HK*4070 Clinical Biomechanics - DRAFT

Winter 2020
Section(s): C01

Department of Human Health and Nutritional Sciences
Credit Weight: 0.50
Version 1.00 - November 05, 2019

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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 MCLN, Room 107
- Labs; as needed
  Section 101 Monday 10:30 AM - 12:20 PM JTP 208B
  Section 102 Wednesday 10:30 AM - 12:20 PM JTP 208B

Section 103 Thursday 2:30 PM - 4:20 PM JTP 208B

1.4 Final Exam

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

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2 Instructional Support

2.1 Instructional Support Team

Instructor:	Dr. Lori Ann Vallis
Email:	lvallis@uoguelph.ca
Telephone:	+1-519-824-4120 x54589
Office:	ANNU 343
Office Hours:	Tuesday @ 10 am - 12 pm or by appointment

Teaching Assistants: To be determined

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; pease email them to coordinate a mututally suitable time.

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3 Learning Resources

3.1 Required Resources

Lecture Notes (Notes)
Lecture notes are the required reading for the course.

Lecture Slides (Notes)
Lecture slides will be posted on Courselink http://courselink.uoguelph.ca on a weekly basis for the subsequent week lectures (~ Friday evenings).

Journal Articles (Article)
We will be focusing on Critical Reading skills this term. To improve critical reading and writing skills we will work with professional staff from the University of Guelph library to learn search techniques and writing skills for performing critical reviews of scientific literature. These skills will be critical for the group Case Study final report.

3.2 Additional Resources

Anatomy, Biomechanics and Control (Textbook)

- Winter, D.A. A.B.C. (Anatomy, Biomechanics and Control) of Balance During Standing and Walking. Waterloo Biomechanics, 1995. May be helpful as a reference on occasion.

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. By the end of this course you will have,

    1. Gained increased knowledge about the role of the sensory systems in balance and mobility control.
    2. Gained increased knowledge about the impact of different heath conditions and pathologies on balance and mobility.
    3. Gained experience with performing critical reviews of published scientific findings.
    4. Gained 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. Gained 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

Labs will not be held each week. Rather 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 Teaching Assistants (TAs) to discuss the clinical case study project milestones and challenges,

5.2 Clinical Case Report

The small-group case report represents a large evaluation component of the course and is a Problem Based . Students are asked to get into groups of 4 individuals (no groups will be allowed to be larger or smaller than this). If at all possible, you should be with people who are in the same HK*4070 laboratory section.

Your group will be assigned/will select a clinical case study. Using a problem based learning approach you will work together to perform independent research on a given pathology (review of anatomy, physiology, neural, biomechanical literature), determine the appropriate clinical test(s) you would perform to assess the balance/mobility of your fictional 'patient' and provide suggestions for rehabilitation techniques.

- Each group will submit one "Clinical Case Study Report" to summarize their findings. This report is expected to be professional.
- Students are encouraged to use any of the assessment tools discussed in this course to strengthen their report. In addition, the group will present their Case Study via a Power Point presentation in lecture during the second to last week or final week of lectures.
- 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.
- Report Format: Please follow the format outlined for most traditional Case Reports.
  Abstract. Structure: Background and Purpose, Case Description, Outcomes, Discussion

Body of Manuscript. 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

5.3 Class Schedule

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

Week	Lecture Topics	Laboratory
Jan 6-9	Week 1: • Introduction; Project Organization • Biomechanics review: Kinetics, kinematics; anatomy review. Focus on posture & locomotion • Center of pressure, center of gravity and center of mass; Strategies for maintaining postural control	NO LABS THIS WEEK
Jan 13-16	Week 2: • Common perturbations to posture & locomotion • Guest Lecture: Janie Vu, Experiental Learning, Professionalism and Learning Reflections	
Jan 20-23	Week 3: • Sensory contributions to balance • Kinematic data smoothing techniques	Clinical Balance Assessment (JTP 208B)
Jan 27-30	Week 4:	

- Initiation of gait & Termination of gait
- Development & postural control

Feb 3-6 Week 5:

- Degeneration & postural control
- Pathological differences in balance

Feb 10-13 Week 6:

- Balance Control Case Studies

Feb 17-20 Week 7: No Labs - Reading week

- No class - Reading week

Feb 24-27 Week 8:

- Overview: Biomechanics of Gait
- Sensory contributions to gait: Proprioception

March 2-5 Week 9: Clinical Gait Assessment

(JTP 208B)

- Gait: Case study w. ACL injury

March 9-12 Week 10:

- Navigation during gait: Role of Sensory Input
- Sensory contributions to gait: Visual and Vestibular deficits

March 16-19 Week 11:

- Development & Locomotion
- Degeneration & Locomotion

March 23-26 Week 12: NO LABS THIS WEEK

- Small-Group Presentations (in lecture)

March 30-Apr 2 Week 13: NO LABS THIS WEEK

- Locomotion in special populations
- Case Studies & Review
- Case reports due Thurs April 2

5.4 Note

Final Exam: Date and Time, TBA

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6 Assessments

6.1 Marking Schemes & Distributions

Name	Scheme A (%)
Critical Review #1: Focus on Research Question (Learning outcomes #1,2,3)	8
Critical Review #2: Focus on Methodology (Learning outcomes #1,2,3)	10
Critical Review #3: Focus on Full Report (Learning outcomes #1,2,3)	12
Clinical Case - Proposal (Learning outcomes # 4,5,6)	5
Clinical Case - Group Oral Presentation (Learning outcomes #1-6)	10
Clinical Case - Written Report (Learning outcomes #1-6)	15
Final Examination (Learning outcomes #1,2,3,4)	40
Total	100

6.2 Assessment Details

Critical Review #1: Focus on Research Question (8%)
Due: Tue, Jan 28

Critical Review #2: Focus on Methodology (10%)
Date: Thu, Feb 13

Critical Review #3: Focus on Full Report (12%)
Date: Tue, Mar 10

Clinical Case - Background literature (5%)
Due: Tue, Feb 4

Clinical Case - Group Oral Presentation (10%)
Date: March 24 or 26, In lecture

Clinical Case - Written Report (15%)
Due: Thu, Apr 4

Final Examination (40%)
Exam Date: To Be Announced

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7 Course Statements

7.1 Course Rule

Please inform the instructors of potential time conflicts with scheduled evaluations by **Tuesday January 14, 2020**. 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.

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/

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