

ENGG3150

Engineering Biomechanics - Winter 2013

Instructor Information

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Teaching Assistant: Mr. Allan Brett, Office: Thornbrough Building, E-Mail: brett@uoguelph.ca

Course and Schedule Information

Course Description: Basic concepts of biological material structure, properties, adaptation and remodeling; viscoelasticity in biological materials and techniques for modeling viscoelastic material behaviour; 2-dimensional and 3-dimensional joint kinematic analysis techniques; muscle mechanics and optimization techniques; current techniques in laboratory instrumentation and biomedical applications.

Prerequisites: ENGG 2150 or ENGG 2160

Class Time: Lecture: Tues./Thurs. - 11:30-12:50 pm, THRN 1319

Laboratory: Monday 1:30-3:20 pm or Friday 3:30-5:20 pm - Thornbrough Room 2193.

Text: Any Matlab™ reference book; other required reading material can be accessed through the library

Learning Objectives

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

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

Approximate Schedule of Topics

Week	Approximate General Lecture Topic for the Week of Lectures	Activity	Activity Location	Course Deliverables
1	Introduction to biomechanics; Human ethics approval process	None		
2	General data collection and processing techniques;	Introduction to Matlab™	In Class (Computer)	Human Ethics Application for Group Project Due: TBA
3	Importance of calibration, instrumentation limitations, error/uncertainty analysis techniques	Data processing using Matlab™	In Class (Computer)	Matlab™ Variable Dictionary Due: TBA
4	Kinematics analysis and data collection techniques	Calibration, determination of joint angles using goniometers	Thorn 2193 During Assigned Laboratory Time	Laboratory Write-up Due: One week after laboratory completion
5	Kinetics analysis and data collection techniques	Force Plate Demo Lab	Thorn 2193 During Assigned Laboratory Time	One Page Project Description Completed as a group and handed in at the beginning of the force plate demo lab
6	Clinical applications of motion capture	VICON Demo Lab	Thorn 2193 During Assigned Laboratory Time	2 minute presentation describing group project presented at beginning of the VICON demo lab
	February Break	February Break	February Break	
7	Electromyography and muscle mechanics	EMG Demo Lab	Thorn 2193 During Assigned Laboratory Time	
8	Clinical applications of electromyography and advanced processing techniques	Project Data Collection	Thorn 2193 (Groups Arrange times with Biological Engineering Technician and TA)	
9	Biomechanical modeling			
10	Occupational biomechanics	Data Analysis, Project Write-up		15 minute group presentations on last two days of class; Project write-up in journal format is due the last day of class
11	Special topics			
12	Special topics			

Marking

Activity	Group or Individual	Percentage of Final Grade
Matlab™ Variable Dictionary	Individual	2.5%
Human Ethics Application for Group Project	Group	5%
One Page Project Description	Group	5%
Calibration, determination of joint angles using goniometers laboratory write-up	Individual	5%
2 minute presentation describing group project	Group	2.5%
15 minute presentation describing results of group project (12 minute presentation; 3 minutes questions)	Group	5%
Project write-up in journal format	Group	20%
Midterm Exam Thursday February 28, 2013 11:30-12:50 pm (THRN 1319)	Individual	20% or 0% (which ever provides the highest course grade)
Final Exam - Tuesday April 9, 2013 7:00-9:00 p.m. (Location TBA)	Individual	35% or 55% (which ever provides the highest course grade)

If a student does not write the midterm exam, the percentage weighting will be shifted to the final exam such that the final exam will be worth 55% of the student's final grade.

In order to pass the course, students must pass both the laboratory/assignment/project 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/assignment/project portions of the course to count towards the final grade. Similarly, students must also obtain a grade of 50% or higher on the laboratory/assignment/project portions of the course in order for the examination portion of the course to count towards the final grade. Students must attend and complete all laboratories in order to pass the course. If a laboratory is missed due to illness or other appropriately documented extenuating circumstance, arrangements must be made with Dr. Oliver as well as Mr. Allan Brett to complete a make-up lab. You will not pass the course without attending and completing the laboratories.

Group Project

Projects will be completed in groups of 4. You may choose your group members, however, all group members must be in the same laboratory section. Specific instructions for the group project components will be provided as the term progresses. In order for a student to receive marks for group presentations, a student must be present and participate in the presentation.

General Course Comments

Please note that this is a Microsoft Excel™ free class...all data analysis and processing will be done using Matlab™.

Grading Scale (as per the 2012-2013 University of Guelph Undergraduate Calendar)

Letter Grade	Percent Range
A+	90-100%
A	85-89%
A-	80-84%
B+	77-79%
B	73-76%
B-	70-72%
C+	67-69%
C	63-66%
C-	60-62%
D+	57-59%
D	53-56%
D-	50-52%
F	0-49%

Disclaimer

The instructor reserves the right to change any or all of the above in the event of appropriate circumstances, subject to the University of Guelph Academic Regulations.