

YORK UNIVERSITY
KINESIOLOGY AND HEALTH SCIENCE
AS/SC KINE 4505 3.0 Neurophysiology of Movement in Health and Disease
Fall 2023: IN-PERSON DELIVERY

Course learning objectives: The purpose of this course is to provide students with an overview of current neurophysiological concepts in motor control. Students will study the neurophysiological principles underlying human movement disorders.

Specific learning objectives:

- be able to describe how sensory information gets into the brain, and how it is processed for movement control
- understand and critically examine recent approaches to the treatment of brain damage and disease
- demonstrate the ability to apply theory to practice in the context of clinical case studies
- develop the ability to discuss and write about current movement disorder research

Prerequisites: AS/SC/KINE 3020 Skilled Performance and Motor Learning **or** AS/SC/KINE 3011 Human Physiology I **or** permission of the course director

Course Director: Dr. Lauren Sergio, lsergio@yorku.ca, 2032 Sherman Building
Office hours: By appointment or dedicated Thursday class time
Course Website: This course is run through eClass.

Lectures: Tuesday/Thursday 10h00 -11h20, Sept. 7 to Dec. 5,2023
Location: Tuesdays - 035 HNE; Thursdays - 001 HNE

Required Textbook: Purves et al. Neuroscience, 3rd Ed. or later, Sinauer, MA, USA

Course Evaluation:

Participation (in class – clinical cases, n=8)	24%
Clinical Poster project, see schedule for due date.	12%
Term Paper Outline, see schedule for due date.	4%
Term Paper Rough Draft, see schedule for due date.	8%
Term Paper Final Version, see schedule for due date.	12%
In-class written quizzes on lectures (4 total, see schedule)	40%

Note: Any extensions for projects must be approved by the instructor **PRIOR** to the due date. Late assignments will be penalised 2% per day up to 10% max reduction (for essay, across all 3 elements).

ACCOMODATION IF UNABLE TO BE ON CAMPUS THE DAY OF THE CLASS: If you are unable to make a particular clinical review class, you may write a 1-page summary of the article addressing the questions discussed in class (contact me for the discussion points). ****You may exercise this option only one time per term**.** If you miss a quiz, you can write a make-up during the final exam period.

Structure of class (TIMES ARE APPROXIMATE, MAY VARY DEPENDING ON TOPIC):

Clinical case class (Tuesdays F23): 10h00-10h35 clinical case breakout groups 10h40-11h20 clinical case discussion. Lecture class (Thursdays F23):10h00-11h20: lecture Q & A, individual meetings

INSTRUCTIONS FOR ESSAY ASSIGNMENTS (there are **three of them)**

- Essay components handed in late will be penalized **2% per day up to 10% total (all 3)**
- **See class schedule for due dates (below)**
- Topics listed below are suggestions only. You are free to come up with your own topic to be cleared by the instructor. It needs to contain the themes of neuroscience **and** movement
- Submit all three components through eClass ("Assignments" section)

ESSAY OUTLINE: Please provide a 1 page (max) double-spaced outline of your paper including a brief introduction/rationale to your topic and what aspects of the topic your essay will cover. The rationale should include why the topic is of interest to you! It can be bullet point. Last day to submit is listed below on the class schedule (but I'll take them earlier) to be returned a week later with feedback.

ESSAY ROUGH DRAFT: Please provide a rough draft of your essay that must include 1) A succinct title for your essay 2) Subheadings for each section of the essay, 3) Bullet points within each subheading of what you will be discussing in that section, 4) *The Crucial Bit*: web links and/or citations for the bullet points.

ESSAY FINAL VERSION: Overall, the paper should comprise a general review of the area (from either a review article or a published book) and a discussion of current research on the topic, using at least **four articles from peer-reviewed journals**. At least three of these articles must be original research papers (i.e., not opinion or review pieces). You will be assessed on the thoroughness with which you have researched the topic, the organization of the paper, the cogency of your arguments, and your writing style.

Include an APA style abstract at the beginning of the paper. Follow the American Psychological Association reference system.

Papers may be a **maximum of 10 pages**, double-spaced, with 1" margins and 12 pt font, ****NOT** including references and/or figures**.

Assignment Submission:

Please do one of the following:

Option 1 - TurnItIn: You are requested to submit your final paper into TurnItIn (on eClass) by 23h59 on the same date the assignment is due.

Option 2 - Alternative to TurnItIn: If you do not want to use Turnitin, please let the course director know in advance. You will be required to submit written a report on how you completed your essay (required contents below), along with detailed annotated bibliography. The report and bibliography must be submitted with your assignment when it is due. You will also email an electronic copy of each report and bibliography (with hyperlinked URLs in it) to the course director. You may also be asked to take an oral examination on the topic of your written assignments directed at issues of originality. The written report must contain the following information, as well as anything else you consider useful to the course director on the issue of academic integrity:

1. A list of the documents and other sources you consulted to understand your topic, along with the dates you first used each of them.
2. An explanation of how those documents and sources led you to the other documents and sources you used.
3. An explanation of which of the sources you used had the most influence on your understanding of the topic of your assignment, and how you used them.

The following are some **suggestions for topics**: (you are free to come up with another, it must involve MOVEMENT and neurophysiology).

1. Surgical approaches to the treatment of Parkinson's disease.
 2. Motor rehabilitation following stroke.
 3. Current research on recovery from spinal cord injury.
 4. Current research in cerebellar disorders.
 5. Current research in basal ganglia disorders (e.g. Parkinson's/Huntington's disease).
 6. Apraxia.
 7. Diseases of the neuromuscular junction.
 8. Amyotrophic lateral sclerosis.
 9. The role of the cerebellum in motor learning.
 10. The effects of deafferentation on movement.
 11. Plasticity following stroke/spinal cord injury/traumatic brain injury.
 12. Potential of stem cell therapies for neurological disorders.
 13. Motor recovery after stroke in children.
 14. Sensorimotor integration in the parietal lobe.
 15. Sensory gating mechanisms.
 16. Attention and motor control.
 17. Traumatic brain injury.
 18. Multiple Sclerosis.
 19. Neuroprosthetics/neuromuscular prosthetics
 20. Movement disorders associated with dementia
- In your paper, make sure you discuss specific neurophysiological mechanisms affected by the disorder (if applicable) or involved in the sensorimotor process.

****THE POSTER TOPIC AND THE ESSAY TOPIC MUST BE DIFFERENT****

INSTRUCTIONS FOR CLINICAL POSTER PROJECT

In this project, you need to design an informative poster, similar to one you may see in a physician's office. You may use any image processing software you would like (powerpoint, canva, pixlr, etc.). The poster must explain **concisely** the nature of the disease or the condition in a few points, signs that may be present, and potential treatments that may be available. Your poster will be evaluated on 1) accuracy of the material, 2) brevity of the presentation, and 3) artistic quality of the design (not too busy, not too many design elements, nice balance of text and images, presented in a way that can be taken in and understood by potential person affected by the disorder!)

Example (this one is a bit light on images, but you get the idea):

New cause of Restless Leg Syndrome (RLS)

Symptoms Of RLS	Causes of RLS
<ul style="list-style-type: none"> A sharp pulling, tingling, drawing, bubbling pain beneath the skin in the calf area An irresistible urge to move legs Periodic involuntary limb movements Severe insomnia, anxiety, depression Lack of social activity <p>The symptoms of RLS are most pronounced when the person is relaxing or sleeping and the legs are at rest.</p>	<ul style="list-style-type: none"> Genes An iron deficiency A dopamine and serotonin level imbalance Increased levels of glutamate - New finding! <p>Increased glutamate levels in the brains of RLS sufferers were also found to be directly related to their sleep quality — the higher the glutamate, the more disturbed the sleep of a patient.</p>

RE-EVALUATION POLICY

During the term:

Any requests for remarking of assignments or quizzes must be received by the course instructor within 7 days of the item's mark being posted, along with the "Evaluation item remark request" form, which can be found on the course website. Please note that your mark may be **raised, lowered, or confirmed**.

Re-appraisal of a final grade:

Any requests for re-appraisal of a final mark must be received by the course instructors within 7 days of the final grade posting, along with the "Evaluation item remark request" form, which can be found on the course website. Please note that your mark may be **raised, lowered, or confirmed**. If the result is still unsatisfactory, requests for a reappraisal of the final grade for a completed course are the responsibility of the Undergraduate Director. You must submit in writing a formal request for a **final grade reappraisal** to the KINE undergraduate Office. The 'Reappraisal of Final Grades' form can be picked up at the KINE Undergraduate Office.

For further details: www.registrar.yorku.ca/policies/grade.htm

TECHNOLOGY REQUIREMENT FOR THIS COURSE

This course will be run through eClass. It is designed as an in-person class, which may have a **synchronous** component if required. Thus, you are expected to be present during class time, and be able to access eClass to submit assignments and access class recordings. For privacy & security reasons, in-class clinical case discussions are **NOT** recorded or posted.

IMPORTANT GENERAL INFORMATION

Student Code of Conduct:

Students and instructors are expected to maintain a professional relationship characterized by courtesy and mutual respect and to refrain from actions disruptive to such a relationship. Moreover, it is the responsibility of the instructor to maintain an appropriate academic environment, and the responsibility of the student to cooperate in that endeavor. Students must conduct themselves in accordance with York University's Student Code of Conduct. This includes all aspects of the course, including online environments. A statement of the policy and procedures involving disruptive and/or harassing behaviour by students in academic situations is available at: <https://oscr.students.yorku.ca/student-conduct>.

Student Code of Rights and Responsibilities:

This code is intended to be educative and promote accountability among students toward their peers and other members of the York community. This code identifies those behaviours that are disruptive to the educational purposes of the University, make the campus less safe, diminish the dignity of individuals and groups, and the enjoyment of their rights. It applies specifically to students because the behaviours of non-student members of the University community are held to comparable standards of account by provincial laws, University policies, and their unions' collective agreements. Information about how to address a concern or a complaint regarding a faculty or staff member can be found at: <http://oscr.students.yorku.ca/>.

Academic Integrity:

Students are expected to maintain the highest standards of academic integrity related to issues such as cheating, enabling cheating, plagiarism, authentic documentation, etc. Breaches of academic integrity will not be tolerated.

The School of Kinesiology and Health Science takes academic dishonesty very seriously and will abide by York University's Senate Policy of Academic Honesty to adjudicate all cases. Students are expected to make efforts to discourage any and all (un)intentional breaches from their course work. Students are expected to complete their own work without assistance, in part or whole, on assignments and tests. Students are expected to act in accordance with the Senate Policy of Academic Honesty and are responsible for familiarizing themselves with these guidelines. Breaches of academic integrity will be handled under the disciplinary proceedings as outlined in: <http://calendars.registrar.yorku.ca/2015-2016/policies/honesty/index.htm>.

Calumet and Stong Colleges' Student Success Programming:

[Calumet](#) and [Stong](#) Colleges aim to support the success of Faculty of Health students through a variety of **free programs** throughout their university career:

- [Orientation](#) helps new students transition into university, discover campus resources, and establish social and academic networks.
- [Peer Mentoring](#) connects well-trained upper-year students with first year and transfer students to help them transition into university.
- [Course Representative Program](#) aims to build the leadership skills of its Course Reps while contributing to the academic success and resourcefulness of students in core program classes.
- [Peer-Assisted Study Session \(P.A.S.S.\)](#) involve upper-level academically successful and well-trained students who facilitate study sessions in courses that are known to be historically challenging.
- [Peer Tutoring](#) offers one-on-one academic support by trained Peer Tutors.
- Calumet and Stong Colleges also support students' [Health & Wellness](#), [leadership and professional skills development](#), [student/community engagement and wellbeing](#), [career exploration](#), [Indigenous Circle](#), [awards and recognition](#), and [provide opportunities to students to work or volunteer](#).
- Please connect with your Course Director about any specific academic resources for this class.
- For additional resources/information about our student success programs, please consult our websites ([Calumet College](#); [Stong College](#)), email scchelp@yorku.ca, and/or follow us on Instagram ([Calumet College](#); [Stong College](#)), Facebook ([Calumet College](#); [Stong College](#)) and [LinkedIn](#)
- Are you receiving our weekly email (Calumet and Stong Colleges - Upcoming evens)? If not, please check your Inbox and Junk folders. If you do not find our weekly emails, then please add your 'preferred email' to your Passport York personal profile. If you need support, please contact ccscadm@yorku.ca, and request to be added to the listerv.

Library Help: if you are having issues accessing Primal Pictures, please refer to the help and tutorial links in eClass. If you having trouble with other library content, please go to the York Library website and click on "Chat Is Online", <https://www.library.yorku.ca/web/>.

Learning Commons: Your York home for study help and workshops, <http://learningcommons.yorku.ca/>.

Computing Help: This site has answers to many frequently asked questions, <http://student.computing.yorku.ca/>. In addition, on the right-hand side you can chat directly with someone at the help desk or submit a ticket for more detailed help if necessary.

Student Accessibility Services: If you need assistance with anything related to equity or accessibility, this is a great place to start: <https://accessibility.students.yorku.ca/>.

CLASS SCHEDULE - Fall 2023 (subject to revision)

September 7	Introduction, course overview/design, Neuroanatomy review Readings: CH. 1 textbook; Show and tell group activity
September 12	Clinical case 1: <i>Hydrocephalus</i>
September 14	Topic 2: Neurophysiology Review. Reading: CH. 2
September 19	Clinical case 2: <i>Seizure disorder</i>
September 21	Topic 3,4: Synaptic Communication, Neurotransmitters Reading: CH. 5,6
September 26	Quiz 1 on topics 1-4
September 28	Topic 5: Somatosensory System Reading: CH. 8
Oct 3	Clinical case 3: <i>Phantom limb pain</i>
October 5	Topic 6: Spinal circuitry & brainstem pathways Readings: CH. 15, pp. 371-387
October 17	Clinical case 4: <i>Spinal cord injury treatment</i>
October 19	Topic 7: Organization of the Motor System Readings: CH. 15, pp. 389-392 Topic 8: Spinal cord injury and Motor Neuron disorders Readings: CH. 16, pp. 393-408 / Lundy-Ekman PP. 284-296
October 24	Quiz 2 on topics 5-8
October 26	Topic 9: Basal Ganglia – Structure, Function, Disorders
October 31	Clinical case 5: <i>Cerebellar ataxia</i>
November 2	Topic 10: Cerebellum – Structure, Function, Disorders Readings: CH. 17,18
November 7	Clinical case 6: <i>Obsessive compulsive disorder</i>

****Last day to drop course without receiving a grade: November 8, 2023****

November 9	Topic 11: Parietal dysfunction: Optic Ataxia and neglect syndrome Reading: Parietal syndrome chapter (provided) Topic 12: Premotor cortex Readings: CH. 16 pp. 408-416; mirror neuron video
November 14	Quiz 3 on topics 9-12
November 16	Topic 13: Cortical networks for Movement

November 21	Clinical case 7: <i>Disconnection syndrome</i>
November 23	Topic 14:Stroke – Acute, Reading: Appendix B: pp. 764-767
November 28	Clinical case 8: <i>Post-stroke aphasia</i>
November 30	Topic 15&16:Stroke – Recovery, Rehabilitation & Neuroplasticity Reading: Reading: CH. 24, constraint-induced therapy video
December 5	Quiz 4, topics 13-16

***DUE DATES FOR ASSIGNMENTS* (all due 23h59, eClass)**

Poster Due Monday Oct. 23

Term Paper Outline Due Monday October 30

Term Paper Rough Draft Due Monday November 13

Term Paper Final Version, Due Monday November 20

Final exam (if required) during exam period (December 7-20th, 2023)