ENGG*3150 Engineering Biomechanics
Winter 2015

UNIVERSITY of GUELPH
School of Engineering

1 Instructional Support

1.1 Instructor

Instructor: Thomas Karakolis, Ph.D.
Office: THRN 2401
Email: tkarakol@uoguelph.ca
Office hours: TBA on Courselink or by appointment

1.2 Lab Technician

Technician: Carly Fennell
Office: THRN 1102, ext. 56676
Email: gennc@uoguelph.ca

1.3 Teaching Assistants

GTA	Email	Office Hours
Erika Fiedler	erikafiedler@icould.com	TBA on Courselink
Kaiyao Gu	guk@uoguelph.ca	TBA on Courselink

2 Learning Resources

2.1 Course Website

Course material, news, announcements, and grades will be regularly posted to the ENGG*3150 Courselink site. You are responsible for checking the site regularly.

2.2 Required Resources

1. D.G.E. Robertson et al. Research Methods in Biomechanics – 2nd Edition. Human Kinetics, 2014.

2.3 Recommended Resources

1. Any Matlab™ textbook. One example is: S. Attaway. Matlab – A Practical Introduction to Programming and Problem Solving – 3rd Edition. Butterworth-Heinemann (Elsevier), 2013.

2.4 Additional Resources

Lecture Information: Selected lecture notes will be posted on the course D2L site.

Lab Information: The handouts/manual for all the lab sessions will be posted on the course D2L site.

Assignments: Download the assignments according to the schedule given in this handout.

Miscellaneous Information: Other information related to Engineering biomechanics will be posted to the course D2L site.

2.5 Communication & Email Policy

Please use lectures and lab help sessions as your main opportunity to ask questions about the course. Major announcements will be posted to the course website. **It is your responsibility to check the course website regularly.** As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

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3 ASSESSMENT

3.1 Dates and Distribution

Labs: 20%

Project: 30%
Presentation – 15%
Report – 15%

Midterm: 15%
Mon Feb 9, 2015 – 19:00 -20:20, Room TBA on Courselink

Final Exam: 35%
TBA

3.2 Course Grading Policies

Missed Assessments: If you are unable to meet an in-course requirement due to medical, psychological, or compassionate reasons, please email the course instructor. Please see below for specific details and consult the undergraduate calendar for information on regulations and procedures for

Academic Consideration:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Accommodation of Religious Obligations: If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements. See the undergraduate calendar for information on regulations and procedures for Academic Accommodation of Religious Obligations: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml

Passing grade: In order to pass the course, you must pass both the laboratory and exam course portions. Students must obtain a grade of 50% or higher on the exam portion of the course in order for the laboratory write-up portion of the course to count towards the final grade.

Missed midterm tests: If you miss a test due to grounds for granting academic consideration or religious accommodation, the weight of the missed test will be added to the final exam. There will be no makeup midterm tests.

Lab Work: You must attend and complete all laboratories. If you miss a laboratory due to grounds for granting academic consideration or religious accommodation, arrangements must be made with the teaching assistant to complete a makeup lab.

Late Lab Reports: Late submissions of lab reports will not be accepted.

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4 AIMS, OBJECTIVES & GRADUATE ATTRIBUTES

4.1 Calendar Description

The following topics related to biomechanics are covered in this course: kinematic and kinetic analysis techniques; electromyography; current techniques in laboratory instrumentation and biomedical applications.

Prerequisite(s): ENGG*2160

Course Aims

This course is an introductory course in engineering biomechanics. The main goals of the course are to (1) introduce students to the language and instrumentation of biomechanics and (2) give them the knowledge and tools to intelligently assess biomechanical problem/questions and then (3) to select the most appropriate techniques and instrumentation to use in order to solve these problems/questions. To consolidate course knowledge, students are exposed to an open ended problem/project of their own choosing in which they have to choose a problem, complete a human ethics application, choose what parameters they should measure, and with the available resources choose the most appropriate measurement and analysis techniques to use.

4.2 Learning Objectives

Upon successful completiong of this course, the students will have an understanding of:

1. The breadth and depth of the field of biomechanics
2. Selected data collection, processing and analysis techniques for biomechanics data
3. How to critically assess the published biomechanics literature

4.3 Graduate Attributes

Successfully completing this course will contribute to the following CEAB Graduate Attributes:

Graduate Attribute	Learning Objectives	Assessment
1. Knowledge Base for Engineering	1, 2	Assignment, Labs, Exams
2. Problem Analysis	1,2,3	Assignments, Labs, Exams, Project
3. Investigation	1,2,3	Assignments, Labs, Exams, Project
4. Design	-	-
5. Use of Engineering Tools	2	Assignments, Labs, Exams, Project
6. Individual and Teamwork	1,2,3	Labs, Project
7. Communication	1,2,3	Assignments, Labs, Exams, Project
8. Professionalism	-	-
9. Impact of Engineering on Society and the Environment	-	-
10. Ethics and Equity	-	-
11. Economics & Project Management	2	Project
12. Life-Long Learning	-	-

4.4 Instructor's Role and Responsibility to Students

The instructor's role is to develop and deliver course material in ways that facilitate learning for a variety of students. Selected lecture notes will be made available to students on Courselink/D2L but these are not intended to be stand-alone course notes. During lectures, the instructor will expand and explain the content of notes and provide example problems that supplement posted notes. Scheduled classes will be the principal venue to provide information and feedback for tests and project.

4.5 Students' Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and tutorials. Students, especially those having difficulty with the course content, should also make use of other resources recommended by the instructor. Students who do (or may) fall behind due to illness, work, or extra-curricular activities are advised to keep the instructor informed. This will allow the instructor to recommend extra resources in a timely manner and/or provide consideration if appropriate.

5 TEACHING AND LEARNING ACTIVITIES

5.1 Timetable

Lectures:

Monday		19:00 – 22:00	TBA

Laboratory:

Monday	Sec 01	15:30 – 17:20	THRN 2135/1319
Tuesday	Sec 02	15:30 – 17:20	THRN 2135/1319
Thursday	Sec 03	15:30 – 17:20	THRN 2135/1319
Friday	Sec 04	15:30 – 17:20	THRN 2135/1319

*THRN 2135 is the Biomechanics Lab and THRN 1319 is a computer lab where students can use Matlab

5.2 Lecture Schedule

Week	Topic
1	No lecture
2	Introduction to biomechanics / Analog to Digital Signal Processing
3	Transducers
4	System and Signal Characteristics
5	Signal to Noise / 3D Motion Analysis
6	Midterm / 3D Motion Analysis (cont'd)
7	Inverse Dynamics
8	EMG
9	Muscle Modeling
10	Medical Imaging/Tissue Mechanics
11	Presentations
12	Clinical Biomechanics / Occupational Biomechanics / Exam Review

5.3 Lab Schedule

Week	Lab
3	Determination of Joint Angles
4	Matlab Signal Processing

5	Force Plate
6	Motion Capture – VICON
7	EMG
8	Project Collection 1
9	Project Collection 2
10	Project Collection 3

* Labs are due the following week (before your next lab session)

5.4 Other Important Dates

Monday, January 5 2014: No class
Monday, February 16 – Friday, February 20 2015: Winter Break
Monday, March 30 2015: last class

6 LAB SAFETY

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. As a student in a lab course you are responsible for taking all reasonable safety precautions and following the lab safety rules specific to the lab you are working in. In addition, you are responsible for reporting all safety issues to the laboratory supervisor, GTA or faculty responsible.

If the laboratory rules are not followed, consequences will include removing student's access to the lab. If this results in lab work not being completed, the student will receive a grade of 0.

7 ACADEMIC MISCONDUCT

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 discourages misconduct. 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.

7.1 Resources

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

A tutorial on Academic Misconduct produced by the Learning Commons can be found at:
http://www.academicintegrity.uoguelph.ca/

Please also review the section on Academic Misconduct in your Engineering Program Guide.

The School of Engineering has adopted a Code of Ethics that can be found at:
http://www.uoguelph.ca/engineering/undergrad-counselling-ethics

8 ACCESSIBILITY

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability for a short-term disability should contact the Centre for Students with Disabilities as soon as possible

For more information, contact CSD at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: http://www.uoguelph.ca/csd/

9 RECORDING OF MATERIALS

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

10 RESOURCES

The Academic Calendars are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs: http://www.uoguelph.ca/registrar/calendars/index.cfm?index