

PSYCH 3J03: Visual Neuroscience

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Office hours	By appointment.
Course Website	Avenue to Learn (avenue.mcmaster.ca) Please check this site regularly for notifications and updates.

**If you require this information in an alternate/accessible format, please contact Dr. Piskuric at (905) 525-9140 ext. 21331.*

Course Aim

This course discusses visual neuroscience from the level of the cell (e.g., photoreceptor transduction) to system (e.g., perceptual processing of faces and motion). Focus will be placed on primary research articles that have contributed to advances in the field.

Intended Learning Outcomes

By the end of this course, students should be able to:

1. Describe the mechanisms underlying visual transduction, processing, and perception.
2. Discuss several major experiments that contributed to our understanding of visual neuroscience.
3. Be able to read data from graphs, and create graphs to represent data.
4. Use critical thinking skills to solve novel problems related to visual neuroscience.
5. Interpret and summarize research articles related to visual neuroscience, and explain their basic scientific significance in an oral presentation format.
6. Work cooperatively and effectively in a team.

Course Format

Tu (seminar)	2:30 – 4:20 PM	ETB 235
Thu (tutorial)	2:30 – 3:20 PM	ETB 235

Prerequisites

PNB 2XA3 or PSYCH 2E03; and one of BIOLOGY 3P03, LIFE SCI 2C03, PNB 2XB3, PSYCH 2D03, 2F03, 2N03, 2NF3; and registration in Level III or IV of an Honours program; or PSYCH 2E03 and ISCI 2A18

Courseware

It is highly recommended that you purchase the PSYCH 3J03 courseware from *The Campus Store* (~\$64). The courseware contains 9 chapters from 3 textbooks that will be discussed throughout the course.

Course Assessment

Participation **10%**

Participation will be based on your **contributions** to seminar and tutorial discussions. Full marks will be awarded for *relevant, constructive, and thoughtful* contributions. Participation in each class will be graded on a scale from 0-1; your final participation grade will be the sum of all classes, weighted to 10%. (Please note that attendance is not considered participation.)

Oral presentations **28% (13%, 15%)**

In groups of 2-3, you will deliver two 25-minute oral presentations based on research articles. Your goal is to teach your audience why the work was done, describe how it was done, identify and explain the most important results, and explain why the results are important. Articles will be assigned two weeks prior to your presentation, so that all groups have an equal amount of preparation time. Please see the rubric on Avenue for details about grading. All members of a group will receive the same grade unless there is a major concern raised by one of the group members; in such cases, a group member's grade may be adjusted as per the discretion of the Instructor.

Peer Feedback **8%**

Following each student presentation, you will complete a brief (<1 pg) peer feedback form to provide your classmates with thoughtful and critical feedback. The Instructor will compile peer feedback into one document and send the results anonymously to the presenters. Peer feedback for each presentation will be graded on a scale of 0-1; your final feedback grade will be the sum of all feedback grades, weighted to 8%.

Homework **9% (3 x 3%; best 3 of 4)**

In each seminar, you will work in groups on in-class exercises that demonstrate course content. Sometimes, the answers will be taken up in class; other times, the problems will be given to you as homework. Your best 3 of 4 homework assignments will contribute to your final grade. In the case of missed homework (i.e., MSAF), your grade will be calculated using the remaining 3 homework assignments.

Midterm **20%**

The midterm examination will take place in class on **Tuesday, October 24th**. The test will begin at 2:30 PM sharp and end at 4:20 PM. **There will be no make-up exam for students who miss the midterm.** For those students who acquire the appropriate missed work documentation (i.e., MSAF), the weight of the midterm will be reallocated to the final exam.

Final Exam **25%**

This course has a final, cumulative examination (short and long answer questions). The exam will be scheduled by the registrar and held during the examination period at the end of the semester.

Academic Accommodation of Students With Disabilities

Students who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each term of study. Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or e-mail sas@mcmaster.ca. For further information, consult McMaster University's Policy for [Academic Accommodation of Students with Disabilities](#).

Other Student Services

The **Student Wellness Centre** (<http://wellness.mcmaster.ca>) provides a range of counseling options, medical services, and wellness programs. The **Student Success Centre** (<http://studentsuccess.mcmaster.ca>) offers academic, personal, and professional support through a variety of programs, tools and resources.

Seeking Help

Please ask the course Instructor or TA for help at any time if you need it. As a learner, it is your responsibility to recognize when you need help and then ask for it.

Missed Work Policy

For absences from classes lasting up to 3 days due to a medical or personal reason:

Using the *McMaster Student Absence Form (MSAF)* on-line self-reporting tool, undergraduate students may report absences lasting up to **3 days** and may also request relief for missed academic work worth less than **25%** of the final grade. The submission of medical documentation is normally not required. Students may use this tool to submit a maximum of **one** request for relief of missed academic work per term. Students must **immediately (within 2 days of the missed work)** follow up with their course instructors regarding the nature of the relief. Failure to do so may negate the opportunity for relief. ***The MSAF tool cannot be used to apply for relief for any final examination or its equivalent.***

Students who (1) are absent for more than 3 days, (2) wish to submit more than one request for relief of missed academic work per term, (3) are absent for reasons other than a medical situation, or (4) missed work worth 25% or more of their grade, cannot use the MSAF tool to request relief. They **MUST** report to their Faculty Office to discuss their situation and may be required to provide appropriate supporting documentation.

For absences from classes lasting more than 3 days, for work worth 25% or more, or for the reporting of more than one request for relief per term: If the reason was medical, the approved McMaster University Medical Form covering the relevant dates must be submitted. The student must be seen by a doctor at the earliest possible date, **normally on or before the date of the missed work** and the doctor must verify the duration of the illness. Relief will not be considered for minor illnesses. If the reason is non-medical, appropriate documentation with verifiable origin covering the relevant dates must be submitted, normally within five working days. In some circumstances, students may be advised to submit a *Petition for Special Consideration (Form A)* seeking relief for missed academic work. In deciding whether or not to grant a petition, adequacy of the supporting documentation, including the timing in relation to the due date of the missed work and the degree of the student's incapacitation, may be taken into account. If the petition is approved the Faculty Office will notify the instructor(s) recommending relief. The student must contact the instructor promptly to discuss the appropriate relief. Failure to do so may negate the opportunity for relief. It is the prerogative of the instructor of the course to determine the appropriate relief for missed term work.

Important Dates

Classes begin	Tuesday, September 5
Last day for registration and drop/add	Wednesday, September 13
Mid-term recess	Monday, October 9 – Sunday, October 15
Last day for cancelling classes	Friday, November 10
Text and exam ban	Thursday, November 30 – Thursday December 7
Last day of classes	Wednesday, December 6
Exams	Friday, December 8 – Thursday, December 21

Notice of changes to course structure

The university reserves the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes. The professor reserves the right to change any and all course requirements if the need should arise. Any change in the course requirements will be posted on the webpage, and the details will be announced in class. Any concerns about announced changes should be addressed with the professor as soon as the changes are announced

Academic Dishonesty

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at www.mcmaster.ca/academicintegrity.

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations.

Grades

Grades obtained in PSYCH 3J03 will be converted according to the following scheme.

90-100%	A+	12	63-66%	C	5
85-89%	A	11	60-62%	C-	4
80-84%	A-	10	57-59%	D+	3
77-79%	B+	9	53-56%	D	2
73-76%	B	8	50-52%	D-	1
70-72%	B-	7	0-49%	F	0
67-69%	C+	6			

List of Topics

Wk	Date	Topic	
1	9/5	Topic	Introduction; Structure Of The Eye And Formation Of Images On The Retina
		Tutorial	How to Create an Effective Scientific Presentation <ul style="list-style-type: none"> • <i>Video:</i> iBio seminar on Creating Effective Presentations by Susan McConnell, a Stanford neuroscientist http://www.ibiology.org/ibioseminars/techniques/susan-mcconnell-part-1.html)
2	9/12	Topic	Phototransduction
		Readings	<ul style="list-style-type: none"> • Nicholls Ch. 20 (Transduction and Transmission in the Retina, 407-419) • Altman, J. (1985) <i>New visions in photoreception. Nature.</i> 313: 264-265.
		Tutorial	Intrinsically-sensitive retinal ganglion cells <ul style="list-style-type: none"> • Freedman MS, Lucas RJ, Soni B, von Schantz M, Muñoz M, David-Gray Z, Foster R (1999) Regulation of mammalian circadian behavior by non-rod, non-cone, ocular photoreceptors. <i>Science</i> 284:502-504. • Berson, D. M., Dunn, F. A., and Takao, M. (2002) Phototransduction by retinal ganglion cells that set the circadian clock. <i>Science</i>, 295:1070–1073.
3	9/19	Topic	Retinal Processing
		Readings	<ul style="list-style-type: none"> • Nicholls Ch. 20 (Transduction and Transmission in the Retina, 420-430) • Matthews, G. & Fuchs, P. (2010) <i>The diverse roles of ribbon synapses in sensory neurotransmission. Nat. Rev. Neurosci.</i> 11: 812-822. (Supplementary)
		Tutorial	<ul style="list-style-type: none"> • Student Presentation
4	9/26	Topic	Effects of Visual Stimuli on Cells in the LGN and Primary Visual Cortex
		Readings	<ul style="list-style-type: none"> • Nicholls Chapter 2 (Signaling in the Visual System)
		Tutorial	<ul style="list-style-type: none"> • Student Presentation
5	10/3	Topic	Functional Architecture of the Visual Cortex
		Readings	<ul style="list-style-type: none"> • Nicholls Chapter 3 (Functional Architecture of the Visual Cortex) • Hubel, D. H., and Wiesel, T. N. (1968) <i>Receptive fields and functional architecture of monkey striate cortex. J. Physiol.,</i> 195: 215–243. (Supplementary)
		Tutorial	<ul style="list-style-type: none"> • Student Presentation
Reading week – no class			
6	10/17	Topic	Colour Vision
		Readings	<ul style="list-style-type: none"> • Chaudhuri Ch. 11 (Colour Vision) • Jacobs, G. H. & de Valois, R. L. (1965) Chromatic opponent cells in squirrel monkey lateral geniculate nucleus. <i>Nature</i>, 206, 487-489.
		Tutorial	<ul style="list-style-type: none"> • Student Presentation
7	10/24	In-class midterm 2:30 – 4:20 PM	
8	10/31	Topic	Intermediate- and high-level visual processing
		Readings	<ul style="list-style-type: none"> • Kandel Ch. 28 (High-Level Processing: Cognitive Influences) • Sheikh, K. (2017, August). How We Save Face – Researchers Crack the Brain’s Facial-Recognition Code. <i>Scientific American</i>, 317(2) Retrieved from https://www.scientificamerican.com/article/how-we-save-face-mdash-researchers-crack-the-brains-facial-recognition-code/
		Tutorial	<ul style="list-style-type: none"> • Student Presentation
9	11/7	Topic	Depth perception and stereopsis
		Readings	<ul style="list-style-type: none"> • Chaudhuri Ch. 12 (Depth Perception and Stereopsis)
		Tutorial	<ul style="list-style-type: none"> • Student Presentation
10	11/14	Topic	Superior colliculus and eye movements
		Readings	<ul style="list-style-type: none"> • Kandel Ch. 39 (The Control of Gaze)
		Tutorial	<ul style="list-style-type: none"> • Student Presentation

11	11/21	Topic	Development of the visual system
		Readings	<ul style="list-style-type: none">• Kandel Ch. 54 (Growth and Guidance of Axons)• Grafstein, B. (2006) Roger Sperry: pioneer of neuronal specificity. <i>J. Neurophysiol.</i>, 96: 2827-2829.• Sperry, R. W. (1944) Optic nerve regeneration with return of vision in anurans. <i>J. Neurophysiol.</i>, 7:57-69. (Supplementary)
		Tutorial	<ul style="list-style-type: none">• Student Presentation
12	11/28	Topic	Plasticity in the visual system
		Readings	<ul style="list-style-type: none">• Kandel Ch. 56 (Experience and the Refinement of Synaptic Connections)• Daw, N.W. (2009) The foundations of development and deprivation in the visual system. <i>J. Physiol.</i>, 587(12):2769-2773.
		Tutorial	<ul style="list-style-type: none">• Student Presentation
13	12/5	Topic	Review