NEUR*2000*01, Course Outline: Fall 2020

General Information

Course Title: Introduction to Neuroscience

Course Description:
This course offers an introduction to the mammalian nervous system, with emphasis on the structure and function of the human brain. General principles of the function and organization of nervous systems will be discussed, providing both an overview of the subject and a foundation for advanced courses. Topics will include the physical and chemical bases for action potentials, synaptic transmission, and sensory transduction; anatomy; development; sensory and motor pathways; and the neuroscience of brain diseases.

Credit Weight: 0.5

Academic Department (or campus): Psychology

Semester Offering: F20

Class Schedule and Location:
Alternative delivery asynchronous – AD-A Remote; Officially T/Th 10:00AM - 11:20AM
> **NOTE**: **To reduce disparities evoked by housing condition, caring responsibilities, and quality and consistency of internet access, this course will be administered *asynchronously* for the F20 semester.** Lectures will be provided in a narrated powerpoint format (accessed through CourseLink).

Instructor Information

Instructor Name: Dr. Jennifer Murray
Instructor Email: **jmurr@uoguelph.ca**
Office location: MCKN 4001; ext. 56330
Office hour: zoom drop-in meetings by email arrangement

GTA Information
GTA Name: TBA
GTA Email: TBA
GTA office location: TBA

GTA Name: TBA
GTA Email: TBA
GTA office location: TBA

GTA Name: TBA
GTA Email: TBA

Other office hours by appointment.

Course Content

Specific Learning Outcomes:
1. LO 1.1 – Depth and Breadth of Understanding (1/2 – introduce/reinforce)
2. LO 1.2 – Inquiry and Analysis (1/2 – introduce/reinforce)
3. LO 2.1 – Information Literacy (2 – reinforce)
4. LO 2.5 – Visual Literacy (1 – introduce)
5. LO 4.2 – Written Communication (1 – introduce)
6. LO 5.3 – Ethical Issues in Research (1/2 – introduce/reinforce)

Lecture Content:
The following outlines the anticipated progression of the course. It will largely be clustered into three themes:
1. *Signals and Synapses*
2. *Sensory and Motor Systems*
3. *Growth and Plasticity*

I reserve the right to revise this schedule of content and suggested readings as I deem necessary. It is your responsibility to take note of any changes that are announced as the semester progresses. Lectures will be uploaded onto Courselink the morning of the listed date. Associated recommended reading page numbers are based on the print version of the 6th edition of the textbook.

Date	Topic	Related Readings
Sept 10	Introduction to the Course – use of animals in research – reading scientific literature	Chapter 1(1-11, 13-22)
Sept. 15	Introduction to the Nervous System & Human Neuroanatomy	Chapter 1(1-11, 13-22)
Sept 17	Electrical Signals	Chapters 2(33-41,46-48)
Sept 22	Conduction	Chapters 3(49-63), 4(65-75,77-82) & 5(85-91, 93-98, 101-103, 107-111)
Sept 24	Synaptic Transmission	Same as above.
Sept 29	**Mastery Quiz 1**	
Oct 1	Neurotransmitters & Receptors	Chapter 6(113-128,130-143) & 7(145-158)
Oct 6	Neurotransmitters & Receptors	Chapter 6(113-128,130-143) & 7(145-158)
Oct 8	Plasticity **Literature Summary 1** *due*	Chapter 8(169-175,176-187,189)
Oct 13	*no class*	
Oct 15	**Mastery Quiz 2**	

Date	Topic	Related Readings
Oct 20	Sensory Systems – Touch Sensory Systems – Pain	Chapter 9(193-208) Chapter 10(213-219,221-226,227-230)
Oct 22	Sensory Systems – Visual Pathways	Chapter 11(233-234,236-237,238-242) Chapter 12(262-267)
Oct 27	*no class - SfN*	
Oct 29	*no class – SfN* **Literature Summary 2** *due*	
Nov 3	**Mastery Quiz 3**	
Nov 5	Motor Systems – Lower Motor Neurons	Chapter 16(357-363,364-368)
Nov 10	Motor Systems –Upper Motor Neurons	Chapter 17(382-385,386-393,395-397)
Nov 12	Motor Systems – Basal Ganglia	Chapter 18(407-410,412-419,421-424)
Nov 17	**Mastery Quiz 4**	
Nov 19	Early Brain Development	Chapter 22(491-493,494-498,503-505,514-515)
Nov 24	Neuronal Growth and Guidance and Synapse Formation	Chapter 23(521-527,531-536, 538-546)
Nov 26	Plasticity in Development **Literature Summary 3** *due*	Chapter 25(571-575, 576-579,580-583,588-590)
Dec 1	**Mastery Quiz 5**	
Dec 3	*Presentation viewings*	

Course Assessments:

Assignment or Test	Date	Contribution to Final Mark (%)	Learning Outcomes Assessed
Mastery Quiz 1	**Sept 29 – 10am-10pm**	**17%**	**1-4**
Mastery Quiz 2	**Oct 15 – 10am-10pm**	**17%**	**1-4**
Mastery Quiz 3	**Nov 3 – 10am-10pm**	**17%**	**1-4**
Mastery Quiz 4	**Nov 17 – 10am-10pm**	**17%**	**1-4**
Mastery Quiz 5	**Dec 1 – 10am-10pm**	**17%**	**1-4**
Literature Summary 1	**Oct 8 – 11:59pm**	**4%**	**1-6**
Literature Summary 2	**Oct 29 – 11:59pm**	**4%**	**1-6**
Literature Summary 3	**Nov 26 – 11:59pm**	**4%**	**1-6**
Presentation Feedback 1	**Dec 7 – 11:59pm**	**1%**	**1-6**
Presentation Feedback 2	**Dec 7 – 11:59pm**	**1%**	**1-6**
Presentation Feedback 3	**Dec 7 – 11:59pm**	**1%**	**1-6**

Additional Notes:
Graduate students are often aiming for careers in the academic sector, but the bulk of their training revolves around research. In order to facilitate graduate student learning and experience, I always provide each of my TAs the opportunity to prep and/or deliver a lecture during the semester.

The CourseLink **Mastery Quizzes** will be multiple choice. Questions will be derived from lecture content and assigned readings, not from the literature summary options. Short segments of scientific literature provided directly within the exams may also be used as a source of multiple choice questions.

Literature Summaries are to be based on primary research articles provided in the list below. Students must select *one of the two articles from each topical list*:

       Summary 1: *Signals and Synapses*
             (Adesnik, Nicoll, & England, 2005)
             (Dunwiddie & Lynch, 1978)

       Summary 2: *Sensory and Motor Systems*
             (Carvalho et al., 2017)
             (Holemans, Meij, & Meyer, 1966)

       Summary 3: *Growth and Plasticity*
             (Comishen, Bialystok, & Adler, 2019)
             (Paolicelli et al., 2011)

The full citations are listed below in **Course Resources** and **full PDFs are available on CourseLink**. Literature summaries must be submitted via Dropbox on CourseLink.

Each Literature Summary should be no more than 6 pages (ideally 3-4), double-spaced, plus a title page with your name, student ID, and the citation of the article upon which you are writing. Any other stylistic formatting details are your choice. Your summary should include an overview of the article purpose/justification, methodology, findings, and discussion of those findings. Up to **1% bonus for the overall class grade for each summary (up to 3% total across the three literature summary assignments)** can be earned by **proposing an experiment grounded in course content to test something new based on the findings of the article**. This is a fun opportunity to think and be creative. Each summary will be marked according to the rubric below.

Up to **16 students** may do an oral literature summary on a ***primary** research journal article of *their* choosing* (must be related to any of the topics covered in the course and *approved by me at least three days in advance*). This presentation will **replace the lowest grade of one written literature summary** and will be assessed according to the same rubric as the written literature summaries, with the mark averaged between the assessments of myself and one of the TAs. The format of this assignment will be a 12-15 minute voice-over powerpoint recording, similar to the format of the lectures, and uploaded to CourseLink via Dropbox Oral Summaries

and uploading a Video Note. Sign-up will begin at a well-advertised designated time early in the semester. If you register for one of these oral student presentations and do not upload your presentation by the **Dec 2nd 11:59pm deadline** for _any_ reason, then the three literature summary marks will remain on the books, including any 0 marks, should you have opted to not submit one of the literature summaries.

Final examination date and time: There will be no final exam for the F20 semester. This does not set a precedent for future course offerings.

Final exam weighting: N/A
[Examination Regulations](#)

Course Resources

Required Text:

Neuroscience (6th Edition, 2018) Edited by Dale Purves, George J. Augustine, David Fitzpatrick, William C. Hall, Anthony-Samuel LaMantia, Richard D. Mooney, Michael L. Platt, and Leonard E. White. Published by Sinauer Associates, Oxford University Press. ISBN: 9781605353807

1 copy on 2-hour reserve.

The following are the articles available for Literature Summaries – these are provided in pdf form in CourseLink.

Adesnik, H., Nicoll, R. A., & England, P. M. (2005). Photoinactivation of Native AMPA Receptors Reveals Their Real-Time Trafficking. _Neuron_, _48_(6), 977–985. https://doi.org/10.1016/J.NEURON.2005.11.030

Carvalho, M. M., Campos, F. L., Marques, M., Soares-Cunha, C., Kokras, N., Dalla, C., … Salgado, A. J. (2017). Effect of Levodopa on Reward and Impulsivity in a Rat Model of Parkinson's Disease. _Frontiers in Behavioral Neuroscience_, _11_, 145. https://doi.org/10.3389/fnbeh.2017.00145

Comishen, K. J., Bialystok, E., & Adler, S. A. (2019). The impact of bilingual environments on selective attention in infancy. _Developmental Science_, _22_(4), e12797. https://doi.org/10.1111/desc.12797

Dunwiddie, T., & Lynch, G. (1978). Long-term potentiation and depression of synaptic responses in the rat hippocampus: localization and frequency dependency. _The Journal of Physiology_, _276_(1), 353–367. https://doi.org/10.1113/jphysiol.1978.sp012239

Holemans, K. C., Meij, H. S., & Meyer, B. J. (1966). The existence of a monosynaptic reflex arc in the spinal cord of the frog. _Experimental Neurology_, _14_(2), 175–186. https://doi.org/10.1016/0014-4886(66)90005-7

Paolicelli, R. C., Bolasco, G., Pagani, F., Maggi, L., Scianni, M., Panzanelli, P., … Gross, C. T. (2011). Synaptic pruning by microglia is necessary for normal brain development. _Science (New York, N.Y.)_, _333_(6048), 1456–1458. https://doi.org/10.1126/science.1202529

Other Resources:
CourseLink will be used to facilitate discussion amongst students. A Forum under the Discussions tab has been started labelled 'Questions & Answers'. Use this to engage with your peers in the classroom. You are welcome to initiate Threads within that Forum. Often, one student's struggle with a topic can help reveal gaps in the knowledge of others, and an exchange of ideas improves the experience of learning for everyone. Your participation in this is fully voluntary, however, as it is a very useful tool for reinforcing understanding, I will incentivize this peer engagement as a form of ***extra credit***. The way this will work is as follows: the TAs and myself will monitor student engagement. At the end of the semester, engagement in class discussions will be quantified and replace up to **1% of the overall course grade**. This quantification will depend in large part on the number of Threads and Replies in which you participate (numbers we can see in CourseLink). However, quality of discussion *will* count, and anyone observed to be abusing the system (e.g., repeated copy/pasting or comments with no added content) will forfeit the extra credit solely at my discretion. Again, this is *not compulsory*, but I recommend you 'change your notification settings' in the Subscriptions sub-tab of Discussions in order to be informed of engagement opportunities in which to participate. Further, for the F20 semester, TAs and myself may also engage with the discussions to help facilitate learning given the remote nature of the course.

Zoom is how the TAs will host office hours. They will be keeping track of students who drop in to their office hours. Any student requesting a meeting with the instructor will first have to have participated in TA office hours.

Course Policies

Grading Policies
Your final grade is determined by **5 online mastery quizzes**, **3 literature summaries**, and **3 summaries of presentations** submitted by your peers.

Dates/deadlines, grading policies, and methods of evaluation are not negotiable. There is a total of **4% points available to earn for extra credit** throughout the semester. No further extra credit opportunities will be made available at any point during or after the semester.

Mastery Quizzes are available during a 12-hr window on the day they're assigned. _All_ students will have **3 attempts** to complete each quiz. The highest marked quiz will be the final grade for that assessment. I oppose the use of lock-down browsers, and I fully anticipate that students will use their text and notes to complete each quiz. If students miss one or two quizzes for any reason, including lack of internet, the weight of that grade will be redistributed to the remaining quizzes. Any student missing more than two quizzes for any reason will need to contact the instructor immediately to discuss options.

Literature Summaries are to be submitted electronically ***by 11:59pm on the date they are due***. Beginning 1 min later, at midnight of the next day (according to the time-stamp of submission), each 24-hr delay will result in 25% automatic deduction in the overall available grade for the

summary. A summary submitted 3 days and 1 minute past the due date **will not be graded**. There are no exceptions to this policy. The windows for all three submissions are **already open**, so you're welcome to begin right away.

Each of the literature summaries will be graded according to the following distribution:

    Clarity in demonstrating an understanding of the published research:

        Purpose (1% of final grade)

        Methods (1% of final grade)

        Findings (1% of final grade)

        Discussion (1% of final grade)

    Creativity in thinking beyond the published research to the next step:

        Propose a follow-up experiment (up to 1% bonus)

Each literature summary is worth 4% of the overall grade. An additional *1% of <u>extra credit</u>* can be earned by including a unique proposal for a follow-up study within each summary.
The detailed rubric is as follows:

	Excellent 20-25 points (~80-100%)	Good 17.5-19.9 points (~70-79%)	Acceptable 15-17.49 points (~60-69%)	Minimally Acceptable 12.5-14.9 points (~50-59%)	Unacceptable <12.5 points (<50%)
Purpose (1%)	Demonstrates superior understanding of the general idea/purpose for why the study was conducted. Identifies background information, research question and hypothesis and presents it in a logical, organized manner.	General understanding of the meaning behind the research. Identifies the critical information but lacks organization of the details which allows fluent comprehension of the study's rationale.	Acceptable understanding of the study. Identifies overall purpose but lacks critical aspects of the paper which permit a rational understanding for the study. Lacks organization of information.	Slight understanding of the study. Presents one or two details regarding the purpose. Critical aspects such as research question/hypotheses and the rationale missing. Little to no organization of information present.	Unsatisfactory understanding of the study/lacks information relevant to the experimental rationale.
Methods (1%)	Describes methodology with great detail. Section includes: description of subjects/model (e.g., species, sex, age—If applicable); apparatus including technique(s) and what they measure; and lastly, procedure of the study. Demonstrated comprehension for why the techniques were selected to address the research question.	Provides good summary of methods. Some detail missing in description pertaining to the methodology used and the rationale behind using these techniques to answer research question(s). Logical and organized presentation of information.	Acceptable iteration of the methods, but limited level of detailed description. Still shows a reasonable understanding of why the methodology was used. Rough organization of information.	Limited description of the methodology. Little effort given to show comprehension for why and how techniques were used to study the research question. Little to no organization of information.	Unsatisfactory description of the methods, lacking details of the subjects, apparatus/design, and procedure. Information presented shows little to no comprehension of rationale behind the methods chosen by authors.

Findings (1%)	Exceptional understanding and description of the results. In detail, describes key findings of raw results from a statistically/pattern-based approach (e.g., behavior *y* was greater following test *x*). Information for each test/experiment is organized in a logical manner.	Describes the results with good detail; some components of the findings are missing. Information is organized in a logical manner.	Acceptable description of results but with two or more key findings missing. Little use of scientific language to describe results. Information presented is not well organized.	Limited description of results, missing major findings, and little to no use of scientific language to describe the data. Information presented has little to no organization.	Unsatisfactory description of results/findings. No use of scientific language to describe data and information is not organized in any logical format.
Discussion (1%)	Excellent understanding of the author's discussion. Provides detailed, logical discussion of the findings and describes the "big picture". Touches on the main points brought forth by the authors and reiterates them in own words in an organized and rational manner. Incorporates creative input grounded in previous research and avoids personal opinion/extreme speculation.	Provides adequate discussion with good detail. Missing some concepts/big picture brought forth by the authors. Organized, but has some errors in logical flow of information. Some extreme speculation and/or personal opinion.	Acceptable description of the discussion. Several errors and missing big picture concepts. Discussion is not very well organized, contains some logical leaps and moderate to heavy use of personal opinion.	Shows little comprehension of discussion provided by the authors. Sentences are largely extracted from the discussion in the article and not completely reiterated in own words. Misses the big picture concepts and contains errors.	Omits key findings and provides no reiteration of the meaning of the results or discussion of their significance within the field. Contains errors.
Follow-up (Bonus 1%)	Addresses a notable limitation from current study that can be studied in follow-up experiment(s). Identifies research question and hypothesis based on that limitation and mentions the expected outcome based on the hypothesis. Provides a few sentences describing modification to the current study or proposes new study which is scientifically sound. Provides a statement of potential significance of the proposed experiment(s)	Addresses a limitation from the current study that will be studied with follow-up experiment(s). Missing elements such as hypothesis or research question. Provides a brief prediction based on hypothesis (if hypothesis provided). Indicates required modifications to the current study or proposes new study which is scientifically sound. Statement of significance of the proposed experiment(s) is missing or does not completely follow rationale of the follow-up experiment(s).	Limitation is not addressed/not very well described. Important elements such as hypothesis or research question is missing. Does not provide brief prediction from hypothesis (if hypothesis is provided). Modifies current study or proposes new study which is moderately sound. No statement of significance of the proposed experiment(s) is provided.	No description of a limitation. Simply states a follow-up experiment without reason. Hypothesis, research question and predictions are missing. Little to no description of how the experiment is going to be performed. No statement of significance of the proposed experiment(s) is provided.	No elements of a study proposal are present.

Plagiarism and Corrupt File Policy: Plagiarism involves students using the work, ideas and/or the exact wording of other people or sources without giving proper credit to others for the work,

ideas and/or words in their papers. It includes copying phrasing and segments of texts from sources. Students can unintentionally commit misconduct because they do not know how to reference outside sources properly or because they don't check their work carefully enough before submission. Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

In this course, Turnitin will be active on the Dropbox to detect possible plagiarism, unauthorized collaboration, or copying. You may screen your own assignments through Turnitin as many times as you wish before the deadline. You will be able to see and print reports that show you exactly where your text too closely aligns with that of the original paper you are reviewing and that of prior student submissions. Any Turnitin score over 30% will receive extra scrutiny and may be returned for a required revision with a late penalty. Any Turnitin score over 40% will not be accepted and will be returned for a required revision with a late penalty.

It is the **sole responsibility of the student** to ensure the file they've uploaded is **not corrupted** and is accessible to the instructor and TAs. Any file found to be corrupted during the marking period will automatically receive a 0 for the assignment. The University is seeing increasing cases of students using online 'corruption services' to get an artificial extension. These cases are being deemed fraud and are a form of academic misconduct.

Presentation Summaries are to be completed via Dropbox uploads by Dec 7, 11:59pm. The same late penalty mechanism for the literature summaries apply (25%/day). You are required to view **any 3** of the uploaded student presentations (1% of final grade each), and upload a short summary paper (<1 page) answering the following questions:

      What was the purpose of the research? (33%)
      What techniques were used to address the hypotheses? (33%)
      What were the major findings of the research? (34%)

Turnitin will also be enabled for these assignments. Any Turnitin scores over 20% will not be accepted for these assignments.

Undergraduate Grading Procedures

Course Policy regarding use of electronic devices and recording of lectures:

Electronic recording of classes is **expressly forbidden** without consent of the instructor. When recordings are permitted, they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the instructor. Similarly, any material created by the course instructor or students is intended for those

enrolled in this course solely. <u>Under no circumstances are you allowed to disseminate course materials to external parties</u>.

Online behaviour
According to the University Secretariat, students have a responsibility to help support community members' access to the tools they need to engage in their learning and development, both in and outside of the classroom. An example of this type of responsibility is the requirement to abide by the following:

Section 4.3.3. Disruption - to not interfere with the normal functioning of the University, nor to intimidate, interfere with, threaten or otherwise obstruct any activity organized by the University, including classes, or to hinder other members of the University community from being able to carry on their legitimate activities, including their ability to speak or associate with others.

As such, appropriate online behaviour will not be tolerated. Examples of inappropriate online behaviour include
• Posting inflammatory messages about your instructor or fellow students
• Using obscene or offensive language online
• Copying or presenting someone else's work as your own
• Adapting information from the Internet without using proper citations or references
• Buying or selling term papers or assignments
• Posting or selling course materials to course notes websites
• Having someone else complete your quiz or completing a quiz for/with another student
• Stating false claims about lost quiz answers or other assignment submissions
• Intentionally 'corrupting' an uploaded assignment to artificially extend a deadline
• Threatening or harassing a student or instructor online
• Discriminating against fellow students, instructors and/or TAs
• Using the course website to promote profit-driven products or services
• Attempting to compromise the security or functionality of the learning management system
• Sharing your username and password

University Policies

Academic Consideration

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor in writing, with your name, id#, and e-mail contact. See the academic calendar for information on regulations and procedures for

Academic Consideration: [Academic Consideration, Appeals and Petitions](#)

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community, faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring.

University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:
Academic Misconduct Policy

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual, and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact Student Accessibility Services as soon as possible.

For more information, contact SAS at 519-824-4120 ext. 54335 or email accessibility@uoguelph.ca or the Student Accessibility Services Website

Drop date

The last date to drop one-semester courses, without academic penalty, is **FRIDAY, December 4th, 2020**. For regulations and procedures for Dropping Courses, see the Schedule of Dates in the Academic Calendar.
Current Undergraduate Calendar

Pandemic Disclaimer
Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings and academic schedules. Any such changes will be announced via CourseLink and/or class email. All University-wide decisions will be posted on the COVID-19 website and circulated by email. The University will not require verification of illness (doctor's notes) for the fall 2020 or winter 2021 semesters.