

NROC64: Sensorimotor Systems

I) Course information

Course number: NROC64H3 S

Tuesdays: 3-5 pm

Place: HL 101

Prerequisites: (BIOB30H &) NROB60H, exclusion (but not equivalent): PSY290H

II) Instructor:

Dr. Matthias Niemeier
1265 Military Trail SW550
e-mail: psyb51@utsc.utoronto.ca
Office Hours: Tuesdays 1-2pm

III) Teaching Assistants:

Annabel Fan, Lawrence Guo, Tyler Roberts

IV) Course coverage and goals

A focus on the mechanisms by which the nervous system processes sensory information and controls movement. The topics include sensory transduction and the physiology for sensory systems (visual, somatosensory, auditory, vestibular). Both spinal and central mechanisms of motor control are also covered.

By the end of this course, you will have ...

- developed a foundational understanding of sensorimotor systems
- strengthened your ability to consume scientific literature
- practiced the acquisition of scientific knowledge
- practiced your ability to understand, critique and extend original research in psychology and neuroscience
- trained your ability to effectively communicate scientific knowledge to others

V) Course readings (required/recommended)

A selection of textbook chapters, reviewer articles and research papers will be used. See Excel sheet posted on Quercus

VI) Web pages

Course Web Site: Quercus

Here you will find the syllabus, and announcements. Also, I will put the lecture slides on that page.

Please check on a regular basis for announcements.

VII) Evaluation

5% Quizzes

Format: 10 true/false questions during lectures 2-12, top 8 quizzes will be counted

10% Thought paper 1

Written assignment, 2 pages, double-spaced

10% Thought paper 2	Written assignment, 2 pages, double-spaced
20% Mid-term test 1	Format: short answer questions. 60 minutes.
20% Mid-term test 2	Format: short answer questions. 60 minutes.
35% Final Term test	90 minutes. Same format as the mid-term

Quizzes are meant to encourage you to read and prepare the material for a given lecture ahead of time and properly prepare the facts for the respective lecture. Given this objective, it follows that there is no opportunity to make up for missed quizzes. That said, only the top 8 quizzes will be counted, i.e., missing a quiz wouldn't impact your grade. The material tested in the quizzes comes from the readings for the respective week. Quizzes will consist of 10 yes/no or true/false questions about reading material of the respective lecture. Quizzes will take the first 5-10 min of each lecture. If you have scores for more than 8 quizzes I'll pick your top 8 scores.

The **mid-term tests** and the **final exam** will be equivalent in format and will have short-answer questions only. Short answer questions are more suitable for measuring conceptual understanding of material, beyond memorizing and recognizing facts.

Material on the exams will include lecture material and text readings. Although the topics covered will overlap, different things may be emphasized in class than in the book or other readings. I recommend reading all the materials and I do urge you to attend all classes. If you miss a class, please make sure to have someone take notes for you. Lectures will not be recorded, and please do not tape the lectures.

It is important that students can demonstrate their intellectual command of the subject matter of this course *in its entirety* at the end of the term. Consequently, it is essential that the final exam provide a comprehensive (cumulative) assessment of the course. Given the stress that cumulative final exams produce, students will have the opportunity to take two mid-term tests to gain an interim assessment of their ongoing command of the course material. The mid-term tests will be one hour long. The mid-term tests (20%) will cover Weeks 1 to 4 and 6 to 9 respectively. The final exam (35%) will cover the course in its entirety.

Summary:

- The first midterm (20%) will cover Part I (Weeks 1-4).
 - The second midterm (20%) will cover Part II (Weeks 6-9).
 - A cumulative final exam (35%) will cover all Parts (Weeks 1-4, 6-12)
- = 10% [Part I] + 10% [Part II] + 15% [Part III] = 35%.

However, if your performance on the final exam with respect to Part I and/or Part II is greater than your performance on the respective mid-term test, then I will let your performance on that part of the final exam assume a weight of 30% and your mid-term test grade will not count. In other words, if you can improve from the mid-term test to the final exam, then the mid-term test will be nothing but a practice test. However, there is one condition: your mid-term grade needs to be 40% or better for this rule to apply. That is, it will be imperative to prepare for the mid-term.

Here the formalized rules:

Mid-term 1 = MID1

Mid-term 2 = MID2

Final Part I = FIN1

Final Part II = FIN2
Final Part III = FIN3

If FIN1 better than MID1 **and** if MID1 \geq 40%, then FIN1 weighs 30%, MID1 weighs 0% of total grade.

If MID1 better than FIN1 **or** if MID2 < 40%, then MID2 weighs 20%, FIN1 weighs 10% of total grade.

If FIN2 better than MID2 **and** if MID2 \geq 40%, then FIN2 weighs 30%, MID2 weighs 0% of total grade.

If MID2 better than FIN2 **or** if MID2 < 40%, then MID2 weighs 20%, FIN1 weighs 10% of total grade.

FIN3 always weighs 15%.

Missing mid-term. Under exceptional circumstances students may miss a mid-term test (for details see section XI). If you miss a mid-term for a valid reason then all other parts of your evaluation will be re-weighted proportionally. If you miss two mid-terms for a valid reason you will write a cumulative make-up mid-term that covers mid-term 1 as well as 2.

Final Exam Policies & Procedures. The scheduling of final exams and the granting of petitions to defer final exams are matters that fall entirely within the jurisdiction of the Registrar's Office. If you have any concerns relating to your final exam attendance, please contact the Registrar.

Thought papers. There will be 2 written assignments, called 'thought papers'. Each of them will be 2 pages long, double-spaced. The idea is to write about one of your own ideas about one research paper. Format is as follows

- 1 paragraph Introduction beginning with a 2-3 sentence long summary of the article (perhaps preceded by a more general statement about the concept that is investigated etc. – 'bigger picture') about one research article (see marked below). The Introduction needs to end with a thesis statement.
- It follows about 1, 2, 3 paragraphs on your own thought about the article. Focus on one thought only.
- Conclusions: 1 paragraph. Summarize what you've been talking about

More information about the t-papers will be posted on Quercus. This includes a document on how to write the written assignment and 2 sample papers. Submission is by Turnitin. Late submissions mean a deduction of 10% of the thought paper grade per late day. Do make sure you write a genuine paper. We will feed the papers into Turnitin.

Normally, students will be required to submit their course essays to Turnitin.com 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 Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com website.

Help with Writing

If you would like help with academic writing, the following resources are available to you:

- The Centre for Teaching and Learning (AC312) Writing Centre offers students one-to-one appointments and supplementary materials to help improve upon their writing skills. <http://ctl.utsc.utoronto.ca/home/> <http://ctl.utsc.utoronto.ca/twc/>
- The English Language Development Centre offers support and specialized writing programs for students who do not speak English as their primary language. <http://ctl.utsc.utoronto.ca/eld/>
- Advice on academic writing <http://www.writing.utoronto.ca/advice>

Literature Searches

Students can use the following resources when conducting literature searches to find relevant articles for their presentation and final essay:

The UTSC Library (AC235)

<http://www.library.utoronto.ca/utsc/>

PubMed

<http://www.ncbi.nlm.nih.gov/pubmed>

PsychINFO

<http://www.apa.org/pubs/databases/psycinfo/index.aspx>

Google Scholar

<http://scholar.google.ca/>

Difficulties with the course: Please talk to me if you are having difficulties with the course. The earlier the better. I will try my best and be happy to help. Please note, that as per university policy it is not possible to negotiate better grades for other reasons than merit.

VIII) Schedule

This schedule is subject to changes as we go along, please see Quercus for updates. Bear et al. 2016, Carpenter & Reddi, 2012, and Kandel et al. are textbooks.

Week	Topics	Required readings	Recommended readings
1	Introduction, Optimal sensorimotor transformation, The retina	Bear et al 2016, chapter 10	
2	Primary visual pathway, Bayesian inference for object perception	Kersten & Yuille Curr Opin Neurobiol 2003	Bear et al 2016, chapter 11
3	Touch/haptics, Proprioception	Lederman & Klatzky Att Perc Psychophys 2009 Carpenter & Reddi, 2012 chapter 5 research article TBD	

4	Optimal multisensory perception, Perception for posture	Ernst & Bühlhoff TICS 2004 Carpenter & Reddi, chapter 11	
5	Mid-term 1 (in class, covers weeks 1-4)		
6	Muscle physiology, Motor pathways	Bear et al 2016, chapter 13 + 14(p.485-491)	
7	Motor systems	Carpenter & Reddi, 2012 chapter 9	
8	Optimal feedback control	Pruszynski & Scott EBR 2012 Scott TICS 2012	
9	Cerebellum, BG	Ramnani Nat Rev Neruosci 2006 Calabresi et al Nat Rev Neruosci 2014, only classic direct/indirect pathways	Ito Nat Rev Neruosci 2008 Bruckner Neuron 2013
	Mid-term 2 (covers weeks 6-9)		
10	Oculomotor system	Goldberg chapter in Kandel et al textbook, -p.792, stop before section on cerebral cortex Coiner et al Brain Struct Funct 2019 research article TBD	
11	Reaching	Vesia & Crawford EBR 2012	
12	Grasping	Janssen & Scherberger Annu Rev Neurosci 2015	supplemental video Blake et al IEEE Proced 4th Int Conf Comp Vis 1993
	Final (covers weeks 1-4,6-12)		

IX) AccessAbility Statement

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 as soon as possible. I will work with you and AccessAbility Services to ensure you can achieve your learning goals in this course. Enquiries are confidential. The UTSC AccessAbility Services staff (located in SW302) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations (416) 287-7560 or ability@utsc.utoronto.ca.

X) Academic Integrity Statement

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Toronto is a strong signal of each student's individual academic achievement. As a result, 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 include, but are not limited to: IN PAPERS AND ASSIGNMENTS: 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: Using or possessing unauthorized aids. Looking at someone else's answers during an exam or test. Misrepresenting your identity. IN ACADEMIC WORK: Falsifying institutional documents or grades. Falsifying or altering any documentation required by the University, including (but not limited to) doctor's notes. All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters. If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources (see <http://www.utoronto.ca/academicintegrity/resourcesforstudents.html>).

XI) Missed Term Work due to Medical Illness or Other Emergency:

All students citing a documented reason for missed term work must submit their request for accommodations **within three (3) business days** of the deadline for the missed work.

Students must submit **BOTH** of the following:

- (1.) A completed **Request for Missed Term Work Accommodations form** (<http://uoft.me/PSY-MTW>), and
- (2.) **Appropriate documentation** to verify your illness or emergency, as described below.

Appropriate documentation:

For missed **TERM TESTS** due to **ILLNESS**:

- Submit the Request for Missed Term Work Accommodations form (<http://uoft.me/PSY-MTW>), along with an **original** copy of the official UTSC Verification of Illness Form (uoft.me/UTSC-Verification-Of-Illness-Form) or an **original** copy of the record of visitation to a hospital emergency room. Forms are to be completed in full, clearly indicating the start date, anticipated end date, and severity of illness. The physician's registration number and business stamp are required.

For missed **ASSIGNMENTS** due to **ILLNESS**:

- Submit the Request for Missed Term Work Accommodations form (<http://uoft.me/PSY-MTW>), along with a **hardcopy** of the Self-Declaration of Student Illness Form (uoft.me/PSY-self-declare-form).

For missed term tests or assignments in **OTHER CIRCUMSTANCES**:

Submit the Request for Missed Term Work Accommodations form (<http://uoft.me/PSY-MTW>), along with:

- In the case of a **death of a family member or friend**, please provide a copy of a death certificate.
- In the case of a **disability-related concern**, if your desired accommodation is within the scope of your Accommodation Letter, please attach a copy of your letter. If your desired accommodation is outside the scope of your Accommodation Letter (ex. if your letter says “extensions of up to 7 days” but you need more time than that) you will need to meet with your consultant at AccessAbility Services and have them email Keely Hicks (keely.hicks@utoronto.ca) detailing the accommodations required.
- For U of T Varsity **athletic commitments**, an email from your coach or varsity administrator should be sent directly to Keely Hicks (keely.hicks@utoronto.ca) **well in advance** of the missed work, detailing the dates and nature of the commitment.
- For **religious accommodations**, please email (keely.hicks@utoronto.ca) **well in advance** of the missed work.

Documents covering the following situations are NOT acceptable: medical prescriptions, personal travel, weddings/personal/work commitments.

Procedure:

Submit your (1.) [request form](#) and (2.) [medical/self-declaration](#)/other documents in person **WITHIN 3 BUSINESS DAYS** of the missed term test or assignment.

Submit to: Keely Hicks, Room SW420B, Monday – Friday, 9 AM – 4 PM

Exceptions to the documentation deadline will only be made under exceptional circumstances. If you are unable to meet this deadline, you must email Keely Hicks (keely.hicks@utoronto.ca) **within the three business day window** to explain when you will be able to bring your documents in person. Attach scans of your documentation.

Within approximately one week, you will receive an email response from your instructor detailing the accommodations to be made (if any). **You are responsible for checking your official U of T email and Quercus course announcements daily, as accommodations may be time-critical.**

Completion of this form does NOT guarantee that accommodations will be made. 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 for accommodation.

Instructors cannot accept term work after April 12, 2019. Beyond this date, you would need to file a petition with the Registrar’s Office to have your term work accepted (<https://www.utoronto.ca/registrar/term-work>).

Note that this policy applies only to missed assignments and term tests. Missed final exams are handled by the Registrar’s Office (<http://www.utoronto.ca/registrar/missing-examination>).

XII) webOption

No online section will be available.

XIII) For Your Health

The Health and Wellness Centre (SL270, 416-287-7065) provides diagnostic, treatment and referral services for all illnesses ranging from the medical to psychological to health promotion. The professional staff of physicians, nurses and counselors provides personal advice and assistance with family issues, eating disorders, depression, stress, drug and alcohol abuse, relationship issues, a positive space for gender/sexuality issues, and more.

<http://www.utsc.utoronto.ca/wellness>