Course Description

BIOM5100/BMG5301/SYSC5302 Medical Instrumentation

Instrumentation designed to measure physiological variables related to the function of the heart, lungs, kidneys, nervous and musculo-skeletal system; emergency, critical care, surgery and anesthesia equipment.

Learning Outcomes

At the end of course a student will be able to:

- describe measurement methods and associated issues for medical instrumentation including sensors, amplifiers
- describe methods to manage measurement challenges including noise, interference and contaminating signals
- describe issues and challenges associated with medical measurement including patient safety
- describe the key physiological parameters for measurement and the methods to measures these for the following body systems
  - heart, lungs, kidneys, nervous and musculo-skeletal system

Course Website

https://carleton.ca/culearn/

Instructor

Dr. Bruce Wallace
www.sce.carleton.ca/~wally

Note that email should be written from your Carleton (or uOttawa) email account and that you should check (or forward) email on your Carleton email account. Email from accounts other than your Carleton email account may not receive any response.

Lectures

Lectures: Mon/Wed 11:30- 1:00

Textbooks: No required text book

References


other references will provided as the term progresses
Marking Scheme

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Project

In this project, students are required to select a topic within the field of medical instrumentation. This is an in-depth research project in a specific topic within the broad area of biomedical instrumentation. The project can consist of designing and performing a medical instrumentation experiment, implementing and testing a medical instrumentation algorithm, or an in depth study of a medical instrumentation application. The topic must not be a core part of your thesis research (it may be related but not a fundamental component of it). The topic must not be the same as another student's topic in the class. Topics are subject to approval by the instructor (see Project Proposal). Students should keep their topics focused as the report length is restricted (see project deliverables).

The level of the sophistication in the project should be appropriate for graduate level work. As a guideline, refer to Bloom's taxonomy of critical thinking. Knowledge, Comprehension, and Application are an assumed foundation in your project; that is, they are necessary for a successful project. While a necessary component, they do not form a sufficient component; that is, by themselves they do not make a successful project. A successful project should be focused on the Analysis, Synthesis, and/or Evaluation levels of critical thinking.

The project deliverables are:

1. Project proposal (0%)
2. Project report (70%)
3. Project presentation (20%)
4. Paper review (10%)

Projects typically take one of three forms:

1. Experimental research (this need not be a full fledge research project and may be a repetition of previously report research or a pilot research study with additional constraints and a limited number of subjects)
2. Design, implementation, and evaluation (e.g., bioamplifier, signal processing method)
3. Medical instrumentation application (explanations of the application, the measurement need and physiology and measurement methods).

Assignments

There will be four assignments. Assignments will be posted on the course CULearn website.
Academic Accommodation

The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). **Requests made within two weeks will be reviewed on a case-by-case basis.** After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website (www.carleton.ca/pmc) for the deadline to request accommodations for the formally-scheduled exam (if applicable).

Notes

The final exam is for evaluation purposes only and will not be returned to students.

Students are expected to attend all lectures and problem analysis sessions. The Faculty of Engineering and Design requires students to have a conflict-free timetable, so requests to accommodate missed exams, assignment due dates, project milestones, etc., because of conflicts with other courses, jobs or vacation plans will not be considered.

Plagiarism (copying and handing in for credit someone else's work) is a serious instructional offence that will not be tolerated. Note that the person providing solutions to be copied is also committing an offence as they are an active participant in the plagiarism. The person copying and the person copied from will be reprimanded according to the regulations set by Carleton University. Please refer to the section on instructional offences in the Undergraduate Calendar for additional information.

Student or professor materials created for this course (including presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the author(s). They are intended for personal use and may not be reproduced or redistributed without prior written consent of the author(s).

Every student should have a copy of our Health and Safety Manual. An electronic version of the manual can be found at www.sce.carleton.ca/courses/health-and-safety.pdf.