MECH 439 - Biomechanical Research Seminar

1 credit, January-April 2016

Fridays, 8-9AM – Blusson Spinal Cord Centre Lecture Hall @ VGH - Main Floor

***Instructor Contact Information***

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# Course Purpose

The primary purpose of this course is to introduce you to the research process by connecting you to an authentic community engaging in biomechanical research - namely, graduate students in this field at UBC. By the end of the course, we hope that you will have a strong understanding of how research questions are framed and studied, and that you will be motivated to participate in research yourself in the future.

# Class Format

The principal class activity will be attending the weekly seminars of the Mechanical Engineering Department’s Biomedical Engineering Research Group.

You will engage in this seminar series mainly by:

* partnering with a graduate student to observe and reflect on their preparation for the seminar series
* filling our seminar review forms on a weekly basis; in doing this, you will also prepare (and occasionally ask) questions of the presenters

In addition to attending the seminar series, you will select a published paper relevant to your graduate student partner's research and write a short report critically reviewing it according to guidelines for publishing work in one of the major orthopaedic engineering journal.

You will also identify an area of personal interest and prepare a short presentation (~5 min) proposing a research study to address an unanswered question in this field (note: you are NOT expected to actually conduct any research).

# Specific Learning Objectives

1. You will become familiar with biomedical engineering research that is being conducted at UBC by faculty members and graduate students in the Department of Mechanical Engineering.

2. You will gain an understanding of how research questions are framed, how studies are designed and conducted to address these questions and how the results are assessed to determine the answers to these questions.

3. You will learn how research work is presented to other researchers (eg, in conference presentations and thesis defences) and how presentations are refined through preparation and practice.

4. You will learn how to critically assess published work in this field to determine how reliable the published results are.

5. You will have an opportunity to investigate an area of personal interest by reading research literature relevant to your interest and will learn how to identify an open question in the field and present a justification for pursuing this (eg, as is normally done in preparing research proposals).

# Prerequisites

None

# Textbook

There is no required text for the course.

# Seminar Format

The seminar series is scheduled for one hour each week. The seminars simulate conference presentations. Either one PhD student will present a 40 minute overview of their research or two MASc students will each present a 20 minute proposal. Each presentation will be followed by questions from all attendees. Our practice is to first require several questions from students before any faculty members ask questions. You will fill out one seminar review form per session and submit it to the instructor. Be sure to write down at least two questions you would like to ask the presenter, and be sure to ask at least three questions during the term (put an asterisk beside any question on your form that you had an opportunity to ask during the seminar, and briefly summarize the presenter's response).

# Critical Paper Review Report - Due Date: February 28, 2016

You will be matched with a graduate student partner early in the term. By **January 31st**, you should identify, in discussion with your partner, a research paper that is important to your partner's research work and submit it to the instructor for approval. You will then read one of the first two papers listed below to learn how a research paper in this field should be structured (the third paper listed is optional, but useful in understanding the process by which a paper is actually written). Finally, you will write a critical review of approximately 1250-1500 words assessing how well your selected paper follows the guidelines. You should use the standard paper section headings (Introduction, Methods, Results, Discussion and Conclusions) to structure your critique.

Key references:

* Brand RA. Writing for Clinical Orthopaedics and Related Research, *Clinical Orthopaedics and Related Research*, 466(1):239–247, 2008.
* Wright TM, Buckwalter JA and Hayes WC. Writing for the Journal of Orthopaedic Research. *Journal of Orthopaedic Research*, 17:459-466, 1999
* O'Connor TR and Holmquist GP. Algorithm for Writing a Scientific Manuscript. *Biochemistry and Molecular Biology Education*, 37(6):344–348, 2009

# Research Proposal Presentation - Due Date: April 1, 2016

In this individual assignment, you have an opportunity to pursue an area of personal interest.

First, identify an area of biomedical engineering that you are interested in learning more about and find at least three recent research papers (past 5 years) that discuss a topic of interest to you. The best source for finding research papers is the PubMed database (available free; many e-links to the full papers are available via the UBC Library system). Please submit a list of these three papers to your instructor by **March 6**.

Read the introductions of these papers to understand how they justify the need to conduct the study reported in the paper. Pay special attention to how they discuss the importance of the larger problem and how they analyze the previous work to identify gaps in our knowledge. Your goal is to identify a still-unsolved problem related to these papers. Based on your readings, articulate a research question you believe is worth addressing.

Prepare a short (5 or 6 slides) PowerPoint or Keynote presentation making the case that this question should be studied. Note that you do not have to figure out HOW you will solve the problem - only that the question should be addressed. Your presentation should have at least the following four components to it:

* A 'hook' - ie, a brief and succinct description of the problem that motivates the study
* A 'what is currently known' section - this describes what we currently know about the problem and what the current approaches are, highlighting their strengths and limitations
* A 'what we don't know' section - this focuses our attention on the limitations of previous studies and the gaps in our knowledge
* The research question itself - if you've done your job correctly, you should be able to say, "therefore, it is necessary that we study the following specific question: ...".

You will present your research proposal during the April 1st seminar session (no joke!) in front of your classmates and the graduate students. We recommend that you discuss a draft of your proposal presentation with the instructor or with your graduate student partner (if they're willing) by about **March 20th** in order to give yourself enough time to revise your presentation before the seminar date.

# Course Grading (Pass/Fail based on the following:)

### Attendance, quality of reviews, questions: 30%

### Critical paper review report (~5 pgs): 35%

### Research proposal presentation (~5 min): 35%

# Key Dates

### ~January 15 - matched with graduate student partner

### January 31 - identify research paper and submit to instructor for approval

### February 28 - critical review paper due

### March 6 - submit list of papers to instructor for approval

### ~March 20 - discuss draft presentation with instructor or grad student partner

### April 1 - presentation date