THE UNIVERSITY OF BRITISH COLUMBIA

Land Acknowledgement

We respectfully acknowledge the Syilx Okanagan Nation and their peoples, in whose traditional, ancestral, unceded territory UBC Okanagan is situated.

HES 102: Biomechanics

Instructor: Dr. Chris McNeil
Instructor's Email: chris.mcneil@ubc.ca (***use this email instead of Canvas messaging***)
Duration: Term 2 Winter 2025
Delivery Modality: In-Person
Course Location: ASC 140
Course Days: Tue/Thu
Class Hours: 5:00-6:20pm
Office hours: By appointment (i.e., send an email and we'll arrange a time to meet)

Other Instructional Staff (Teaching Assistants)

- Merete Rudolf (mereteru@student.ubc.ca)
- Hailey Tutt (htutt@student.ubc.ca)

Course Description

Application of the elementary principles of physics and math to quantitative analysis of human movement. Analysis will also focus on the development of forces within muscles and their effect on initiating and controlling human movement (pertaining to exercise, physical activity, and rehabilitation). Formerly offered as HMKN 101. Credit will be granted for only one of HES 102 or HMKN 101. [3-0-0] Prerequisite: Registration limited to students in the B.H.E.S. program.

Course Overview, Content, and Objectives

The goal of this course is for students to gain an understanding of how the basic principles of physics may be combined with knowledge of the musculoskeletal system to form a basis for studying human movement. Examples of movement will include those pertaining to exercise and more general activities such as climbing stairs. The motion of objects in sports (e.g., a baseball) will also be investigated. The student should gain an understanding of the use of a quantitative analysis to explain how mechanical principles govern human motion.

Learning Outcomes

Upon successful completion of this course, students will be able to…

1) Understand how two-dimensional rigid-body dynamics can be used to quantify human motion
2) Grasp the cause-and-effect relationship between forces applied to an object and the resultant linear or angular motion of the object
3) Perform mathematical analyses of complex human motion in two dimensions

Assessments of Learning

- Assignments (firm deadlines of January 22, February 5, March 5, and March 31) 30%
- Midterm 1 (February 10) 15%
- Midterm 2 (March 19) 20%
- Final Exam (sometime between April 13-24) 35%

Learning Activities

Lectures are structured to permit extensive practice solving the types of problems that will appear on assignments and exams. Students can work individually, but are encouraged to work together with those seated near to them to solve problems cooperatively. At times, questions will require that an answer be provided via the web-based version of iClicker.

Learning Materials

Given the focus on practice problems, a scientific calculator (i.e., one with trigonometry functions -- sin, cos, tan) is required for all lectures. Although entirely optional, students may find it helpful to bring a small ruler, a protractor, and graphing (a.k.a. grid or engineering) paper to assist in sketching problems accurately.

All electronic communication devices are strictly prohibited during exams, so a cell phone may not be used as a substitute for a calculator. If a programmable calculator (e.g., TI-84 Plus) is brought to an exam, the student will be required to reset the memory in the presence of the instructor or a teaching assistant. It is the responsibility of the student to know how to perform this task. If the student cannot reset the memory of a programmable calculator, the calculator will be confiscated for the duration of the exam.

Textbook:

McGinnis, Peter M., Biomechanics of Sport and Exercise. Human Kinetics Publishers
• 2nd (2004), 3rd (2013), or 4th (2021) edition will be fine.

Learning Resources

HES 102 is included in the Supplemental Learning (SL) program provided by the Student Learning Hub at UBCO. Your SL leader this year is Adriah Buhler. Beginning on January 12th, Adriah will hold peer-facilitated study sessions on Mondays and Wednesdays from 12:30-2:00pm in ART 104.

Late Policy

Assignments will be posted to Canvas, and must be submitted to Canvas within five minutes of the start of the lecture one week later; i.e., before 5:05:00pm). Please note that this deadline already includes a five-minute grace period, so any assignment timestamped after the appointed time will be considered late. As soon as you know an illness or other unexpected circumstance will prevent you from meeting the deadline, send me an email and complete the online HES self-declaration form. Without an approved form, assignments received after the appointed time will be considered late and assessed the following penalties:
<1 hour: 10% deducted from grade
1-24 hours: 20% deducted from grade
24-48 hours: 50% deducted from grade
>48 hours: a grade of zero

Missed Exam Policy

All exams will be a combination of multiple-choice, short answer and calculation questions. An equation sheet will be provided.

Midterm exams will be held during class time. When a midterm exam is missed, the student is required to contact the instructor as soon as possible. In the event of a medical reason, the School's Self Declaration Form must be completed, ideally prior to the exam. Without a valid reason for a missed exam, the student will receive a grade of zero. If there is a valid reason for the missed exam, the student may choose to: a) work with the instructor to schedule a make-up exam at the earliest opportunity; b) shift weighting of the midterm exam (15 or 20%) to the final exam; i.e., the final exam will be worth 50 or 55%. A known absence (e.g., a varsity sporting event) must be brought to the attention of the instructor as soon as the student is aware of the conflict.

The final exam is cumulative. It will take place during the exam period and, except for cases of an examination hardship / clash or academic concession (see the Final Examinations section on page 5 of this document for more information), must be written at the scheduled time. Hence, students should not book travel until after the exam schedule has been published.

For all exams, students will be required to sign in and show their student card or a piece of government-issued photo ID.

Passing/Grading Criteria

• The teaching assistants (TAs) do the marking for the course. If a student has a question/concern about the grade on an assignment or exam, the first step is to make an appointment with the TA who marked the work. If the matter cannot be resolved with the TA, email the instructor to make an appointment. Please note, if the instructor regrades the assignment, it is possible that the grade can increase, stay the same or decrease.
• Unless there are exceptional circumstances, students have one week from the date that assignments are returned (or exam grades are posted) to initiate the process of appealing a grade.
• The final grade of every student will reflect their actual performance during the term; i.e., there will be no rounding of grades (e.g., from 49% to 50% or 79% to 80%). To hand out extra marks here and there or offer additional assignments to select students would be unfair to the class as a whole and, in the grand scheme of things, would undermine the degree that each student is seeking.

Tentative Course Schedule (with Associated Textbook Readings)

Date	Topic	Textbook
Tuesday, January 6	Course syllabus; Intro to biomechanics	Introduction
Thursday, January 8	Math review; Forces	Chapter 1
Tuesday, January 13	Forces	Chapter 1
Thursday, January 15	Forces; **assignment 1 posted**	Chapter 1
Tuesday, January 20	Forces & Linear kinematics	Chapters 1 & 2
Thursday, January 22	Linear kinematics; **assignment 1 due**	Chapter 2
Tuesday, January 27	Linear kinematics & Linear kinetics	Chapters 2 & 3
Thursday, January 29	Linear kinetics; **assignment 2 posted**	Chapter 3
Tuesday, February 3	Linear kinetics	Chapter 3
Thursday, February 5	**Review for midterm exam**; **assignment 2 due**	
Tuesday, February 10	**Midterm exam 1**	
Thursday, February 12	Work, power and energy	Chapter 4
Tuesday, February 17	**Reading Week – no lecture**	
Thursday, February 19	**Reading Week – no lecture**	
Tuesday, February 24	Work, power and energy	Chapter 4
Thursday, February 26	Torques & moments of force; **assignment 3 posted**	Chapter 5
Tuesday, March 3	Torques & moments of force	Chapter 5
Thursday, March 5	Angular kinematics; **assignment 3 due**	Chapter 6
Tuesday, March 10	Angular kinematics	Chapter 6
Thursday, March 12	**OCRS conference – no lecture**	
Tuesday, March 17	**Review for midterm exam**	
Thursday, March 19	**Midterm exam 2**	
Tuesday, March 24	Angular kinetics; **assignment 4 posted**	Chapter 7
Thursday, March 26	Angular kinetics	Chapter 7
Tuesday, March 31	Mechanics of biological materials; **assignment 4 due**	Chapter 9
Thursday, April 2	**No lecture**	
Tuesday, April 7	Neuromuscular system	Chapters 11 & 12
Thursday, April 9	**Review for final exam**	

Other Course Policies:

Final Examinations

You can find the Senate-approved term and examination dates here. Except in the case of examination clashes and hardships (three or more formal examinations scheduled within a 27-hour period) or unforeseen events, students will be permitted to apply for out-of-time final examinations only if they are representing the University, the province, or the country in a competition or performance; serving in the Canadian military; observing a religious rite; working to support themselves or their family; or caring for a family member. Unforeseen events include (but may not be limited to) the following: ill health or other personal challenges that arise during a term and changes in the requirements of an ongoing job.

Further information on Academic Concession can be found under Policies and Regulation in the Okanagan Academic Calendar.

Grading Practices

Faculties, departments, and schools reserve the right to scale grades in order to maintain equity among sections and conformity to University, faculty, department, or school norms. Students should therefore note that an unofficial grade given by an instructor might be changed by the faculty, department, or school. Grades are not official until they appear on a student's academic record.

Further information on Grading Practices can be found in the Okanagan Academic Calendar.

UBC Values

UBC creates an exceptional learning environment that fosters global citizenship, advances a civil and sustainable society, and supports outstanding research to serve the people of British Columbia, Canada, and the world. UBC's core values are excellence, integrity, respect, academic freedom, and accountability.

About the Academic Integrity Matters (AIM) Program

AIM is a program that provides help and supports with academic integrity (AI) issues for undergraduate and graduate students. Please contact aim.ok@ubc.ca for any questions or for a 1-on-1 appointment with an AIM consultant.

Statement on Academic Misconduct

Academic integrity is integral to UBC as an institution of higher learning and research. Violations of academic integrity (i.e., academic misconduct) harm the academic enterprise; as a result, serious consequences arise and penalties may be imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred for consideration for academic discipline. Careful records are kept to monitor and prevent recurrences. Any instance of cheating or taking credit for someone else's work, whether intentionally or unintentionally, can and often will result in at minimum a grade of zero for the assignment, and these cases will be reported to the Head of the Department and Associate Dean Academic of the Faculty.

A more detailed description of academic integrity, including the University's policies and procedures, may be found in the Academic Calendar.

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Resources to Support Student Success:

Visit the Student Support and Resources page to find one-on-one help or explore resources to support your experience at UBC Okanagan, as well as many other campus services available to all students.

Disability Resource Centre

The Disability Resource Centre (DRC) facilitates disability-related accommodations and programming initiatives to that remove barriers for students with disabilities and/or ongoing medical conditions. If you require academic accommodations to achieve the objectives of a course, please contact the DRC at:

UNC 215
Phone: 250.807.8053
Email: drc.questions@ubc.ca
Web: https://students.ok.ubc.ca/academic-success/disability-resources/

Equity and Inclusion Office

Through leadership, vision, and collaborative action, the Equity & Inclusion Office (EIO) develops action strategies in support of efforts to embed equity and inclusion in the daily operations across the campus. The EIO provides education and training from cultivating respectful, inclusive spaces and communities to understanding unconscious/implicit bias and its operation within in campus environments. UBC Policy 3 prohibits discrimination and harassment on the basis of BC's Human Rights Code. If you require assistance related to an issue of equity, educational programs, discrimination or harassment please contact the EIO.

ADM 100B & 100C
Phone: 250.807.9291
Email: equity.ubco@ubc.ca
Web: https://equity.ok.ubc.ca/

Student Wellness

At UBC Okanagan, health services to students are provided by Student Wellness. Nurses, physicians and counsellors provide health care and counselling related to physical health, emotional/mental health, and sexual/reproductive health concerns. As well, health promotion, education and research activities are provided to the campus community. If you require assistance with your health, please contact Student Wellness for more information or to book an appointment.

UNC 337
Phone: 250.807.9270
Email: healthwellness.okanagan@ubc.ca
Web: https://students.ok.ubc.ca/health-wellness/

Office of the Ombudperson

The Office of the Ombudsperson for Students is an independent, confidential and impartial resource to ensure students are treated fairly. The Ombuds Office helps students navigate campus-related fairness

concerns. They work with UBC community members individually and at the systemic level to ensure students are treated fairly and can learn, work and live in a fair, equitable and respectful environment. Ombuds helps students gain clarity on UBC policies and procedures, explore options, identify next steps, recommend resources, plan strategies and receive objective feedback to promote constructive problem solving. If you require assistance, please feel free to reach out for more information or to arrange an appointment.
UNC 217
Phone: 250.807.9818
Email: ombuds.office.ok@ubc.ca
Web: https://ombudsoffice.ubc.ca/

Student Learning Hub
The Student Learning Hub is your go-to resource for free math, science, writing, and language learning support. The Hub welcomes undergraduate students from all disciplines and year levels to access a range of supports that include **tutoring in math, sciences, languages, and writing, as well as help with academic integrity, study skills and learning strategies**. Students are encouraged to visit often and early to build the skills, strategies and behaviors that are essential to being a confident and independent learner. For more information, please visit the Hub's website.
LIB 237
Phone: 250.807.8491
Email: learning.hub@ubc.ca
Web: https://students.ok.ubc.ca/academic-success/learning-hub/

The Global Engagement Office
The Global Engagement Office provides advising and resources to assist International students in navigating immigration, health insurance, and settlement matters, as well as opportunities for intercultural learning, and resources for Go Global experiences available to all UBC Okanagan students, and more.
UNC 227
Email: ubco.global@ubc.ca
Web: https://students.ok.ubc.ca/about-the-avp-students-portfolio/directory/global-engagement-office/

Safewalk
Don't want to walk alone at night? Not too sure how to get somewhere on campus? Call Safewalk at **250-807-8076**.
Web: https://operations.ok.ubc.ca/security-and-emergencies/safewalk/