

Western University
Faculty of Engineering
Department of Mechanical & Materials Engineering

MME 9655/BME 9655 – Impact Biomechanics

COURSE OUTLINE FALL 2019

OBJECTIVES:

- To develop a critical understanding of the fundamentals of impact biomechanics and acquire basic knowledge of how impact events are modeled through theoretical, physical, or mathematical models.
- To learn the mechanisms by which impact injuries (such as concussion) occur and learn the injury tolerance of body regions to impact loading.
- To become familiar with the theory behind methods and devices for prevention of impact-related injuries with particular focus on automotive accidents and sports-related injuries.

PREREQUISITES: Graduate student standing or permission from the instructor

ANTIREQUISITES: None

TOPICS:

1. Introduction to impact biomechanics
2. Mechanisms of injury and response to impact
3. Structure, connection, and material property of biological tissue
4. Human tolerance to impact
5. Head/brain injury
6. Neck injury
7. Chest injury
8. Extremity injury
9. Vulnerable population injury
10. Injury prevention: regulation and methods

CONTACT HOURS: 2 hours per week, half course, plus additional session for student presentation project.

TEXTBOOK(S): None

REFERENCES:

1. Accidental Injury Biomechanics and Prevention, 3rd edition, Yoganandan, N., Nahum, A.M., and Melvin, J.W. (Eds.), Springer-Verlag New York, 2015.
2. The Biomechanics of Impact Injury - Biomechanical Response, Mechanisms of Injury, Human Tolerance and Simulation, King, A.I., Springer International Publishing, 2018

EVALUATION:

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| Term Test 1 (15%): | Week of October 14, 2019 (tentative), open book |
| Term Test 2 (20%): | Week of November 18, 2019 (tentative), open book |
| Paper critique (2 x 10%): | Each student will select two recent papers and conduct a 20-min in-class oral review |
| Project - Presentation (15%): | Student will review a topic related to injury and prevention of an anatomical region, or multiple regions of a specific population, or injuries of a scenario. The topic will be selected in consultation with the course instructor. Presentation will be scheduled <u>in the week of December 9, 2019</u> . |
| Project - Report (25%): | The student will first provide a one-page summary of tentative project (5%) <u>in the week of November 4, 2019</u> , and finally write a report (25%), due <u>December 16, 2019</u> |
| Class participation (5%): | All the class is expected to participate in lecture and presentation |

INSTRUCTOR: H. Mao, Ph.D.
Office: TEB365, Tel. 519-661-2111, ext. 80364
Email: haojie.mao@uwo.ca

Office Hours: Thursdays (1:00-2:00 pm), or by appointment

ATTENDANCE: Any student who, in the opinion of the instructor, is absent too frequently from class or laboratory periods in any course, will be reported to the Associate Dean (Graduate) (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Associate Dean (Graduate), the student will be debarred from taking the regular examination in the course

CONDUCT: Students are expected to arrive at lectures on time, and to conduct themselves during class in a professional and respectful manner that is not disruptive to others.

SICKNESS: Students should immediately consult with the instructor or Associate Chair (Graduate) if they have problems that could affect their performance in the course. The student should seek advice from the Instructor or Associate Chair (Graduate) regarding how best to deal with the problem. Failure to notify the Instructor or the Associate Chair (Graduate) immediately (or as soon as possible thereafter) will have a negative effect on any appeal.

ACCESSIBILITY: Please contact the course instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation

PLAGIARISM/

ACADEMIC OFFENCES: Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage of text from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence. Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following site:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholoff.pdf (tested on 07-31-2019)

NOTICES: Students are responsible for regularly checking their Western email.

NOTE: The above topics and outline are subject to adjustments and changes as needed.