders (<30% of the time). *Please keep in mind that class discussion is training to think critically and objectively.* It is not the time to casually “chat” about your personal feelings and comments on the assigned topic.

Textbook: Fundamentals of Comparative Cognition by Sara Shettleworth (2012) Oxford University Press

Week 1 (January 7th) Primer

Textbook: Chapter 1

Course outline and a short lecture on methodologies used in contemporary biopsychological research

Week 2 (January 14th) Episodic memory

Textbook: Chapter 2, 17 – 34

Paper 1: Food-caching Western Scrub-Jays keep track of who was watching when. Dally JM, Emery NJ, Clayton NS. Science. 2006; 312(5780), 1662-1665.

Paper 2: Replay of episodic memories in the rat. Panoz-Brown D, Iyer V, Carey LM, ... Crystal JD. Curr Biol. 2018; 28(10):1628-1634.

Week 3 (January 21st) Associative learning

Textbook: Chapter 2, 34 - 41

Paper 1: Memory formation in the absence of experience. Vetere G, Tran LM, Moberg S ... Frankland PW. Nature Neuroscience 2019; 22, 933-940.

Paper 2: Partially dissociable roles of the orbitofrontal cortex and dorsal hippocampus in context-dependent hierarchical associations. Peterson S, Chavira J, Garcia Arango JA, Seamans D, Cimino ED, Keiflin R Current Biology. 2024; 34:5532-5545.e3.

Week 4 (January 28th) Concept learning

Textbook: Chapter 2, 41 - 48

Paper 1: Food-caching mountain chickadees can learn abstract rules to solve a complex spatial-temporal pattern. Benedict LM, Heinen VK, Welklin JF, Sonnenberg BR, Whitenack LE, Bridge ES, Pravosudov VV, Current Biology, 2023 33:3136-3144.e5.

Paper 2: Monkeys quickly learn and generalize visual categories without lateral prefrontal cortex. Minamimoto T, Saunders RC, Richmond BJ, Neuron. 2010; 66, 501–507.

Week 5 (February 4th) Spatial navigation

Textbook: Chapter 3, 49-57

Paper 1: Way-finding in displaced clock-shifted bees proves bees use a cognitive map. Cheeseman JF, Miller CD, Greggers U, . . . Menzel R. Proc Natl Acad Sci U S A, 2014; 111(24), 8949-8954.

Paper 2: Development of the hippocampal cognitive map in preweanling rats. Wills TJ, Cacucci F, Burgess N, O'Keefe J. Science. 2010; 328(5985):1573-6.

Week 6 (February 11th) Foraging and Planning

Textbook: Chapter 3, 57-61; 66-72

Paper 1: Western scrub-jays anticipate future needs independently of their current motivational state. Correia SP, Dickinson A, Clayton NS. *Curr Biol*. 2007; 17(10):856-61.

Paper 2: Sensitivity to "sunk costs" in mice, rats, and humans. Sweis BM, Abram SV, Schmidt BJ, ... Redish AD. *Science*. 2018; 361(6398):178-181.

Week 7 (February 18th) Reading week: No class

Week 8 (February 25th) Numerical cognition

Textbook: Chapter 3, 61-66

Paper 1: Basic math in monkeys and college students. Cantlon JF, Brannon EM. *PLoS Biol*. 2007; 5(12):e328.

Paper 2: Numerical representation for action in crows obeys the Weber-Fechner Law. Kirschhock ME, Nieder A. *Psychological Science*. 2023; 34(12):1322-1335.

Week 9 (March 4th) Tool-use

Textbook: Chapter 3, 73-80

Paper 1: Discovery of species-wide tool use in the Hawaiian crow. Rutz C, Klump BC, Komarczyk L, ... Masuda BM. *Nature*. 2016; 537(7620):403-7.

Paper 2: Tool use increases mechanical foraging success and tooth health in southern sea otters (*Enhydra lutris nereis*). Law CJ, Tinker MT, Fujii JA, Nicholson T, Staedler M, Tomoleoni JA, Young C, Mehta RS. *Science* 2024; 384:798–802.

Week 10 (March 11th) Theory of mind

Textbook: Chapter 4, 81-88

Paper 1: Macaques exhibit implicit gaze bias anticipating others' false-belief-driven actions via medial prefrontal cortex. Hayashi T, Akikawa R, Kawasaki K, ..., Hasegawa I. *Cell Reports* 2020; 30(13):4433-4444.

Paper 2: Social agent identity cells in the prefrontal cortex of interacting groups of primates. Báez-Mendoza R, Mastrobattista EP, Wang AJ, Williams ZM. *Science* 2021; 374:eabb4149.

Week 11 (March 18th) Prosocial behaviour

Textbook: Chapter 4, 89-92

Paper 1: Rat behavior and dopamine release are modulated by conspecific distress. Lichtenberg NT, Lee B, Kashtelyan V, ... Roesch MR. Elife. 2018;7. pii: e38090.

Paper 2: Affective mirror and anti-mirror neurons relate to prosocial help in rats. Wu W-Y, Cheng Y, Liang K-C, Lee RX, Yen C-T. iScience. 2023; 26:105865.

Week 12 (March 25th) Social learning

Textbook: Chapter 4, 93-101

Paper 1: Potent social learning and conformity shape a wild primate's foraging decisions. Van de Waal, E., Borgeaud, C., Whiten, A. Science. 2013; 340, 483-485.

Paper 2: Behavioral and neural correlates of hide-and-seek in rats. Reinhold AE, Sanguinetti-Scheck JI, Hartmann K, Brecht M. Science. 2019; 365(6458): 1180-1183.

Week 13 (April 1st) Communication

Textbook: Chapter 4, 101-111

Paper 1: Allometry of alarm calls: black-capped chickadees encode information about predator size. Templeton CN, Greene E, Davis K. Science. 2005; 308(5730):1934-7.

Paper 2: Patterns of call communication between group-housed zebra finches change during the breeding cycle. Gill LF, Goymann W, Ter Maat A, Gahr M. Elife. 2015; 4.

Marking Scheme

Assessment	Percent	Details	Due Date
Presentation	20%		No Specific Date
Discussant	10%		No Specific Date
Research proposal	26%		2025-03-11
Discussion questions	44%		2025-01-14,2025-01-21,2025-01-28,2025-02-04,2025-02-11,2025-02-25,2025-03-04,2025-03-11,2025-03-18,2025-03-25,2025-04-01

Assignment details

Presentation

You are required to present assigned articles at least once during the semester. Your presentation should clearly and concisely explain the assigned paper and include an

introduction to the central hypothesis/question, methods, findings, and conclusions. The presentation should take no more than 20 minutes.

Your presentation will be evaluated based on 1 (poor) to 5 (excellent) scales in the following five categories:

Content --- The presentation must include all the information needed for the audience to understand the main ideas of the article.

Organization --- The presentation should begin with an overview of what will be covered. Each idea or topic should be logically linked to the next topic. In some cases, it may be useful to review previous findings. The presentation should close with a summary of the main points.

Clarity --- The presenter needs to avoid using jargon found in the articles. Translate it to a simple word or phrase so that the audience can understand.

Oral delivery --- The presenter should speak clearly, loudly, and at an effective pace.

Please ensure that the duration of your presentation is less than 20 minutes. Significant overtime (more than 3 minutes) will be penalized by a 20% mark reduction.

Discussant

At least once during the semester, you will play the role of a discussant who moderates the class discussion. It is the discussant's responsibility to ensure the discussion stays on topic and raise points/questions for discussion if necessary.

Discussion questions

By 2 pm on every class time (starting from January 14th), you must submit a one-page paper of questions on the assigned readings on the "Assignments" page in Quercus. Each paper should include 1) three take-home messages from the assigned chapter of the textbook and 2) one question on Paper 1 and another question on Paper 2.

The questions can be points of confusion, issues for further consideration, and follow-up research ideas. Please type in a 12-point font. Put your name and the date at the top, not on a separate page.

Each paper will be marked on a 4-point scale, where 1= off the mark; 2= acceptable, 3 = on the mark; 4 = insightful. Note you receive 0 points for an unacceptable or not-turned-in-on-time paper (because of missed class or lateness). You can earn up to 2 points (50% of the mark assigned to each paper) by actively sharing your thoughts and offering answers to questions raised by other students during the class discussion. As feedback, your mark will be posted in Quercus within one week.

Research proposal

The research proposal is due at 2 pm on March 11th (EST). Please submit your proposal to the "Assignment" page in Quercus. In this assignment, you will propose an experiment (or a series

of experiments) on one of the topics we cover during the course. You need to choose a topic different from the topic of your presentation. Your research proposal should include an introduction, a central hypothesis/question, a detailed method section, and a results section that shows the expected outcome. You might also consider what an unexpected outcome would mean for your hypothesis. Your papers should be a minimum of 12 pages and a maximum of 15 pages (double-spaced pages, not including references, tables, and figures, if any) with the list of references in APA format. Please use 12-point font and 1-inch margins. Include a cover page with your name, student number, and the title of your proposal.

The proposal will be evaluated based on the following criteria:

Importance of the central hypothesis --- The introduction summarizes sufficient background information to demonstrate why your main hypothesis is important.

Effectiveness of experiment(s) --- Sufficient justifications are provided to evaluate whether the proposed experiment is the best way to address the hypothesis.

Logic of expected outcome --- Expected results are logical and are thoroughly explained.

Novelty of research --- No previous publication uses the same methodologies and approaches for addressing the same hypothesis.

Late Assessment Submissions Policy

The research proposal is due at 2 pm on March 11th (EST). The request for the deadline extension should be accompanied by legitimate excuses and must be submitted three business days before the actual deadline. The penalty for late submission without a pre-approved extension is a reduction by 10% of the maximum mark for each business day that the assignment is late (the clock starts at 2:01 pm on March 11th). Therefore, an assignment submitted more than ten business days after the deadline will have a mark of zero recorded for that assignment.

Policies & Statements

Attendance

You will lose 4% points (assigned to Discussion questions) in every class you miss. If you have legitimate excuses, such as family emergencies, illness, and religious holidays, please record your absence through the ACORN online absence declaration. AND within one week of missing a class, please email me how many days you reported as an absence. Then, the missed mark for discussion questions will be re-weighted to those for the remaining weeks. No make-up assignments/presentations will be accepted.

Religious Accommodations

As a student at the University of Toronto, you are part of a diverse community that welcomes and includes students and faculty from a wide range of cultural and religious traditions. For my part, I will make every reasonable effort to avoid scheduling tests, examinations, or other compulsory activities on religious holy days not captured by statutory holidays. Further to University Policy, if you anticipate being absent from class or missing a major course activity (such as 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.

Specific Medical Circumstances

If you become ill and it affects your ability to do your academic work, consult me right away. Normally, I will ask you for documentation in support of your specific medical circumstances. This documentation can be an Absence Declaration (via ACORN) or the University's Verification of Student Illness or Injury (VOI) form. The VOI indicates the impact and severity of the illness, while protecting your privacy about the details of the nature of the illness. If you cannot submit a VOI due to limits on terms of use, you can submit a different form (like a letter from a doctor), as long as it is an original document, and it contains the same information as the VOI (including dates, academic impact, practitioner's signature, phone and registration number). For more information on the VOI, please see <http://www.illnessverification.utoronto.ca>. For information on Absence Declaration Tool for A&S students, please see <https://www.artsci.utoronto.ca/absence>. If you get a concussion, break your hand, or suffer some other acute injury, you should register with Accessibility Services as soon as possible.

Academic Integrity

All suspected cases of academic dishonesty will be investigated following procedures outlined in the [Code of Behaviour on Academic Matters](https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019) (<https://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019>). If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, please reach out to me. Note that you are expected to seek out additional information on academic integrity from me or from other institutional resources. For example, to learn more about how to cite and use source material appropriately and for other writing support, see the U of T writing support website at <http://www.writing.utoronto.ca>. Consult the Code of Behaviour on Academic Matters for a complete outline of the University's policy and expectations. For more information, please see [A&S Student Academic Integrity](https://www.artsci.utoronto.ca/current/academic-advising-and-support/student-academic-integrity) (<https://www.artsci.utoronto.ca/current/academic-advising-and-support/student-academic-integrity>) and the [University of Toronto Website on Academic Integrity](https://www.academicintegrity.utoronto.ca) (<https://www.academicintegrity.utoronto.ca>).

Generative artificial intelligence tools

The use of generative artificial intelligence (AI) tools, including ChatGPT and other AI writing assistants, for the completion of or to support the completion of any assignments in this course is prohibited. Representing an idea that was AI-generated as one's own idea may be considered an academic offense in this course.

Students with Disabilities or Accommodation Requirements

Students with diverse learning styles and needs are welcome in this course. If you have an acute or ongoing disability issue or accommodation need, you should register with Accessibility Services (AS) at the beginning of the academic year by visiting <https://studentlife.utoronto.ca/departments/accessibility-services/>. Without registration, you will not be able to verify your situation with your instructors, and instructors will not be advised about your accommodation needs. AS will assess your situation, develop an accommodation plan with you, and support you in requesting accommodation for your course work. Remember that the process of accommodation is private: AS will not share details of your needs or condition with any instructor, and your instructors will not reveal that you are registered with AS.

Equity, Diversity and Inclusion

The University of Toronto is committed to equity, human rights and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect where all members of our community can express themselves, engage with each other, and respect one another's differences. U of T does not condone discrimination or harassment against any persons or communities.

Departmental Guidance for Undergraduate Students in Psychology

The Department of Psychology recognizes that, as a student, you may experience disruptions to your learning that are out of your control, and that there may be circumstances when you need extra support. Accordingly, the department has provided a [helpful guide](#) to clarify your and your instructor's responsibilities when navigating these situations. This guide consolidates Arts & Science Policies for undergraduate students in one place for your convenience. As an instructor in the department, I will frequently consult with these recommendations when providing you with support, and I recommend that you also consult it to learn more about your rights and responsibilities before reaching out to me.

Course Materials, including lecture notes

Course materials are provided for the exclusive use of enrolled students. These materials should not be reposted, shared, put in the public domain, or otherwise distributed without the explicit permission of the instructor. These materials belong to your instructor, the University, and/or other sources depending on the specific facts of each situation and are protected by copyright. Students violating these policies will be subject to disciplinary actions under the Code of Student Conduct.