



HK*4070 Clinical Biomechanics

Winter 2021

Section(s): C01

Department of Human Health and Nutritional Sciences

Credit Weight: 0.50

Version 1.00 - January 06, 2021

1 Course Details

1.1 Calendar Description

This course covers functional anatomy, neurophysiology and mechanical characteristics of humans at the tissues and whole-body levels. Pathomechanics of human movement resultant from disease, abuse or trauma will be examined. Special emphasis will be placed on etiology, testing and correction of functional disorders with special reference to balance, gait and orthopaedic biomechanics.

Pre-Requisites: ENGG*2660 or (HK*2270, HK*3600)

1.2 Course Description

This course is designed to explore the theoretical basis of clinical biomechanics and expose students to the skills necessary to work in the area. Special emphasis will be in the areas of: Posture and Balance, Gait, and Orthopedic Biomechanics. Lectures will cover the theory underlying normal musculoskeletal and neural control system function using physics and engineering concepts. Clinical and pathological examples will be discussed to highlight differences from the healthy state, and explore how these differences arise.

Note: The prerequisites of HK*2270 and HK*3600 may be waived for Biological/Biomedical Engineering students at the discretion of the course instructor.

1.3 Timetable

- Lectures: Tuesday/Thursday 1:00 PM - 2:20 PM (asynchronous* - recorded and posted to Courselink)
- Tutorials/Labs (synchronous - via Zoom conference link)
 - Section 0102 Wednesday 10:30 AM - 12:20 PM

▫ Section 0103 Thursday 2:30 PM - 4:20 PM

*some lectures will be synchronous - noted in Class Schedule section

1.4 Final Exam

Exam time and location is subject to change. Please see WebAdvisor for the latest information.

2 Instructional Support

2.1 Instructional Support Team

Instructor: Emma Plater PT
Email: plater@uoguelph.ca
Office Hours: Synchronous Q&A: Mondays 1-3 via Zoom conference link

TEACHING ASSISTANTS:

Jenna Pitman (PhD student) - pitmanj@uoguelph.ca

Avery Hinks (MSc student) - ahinks@uoguelph.ca

Meaghan Walsh (MSc student) - mwalsh07@uoguelph.ca

TAs will be available to answer questions about Critical Reviews and Group Case Projects in the scheduled Tutorial Time periods. Outside this time period they may be available to meet with you by appointment; please email them to coordinate a mutually suitable time.

The instructional support team will monitor the Discussion Board on CourseLink regularly. It is strongly recommended that students post all content-related questions to the Discussion Board instead of e-mailing the instructional support team directly so that all students in the class can benefit from the answers. Students are encouraged to answer their peers' questions on the Discussion Board when able.

3 Learning Resources

3.1 Required Resources

Lecture Slides (Notes)

Lecture slides will be posted on Courselink <http://courselink.uoguelph.ca> on a weekly basis for the subsequent week lectures (~ Monday mornings).

Journal Articles (Article)

We will be focusing on Critical Reading skills this term. These skills will be critical for the group Case Study final report.

3.2 Additional Resources**Clinically Oriented Anatomy (Textbook)**

- Moore, K.L. and Dalley, A.F. Clinically oriented anatomy (5th edition). Lippincott Williams and Wilkins, 2006. May be helpful as a reference on occasion.
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4 Learning Outcomes**4.1 Course Learning Outcomes**

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

1. Gain increased knowledge about the role of the sensory systems in balance and mobility control.
 2. Gain increased knowledge about the impact of different health conditions and pathologies on balance and mobility.
 3. Gain experience with performing critical reviews of published scientific findings.
 4. Gain knowledge and practice performing different clinical tests designed for the assessment of posture and mobility at different stages of lifespan development and/or for different health conditions.
 5. Gain experience reading and performing clinical case reports.
 6. Gain project management experience and gain skills to manage and navigate group dynamics over the course of conducting the final case study report.
 7. Gain greater understanding and experience with preparing a clinical case report using the scientific method.
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5 Teaching and Learning Activities**5.1 Summary of Laboratories**

We will use laboratory time throughout the course to:

- Gain hands on experience with reviewing clinical tests that will be useful in the

group case report

- Participate in "Journal Club" discussions of published journal articles in the field
- Meet with group members and Teaching Assistants (TAs) to discuss the clinical case study project milestones and challenges

Critical Reviews

This individual assignment is meant to develop students' critical appraisal skills, as keeping up-to-date with relevant literature is very important for clinical practice. Students will select a paper from a list provided on CourseLink and will write a summary and critical appraisal of their chosen paper.

- Target audience is clinicians who are considering a specific rehabilitation technique to improve postural stability in their patient population.
- The critical review should be written using a formal tone (third person) no more than 4 pages, 1 inch margins, 1.5 spacing and should provide a detailed Analysis of the Text.
- Each critical review will have a different focus and will build on the one before it (i.e. 1. Focus on Research Question, 2. Focus on Methodology, 3. Focus on Full Paper)
- Students will produce a visual summary of each review (e.g. infographic) in a format that could be shared on social media. Only the final summary will be marked; the first two will give students a chance to practice developing this material and receive feedback.

Clinical Case Report

The small-group case report represents a large evaluation component of the course and is problem-based. Students are asked to get into groups of 4 individuals in the same laboratory section. Each group will select a clinical case study from a list provided on CourseLink. Using a problem based learning approach students will work together to perform independent research on a given pathology (review of anatomy, physiology, neural, biomechanical literature), determine the appropriate clinical test(s) they would perform to assess the balance/mobility of their fictional 'patient' and provide suggestions for rehabilitation techniques. Students are encouraged to use any of the assessment tools discussed in this course to strengthen their report.

Each group will submit the following (1 per group):

- Proposal
- Up to 5 additional questions about the case
- Written "Clinical Case Study Report" to summarize their findings
 - This report is expected to be professional.
 - Please follow the format outlined for most traditional Case Reports (can find on PubMed, etc)
 - Structure: Abstract, Background and Purpose, Case Description, Outcomes, Discussion
 - Word limit: 2,000 words (excluding abstract and references)
 - Please provide important details (patient history, background information on the pathology, intervention, and outcome information.
 - References: No more than 20
- Power Point presentation summary of case study
 - Maximum 5 minutes (MUST be succinct and only contain the MOST appropriate information!)
 - Maximum 4 slides - recommended to have 1 slide per presenter
 - Target audience = clinicians; this is meant to mimic clinical "grand rounds" where clinicians gather and each has a very brief time to summarize patient background, progress and plan moving forward
 - Students will record their presentations ahead of time, upload and the class will watch the presentations during lab time
 - Audience members will participate in peer evaluation and are strongly encouraged to ask questions of their peers
- Patient information handout
 - Maximum 1 page double-sided (can be structured as full page or as folded pamphlet), 1 inch margins, 1.5 spacing, font no smaller than 12 (but larger recommended)
 - Target audience = specific "patient" from case; this is meant to be information the clinician would provide to their patient
 - Include information about the condition, the tests done and what the results mean, details on the rehabilitation plan (i.e. instructions on how to perform any exercises assigned); can also include 1-3 links for further information but these MUST be patient-friendly resources. Students are encouraged to imagine themselves as their patient to help guide what the patient would want to know with respect to their condition and clinical experience.

- Note: everyone in a group will normally receive the same mark for the project. However, the instructor reserves the right to assign a higher or lower mark to individuals who have done much more or much less than their share of the allotted work, by consensus of their group.

5.2 Class Schedule

Material presented in class and laboratories may vary slightly from that depicted here.

Week	Dates	Lectures	Lab Content	Due dates
1	Jan 11-15	Lecture 1: Introduction *SYNCHRONOUS Lecture 2: Guest Lecture (Project Management)* *SYNCHRONOUS	None	
2	Jan 18-22	Lecture 3: Anatomy & Biomechanics Review 1 Lecture 4: Anatomy & Biomechanics Review 2	Journal Club 1	*Article 1 released Jan 18, sign up starts Jan 19
3	Jan 25-29	Lecture 5: Biomechanics of Balance Lecture 6: Biomechanics of Gait	Journal Club 2	
4	Feb 1-5	Lecture 7: Balance & Gait in Early Development 1 Lecture 8: Balance & Gait in Early Development 2 + Guest Lecture (Activity Tracking in Young Children)	Case Discussion 1	Critical Review #1 (Feb 5 @ 4:30 pm)

5	Feb 8-12	Lecture 9: Balance & Gait in Aging Lecture 10: Balance & Gait in Altered Cognition	Clinical Tests 1	Case - Proposal (Feb 8 @ 4:30 pm)
6	Feb 15-19	READING WEEK		*Article 2 released Feb 16, sign up starts Feb 17
7	Feb 22-26	Lecture 11: Motor Deficits 1 Lecture 12: Motor Deficits 2	Journal Club 3	
8	Mar 1-5	Lecture 13: Sensory Contributions - Vision + Guest Lecture (Research in Vision & Balance) Lecture 14: Sensory Contributions - Vestibular	Case Discussion 2	Case - Extra Questions (Mar 1 @ 4:30 pm) Critical Review #2 (Mar 5 @ 4:30 pm) *Article 3 released Mar 1, sign up starts Mar 2
9	Mar 8-12	Lecture 15: Sensory Contributions - Tactile Lecture 16: Sensory Contributions - Proprioception	Journal Club 4	
10	Mar 15-19	Lecture 17: Sensorimotor Deficits 1 Lecture 18: Sensorimotor Deficits 2	Clinical Tests 2	Critical Review #3 (Mar 19 @ 4:30 pm)
11	Mar 22-26	Lecture 19: Guest Lecture (Concussion)	Case Discussion 3	

		Lecture 20: Balance & Gait in Lower Extremity Amputation		
12	Mar 29- Apr 2	Lecture 21: Guest Lecture (Prosthetics)* *may be SYNCHRONOUS Lecture 22: External Devices 1	Clinical Tests 3	Case - Written Report (Apr 2 @ 4:30 pm)
13	Apr 5-9	Lecture 23: External Devices 2 Lecture 24: Wrap-up and Review	Oral Presentations	Case - Presentation (in lab time Apr 7/8)

5.3 Note

Final Exam: Date and Time, TBA

VIA Respondus Lockdown browser

6 Assessments

6.1 Marking Schemes & Distributions

Name	Scheme A (%)
Critical Review #1: Focus on Research Question	8
Critical Review #2: Focus on Methodology	10
Critical Review #3: Focus on Full Report	12
Critical Review #3 Infographic	5
Clinical Case - Proposal	5
Clinical Case - Written Report	15
Clinical Case - Patient Handout	10
Clinical Case - Group Oral Presentation	10

Name	Scheme A (%)
Final Examination	25
Total	100

6.2 Assessment Details

Critical Review #1: Focus on Research Question (8%)

Due: Week 4

Learning Outcome: 1, 2, 3

Critical Review #2: Focus on Methodology (10%)

Date: Week 8

Learning Outcome: 1, 2, 3

Critical Review #3: Focus on Full Report (12%)

Date: Week 10

Learning Outcome: 1, 2, 3

Critical Review #3 Infographic (5%)

Date: Week 10

Learning Outcome: 1, 2, 3

Clinical Case - Proposal (5%)

Due: Week 5

Learning Outcome: 4, 5, 6

Clinical Case - Written Report (15%)

Due: Week 12

Learning Outcome: 1, 2, 3, 4, 5, 6, 7

Clinical Case - Patient Handout (10%)

Date: Week 12

Learning Outcome: 1, 2, 3, 4, 5, 6, 7

Clinical Case - Group Oral Presentation (10%)

Date: Week 13, In lab; recorded ahead of time and uploaded

Learning Outcome: 1, 2, 3, 4, 5, 6, 7

Final Examination (25%)

Date: To be scheduled by registrar

Learning Outcome: 1, 2, 3, 4

Exam Location: Via Respondus Lock down browser

7 Course Statements

7.1 Course Rule

Please inform the instructors of potential time conflicts with scheduled evaluations by **Week**

2 of classes. If any scheduled evaluations are missed due to documented illness or compassionate circumstances, you must inform an instructor within 5 days of the missed evaluation. Negligence to do so may result in failure of the missed component. Accommodations following these circumstances will be made at the discretion of the course instructor. If a student has any objections or concerns regarding the way a quiz or examination has been graded, they may resubmit their quiz/exam paper for re-marking; the risk, however, is that this re-evaluation will remain the final one, whether higher or lower in score than the original.

7.2 Grading

Indicate all course policies regarding in-semester tests and assignment submissions, including time and place for submission of assignments and explicit penalties for late submissions.

7.3 Respondus

- This course requires the use of Respondus LockDown Browser and Monitor (webcam) for proctoring within CourseLink. You must download and install LockDown Browser and Monitor to complete the practice test (if provided) and course exam(s). The purpose of the practice test is to ensure that Respondus LockDown Browser and Monitor is set up properly and that you are comfortable using the software.
- Respondus LockDown Browser is a locked browser connected to the Quizzes tool in CourseLink. It prevents you from printing and copying, using other operating software, using search engines (e.g., going to another URL), communicating via instant messaging, and it blocks non-web-related software (e.g., Adobe PDF, Microsoft Word).
- Respondus Monitor is a companion application for LockDown Browser that uses webcam and video technology to ensure academic integrity during online exams. The software captures video during the exam and allows the instructor to review the video once the exam is completed.
- In order to use Respondus LockDown Browser and Monitor, you must meet the technical requirements. Visit the Remote Learning website for guidance on preparing your online exam environment.
- If you have any concerns about meeting system requirements, contact CourseLink Support. They will work with you to find alternative solutions or make alternative arrangements.

8 Department of Human Health and Nutritional Sciences

Statements

8.1 Academic Advisors

If you are concerned about any aspect of your academic program:

- Make an appointment with a program counsellor in your degree program. [B.Sc. Academic Advising](#) or [Program Counsellors](#)

8.2 Academic Support

If you are struggling to succeed academically:

- Learning Commons: There are numerous academic resources offered by the Learning Commons including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist. <http://www.learningcommons.uoguelph.ca/>
- Science Commons: Located in the library, the Science Commons provides support for physics, mathematic/statistics, and chemistry. Details on their hours of operations can be found at: <http://www.lib.uoguelph.ca/get-assistance/studying/chemistry-physics-help> and <http://www.lib.uoguelph.ca/get-assistance/studying/math-stats-help>

8.3 Wellness

If you are struggling with personal or health issues:

- Counselling services offers individualized appointments to help students work through personal struggles that may be impacting their academic performance. <https://www.uoguelph.ca/counselling/>
- Student Health Services is located on campus and is available to provide medical attention. <https://www.uoguelph.ca/studenthealthservices/clinic>
- For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers runs training workshops and one-on-one sessions related to stress management and high performance situations. <http://www.selfregulationskills.ca/>

8.4 Personal information

Personal information is collected under the authority of the University of Guelph Act (1964),

and in accordance with Ontario's Freedom of Information and Protection of Privacy Act (FIPPA) <http://www.e-laws.gov.on.ca/index.html>. This information is used by University officials in order to carry out their authorized academic and administrative responsibilities and also to establish a relationship for alumni and development purposes.

For more information regarding the Collection, Use and Disclosure of Personal Information policies please see the Undergraduate Calendar.
(<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/intro/index.shtml>)

9 University Statements

9.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

9.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals
<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Graduate Calendar - Grounds for Academic Consideration
<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions
<https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml>

9.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses
<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

Graduate Calendar - Registration Changes
<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml>

Associate Diploma Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml>

9.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

9.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance and not later than the 40th Class Day.

For Guelph students, information can be found on the SAS website
<https://www.uoguelph.ca/sas>

For Ridgetown students, information can be found on the Ridgetown SAS website
<https://www.ridgetownc.com/services/accessibilityservices.cfm>

9.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community—faculty, staff, and students—to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct
<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

Graduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

9.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

9.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars

<https://www.uoguelph.ca/academics/calendars>

9.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings and academic schedules. Any such changes will be announced via CourseLink and/or class email. All University-wide decisions will be posted on the COVID-19 website (<https://news.uoguelph.ca/2019-novel-coronavirus-information/>) and circulated by email.

9.10 Illness

The University will not normally require verification of illness (doctor's notes) for fall 2020 or winter 2021 semester courses. However, requests for Academic Consideration may still require medical documentation as appropriate.
