UNIVERSITY OF CALGARY

KNES 365 - Sensorimotor Neuroscience
Fall 2022
Faculty of Kinesiology

Approved by WB: July 2022

Course Information

Instructor Name:	**Chris Banman**	**Classroom #:**	**ICT 121**
Phone Number:	**403-220-7810**	**Day(s) Class Meets:**	**Tuesday, Thursday**
Email Address:	**cjbanman@ucalgary.ca**	**Time Class Meets:**	**15:30-16:45**
Office #:	**KNB 2232**	**Course Website:**	**D2L**
Office Hours:	**By Appointment**		

Course Description:
This course focuses on how human movement is coordinated by the nervous system. Major topics and themes covered are the neuromuscular and sensory systems, sensorimotor integration, balance control, spinal cord injuries, movement disorders, and aging. The course will begin with a review of the relevant neuroanatomy and neurophysiology, and emphasis will be placed on the scientific techniques used to study human motor control throughout.

Prerequisites:
Kinesiology 251 and 260

Antirequisite(s):
Credit for Kinesiology 365 and 503.44 will not be allowed.

Course Objectives:
The overall objective is to equip students with the knowledge required to understand basic and clinical aspects of sensory and motor function. This knowledge will be particularly relevant for students interested in neuroscience research or those pursuing careers providing healthcare for athletes (e.g., concussion patients), older adults, or those suffering from neurological disorders and injuries.

Upon completion of this course, it is expected that students will be able to:

i) Describe anatomical and physiological properties of human sensory and motor systems in detail.

ii) Define how sensory and motor systems contribute to complex human motor behaviours (e.g., the control of standing balance or dexterous use of tools).

iii) Describe how different pharmacological agents (drugs) act at the synapse to alter nervous system function.

iv) Understand the sensorimotor mechanisms underlying age-, injury-, and disease-related changes within the nervous system.

v) Understand the basic science behind common clinical neurological tests and interpretation of their results.

vi) Appreciate (*and potentially even contribute to*) the emerging fields of neurorehabilitation and neuroprosthetics.

Course Content:

WEEK	DATE	TOPIC
1	Sept 6, 9	Course Introduction *KNES 251 REVIEW WEEK*: Resting & Action Potentials
2	Sept 13, 15	Axonal Conduction, Synaptic Transmission, Integration of EPSPs/IPSPs, Neuromuscular Junction, Muscle Potentials, Motor Unit Recruitment, Electromyography, Microneurography
3	Sept 20, 22	Somatosensory System I: Muscle Spindles & the Fusimotor System Somatosensory System II: Cutaneous Receptors
4	Sept 27, 29	Somatosensory System III: Golgi Tendon Organs & Joint Receptors Spinal Reflexes I: Anatomy of the Spinal Cord Spinal Reflexes II: Monosynaptic & Polysynaptic Reflexes
5	Oct 4, 6	Spinal Cord Injuries and their Symptomology *****Mid-Term I*** OCTOBER 6, 2022**
6	Oct 11, 13	Visual System I: Visual System Anatomy & Physiology Visual System II: Visuo-Motor Control of Movement
7	Oct 18, 20	Vestibular System I: Vestibular System Anatomy & Physiology Vestibular System II: Vestibulo-Motor Control of Movement
8	Oct 25, 27	Vestibular System III: Clinical Vestibular Testing Human Balance and Locomotion I: Quiet Standing Balance Control
9	Nov 1, 3	Human Balance and Locomotion II: Automatic Postural Responses *****Mid-Term II*** NOVEMBER 3, 2022**
10	Nov 8, 10	**MID-TERM BREAK** **MID-TERM BREAK**
11	Nov 15, 17	Human Balance and Locomotion III: Walking and Running Humans in Space: Sensorimotor Adaptations in Microgravity
12	Nov 22, 24	Mild Traumatic Brain Injuries and Concussion Healthy Adult Aging and its Effects on the Nervous System
13	Nov 29, Dec 1	Clinical Sensorimotor Disorders I: Sensory Dysfunction Clinical Sensorimotor Disorders II: Motor Dysfunction
14	Dec 6	Neuroscience Techniques of the Past, Present, and Future

Required Reading Materials:
N/A

Recommended Reading Materials: (Optional)

1. Purves D., Augustine G. J., Fitzpatrick D., Hall W. C., LaMantia A.-S., White L. E. (2012) Neuroscience. 5th edition. Massachusetts: Sinauer.

2. Kandel E.R., Schwartz J.H., Jessel T.M., Siegelbaum S.A., Hudspeth A.J. (2013) Principles of Neural Science. 5th edition. New York: McGraw Hill.

3. Tresilian J. (2012). Sensorimotor Control and Learning: An Introduction to the Behavioural Neuroscience of Action. New York: Palgrave Macmillan Publishing.

4. Enoka R. M. (2015). Neuromechanics of Human Movement. 5th edition. Illinois: Human Kinetics.

Assessment Components/Expectations

Grading Scale:

Letter	Percent	Grade Point Value	Description
A+	95.0 and above	4.00	Outstanding
A	90.0 - 94.9	4.00	Excellent – Superior performance, showing comprehensive understanding of subject matter
A-	85.0 - 89.9	3.70	
B+	81.0 – 84.9	3.30	
B	77.0 - 80.9	3.00	Good – Clearly above average performance with knowledge of subject matter generally complete.
B-	73.0 - 76.9	2.70	
C+	69.0 - 72.9	2.30	
C	65.0 - 68.9	2.00	Satisfactory – Basic understanding of the subject matter. Grade point average below 2.00 is not sufficient for promotion.
C-	61.0 - 64.9	1.70	**Minimum grade required if needed as a prerequisite course.**
D+	57.0 - 60.9	1.30	
D	54.0 - 56.9	1.00	Minimal pass – Marginal performance, generally insufficient preparation for subsequent courses in the same subject.
F	Below 54.0	0	Fail – Unsatisfactory performance of failure to meet course requirements.

Evaluation of Course Content:

1. Top Hat Participation: 20%
2. Mid-Term I: 20% (Thursday, October 6, 2022)
3. Mid-Term II: 20% (Thursday November 3, 2022)
4. Final Exam: 40% (Date TBD – Registrar Exam Period is December 10-21, 2022)

TOTAL: 100%.

Top Hat Participation (20%):

Each lecture will contain a short quiz designed to test your understanding of the material both going into a new course topic and after each course topic is completed. **These will be available at the beginning of each lecture. Top Hat questions get posted online within the Top Hat platform (please make sure you register for an account using your UCalgary email address and UCID at: https://tophat.com).** These quizzes will allow the instructor to probe the class's knowledge of the course content and help identify content that students are struggling with most. They also serve to get students to engage in active learning through accompanying group discussion and in-class demonstrations. Content related questions will further provide students with sample questions that are similar in difficulty and structure to what they should expect to encounter on the midterm/final exams. Content related questions will be straightforward and based directly on material discussed during lectures; the expectation is that you will get full marks by simply attending and following along with the lectures. These will come in the form of multiple choice or true/false questions, a sentence requiring you to fill in the blanks, a word/definition matching problem, etc. Each question will be worth 1 mark, subdivided as follows: 0.25 for participation, 0.75 for correct answers. Content related quizzes will be equally weighted,

and up to 5 of the student's lowest scores (incorrect answers or zeros from being absent) will be dropped at the end of the course. In addition to content-related quizzes, periodically, Top Hat questionnaires will also be used to gauge other aspects of the student experience, including perceptions of course difficulty, interest level in the material covered, ratings of the instructor's performance, and opinions on the field of neuroscience in general. These questionnaires are specifically designed for the instructor to learn **what works**, **what does not work**, and **how to constantly improve** this course by taking a scientific, data-driven approach.

Midterm Exams (40%):
There will be two midterm exams scheduled during regular class time. The exams are equally weighted (20%) and will take place on **Thursday, October 6, 2022** and **Thursday November 3, 2022**. The midterms will test your knowledge of the course material and challenge you to apply terms and concepts. The midterms will consist of multiple-choice questions and be delivered during class time on these dates.

Midterm Exam Policy:
The Faculty of Kinesiology policy is that all students are expected to write midterm exams on the dates listed on the course outline. Special accommodation may be granted by the instructor in **exceptional circumstances only**, which includes illness, participation in athletic events (varsity, national or international), domestic affliction, and religious conviction. It is the student's responsibility to supply proper documentation and/or notification **prior to** the originally scheduled midterm to support their circumstance. Personal travel plans and arrangements are not valid reasons for requesting a special accommodation for a midterm exam.

Final Exam (40%):
The date, time and location of the final exam will be scheduled by the Registrar's Office (**December 10-21, 2022**). The final exam will test your knowledge of concepts learned in this course. **The final exam will consist of multiple-choice questions that cover the entire content of the course**.

Late Policy:
Top Hat activities must be completed within the allotted time during the class. Late submissions will not be accepted.

Contacting the Instructor:
Students requiring assistance are encouraged to speak with their instructor during class or office hours. If you wish to meet with the instructor outside of office hours, please phone or email the instructor to make an appointment.

Email, while commonly used, does limit the effectiveness of communications and may not be the best way for instructors to answer student questions. Therefore, the instructor may request a telephone call or personal meeting. Your instructor will inform you as to his/her expectations about emails.

Students' Union:
The Faculty of Kinesiology representative is Jessie Dinh and can be reached at kinesrep@su.ucalgary.ca.

Supplementary Course Information

Plagiarism/Cheating/Other Academic Misconduct
(see Calendar https://www.ucalgary.ca/pubs/calendar/current/k.html):
A **single** offence of cheating, plagiarism or other academic misconduct is a serious act that will not be tolerated in the Faculty of Kinesiology. Penalties for such acts will be determined by the Dean and may result in a failing grade, probation, suspension, or expulsion. Any student who is uncertain if an action falls into this category should consult the instructor and/or the Calendar in advance.

Academic Accommodation Policy and Information on Student Accessibility Services:

It is the student's responsibility to request academic accommodation. If you are a student with a documented disability who may require academic accommodation and have not registered with Student Accessibility Services, please contact their office at 403-220-8237. You are also required to discuss your needs with your instructor preferably within the first fourteen (14) days of this course. Students who have not registered with Student Accessibility Services **are not** eligible for formal academic accommodation. For further information, go to http://www.ucalgary.ca/access/. ucalgary.ca/student-services/access/prospective-students/academic-accommodations.

Accommodations on Protected Grounds other than Disability:
Students who require an accommodation in relation to their coursework or to fulfil requirements for an undergraduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to Jodie McGill, Team Lead Student Advising at jdmcgill@ucalgary.ca. Students who require an accommodation unrelated to their coursework or the requirements for an undergraduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Vice-Provost (Student Experience). For additional information on support services and accommodations for students with disabilities, visit www.ucalgary.ca/access/. https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Accommodation-for-Students-with-Disabilities-Procedure.pdf

Intellectual Property:
Course materials created by professor(s) (including presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the professor(s). These materials may not be reproduced, redistributed or copied without the explicit consent of the professor. The posting of course materials to third party websites such as note-sharing sites without permission is prohibited.

FOIP Policy:
The University of Calgary is under the jurisdiction of the Provincial Freedom of Information and Protection of Privacy (FOIP) Act. Please refer to the website for further details. https://www.ucalgary.ca/legal-services/access-information-privacy

Internet and Electronic Communication Device Information:
Any surfing of the Internet during lectures that is not directly related to the class discussion is distracting and strictly forbidden. Additionally, the use of any electronic devices (i.e., cellular phones) for emailing, texting, etc., is strictly prohibited. Please turn **OFF** your phone before the beginning of each lecture unless permitted. Instructors have the authority, at the discretion of the Dean to require that specific course assignments, term papers and academic exercises be submitted in an electronic format.

Library and Resources in the Library:
Visit the University of Calgary's library at http://library.ucalgary.ca/.

Wellness and Mental Health Resources
The University of Calgary recognizes the pivotal role that mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive support when needed. We encourage you to explore the excellent mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through Student Wellness Services (Room 370 MacEwan Student Centre, https://www.ucalgary.ca/wellness-services/services/mental-health-services) and the Campus Mental Health Strategy (http://www.ucalgary.ca/mentalhealth/).

Student Success
The Student Success Centre provides services and programs to ensure students can make the most of their time at the University of Calgary. Our advisors, learning support staff, and writing support staff assist students in enhancing their skills and achieving their academic goals. They provide tailored learning support and advising programs, as well as one-on-one services, free of charge to all undergraduate and graduate students. For more information visit: https://www.ucalgary.ca/student-services/student-success

Student Ombuds Office

The Student Ombuds Office supports and provides a safe, neutral space for students. For more information, please visit www.ucalgary.ca/ombuds/ or email ombuds@ucalgary.ca

Student Union (SU) Information
The SU Vice-President Academic can be reached at (403) 220-3911 or suvpaca@ucalgary.ca; Information about the SU, including elected Faculty Representatives, can be found here: https://www.su.ucalgary.ca

Graduate Students' Association (GSA) Information
The GSA Vice-President Academic can be reached at (403) 220-5997 or gsa.vpa@ucalgary.ca; Information about the GSA can be found here: https://gsa.ucalgary.ca

Emergency Evacuation/Assembly Points
Assembly points for emergencies have been identified across campus. Assembly points are designed to establish a location for information updates from the emergency responders to the evacuees; from the evacuated population to the emergency responders. For more information, see the University of Calgary's Emergency Management website: http://www.ucalgary.ca/emergencyplan/assemblypoints

Safewalk
Campus security will escort individuals, day or night, anywhere on campus (including McMahon Stadium, Health Sciences Centre, Student Family Housing, the Alberta Children's Hospital and the University LRT station). Call 403-220-5333 or visit http://www.ucalgary.ca/security/safewalk. Use any campus phone, emergency phone or the yellow phone located at most parking lot pay booths. Please ensure your personal safety by taking advantage of this service.