Instructor Information and Office hours

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Mackenzie Building 3165

TA Information and Office hours

TBD
Email: TBD

Course Number and Calendar Description

SYSC 4202 Clinical Engineering

Prerequisites

Fourth (4th) year status in engineering or permission of department

Course Objectives

SYSC4202 Clinical Engineering will introduce students to the profession of Clinical Engineering; a specialized branch of Biomedical Engineering. Topics of discussion and lectures will include an overview of the Canadian Health Care System with examples of other countries; the role of clinical engineering in healthcare; medical technology management in industrialized; patient and staff safety considerations; electromagnetic interference; reliability, quality assurance practices; introduction to biomedical sensor and medical technologies; applications of telemedicine; medical technology procurement; the impact of technology on healthcare, and technology assessment. The course provides a good background for students interested in biomedical engineering, clinical engineering, or medical informatics and for students wishing to work in a biomedical and/or healthcare industry.

Learning Outcomes

The learning outcomes of this course include:

a. Role of clinical engineering in healthcare;

b. Various roles and responsibilities of healthcare professionals
c. Funding of healthcare technology and healthcare system in Canada

d. Medical technology and device management in industrialized countries;

e. Patient and staff safety considerations;

f. Electromagnetic interference;

g. Medical device reliability and quality assurance practices;

h. Introduction to biomedical sensor and medical technologies;

i. Applications of telemedicine;

j. Medical technology procurement practices and guidelines;

k. Impact of technology on healthcare;

l. Healthcare Technology Assessment.

Graduate Attributes (GA’s)

The Canadian Engineering Accreditation Board requires graduates of engineering programs to possess in 12 attributes including:

1. A knowledge base for engineering
2. Problem Analysis
3. Investigation
4. Design
5. Use of engineering tools
6. Individual and Team Work
7. Communication Skills
8. Professionalism
9. Impact of Engineering on Society and the Environment
10. Ethics and Equity
11. Economics and Project Management
12. Life-long Learning

Textbooks (or other resources) if applicable

None

Evaluation and Grading Scheme

Quizzes and/or Assignments: 25%
Problem Analysis: 10%
Mid-Term Examination: 25%
Final Examination: 40%
Total: 100%

Breakdown of course requirements (labs, assignments, quizzes, exams, etc)
• Lectures, three (3) hours a week, Tuesdays, 18:05 to 20:55 (Mackenzie Building 4342)
• Problem analysis sessions, three (3) hours odd weeks, Fridays, 14:35 to 17:25 (Mackenzie Building 3235)

Quizzes and/or Assignments:
There will be up to ten (10) in-class quizzes to be completed at the beginning of each class or up to five (5) assignments to be completed outside of class. The quizzes will be based on material presented during the previous lecture. 10 to 15 minutes will be allowed at the beginning of the lecture to complete the quiz. Each quiz will be graded out of 5. Assignments will be on topics as discussed in class and/or during the problem analysis sessions. Each quiz will be graded out of 5. The total marks of the quizzes and assignments will constitute 25% of the final mark.

Problem Analysis Sessions:
There will be five (5) problem analysis sessions in which various topics and problems are to be discussed. Attendance will be noted during these sessions. Attendance and discussion participation in the sessions will account for 2 mark each for a total of 10 marks. Students may be asked to hand in notes, provide short oral presentations, or simply engage in discussion during these sessions. The problem analysis sessions will be held on the following days:

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
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<tbody>
<tr>
<td>3</td>
<td>Friday, Jan 25</td>
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<tr>
<td>5</td>
<td>Friday, Feb 8</td>
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<td>7</td>
<td>Friday, Mar 1</td>
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<td>9</td>
<td>Friday, Mar 15</td>
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<td>11</td>
<td>Friday, Mar 29</td>
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Mid-term Exam: Counts for 25 marks of the total mark
Final exam: Counts for 40 marks of the total mark. The final exam is for evaluation purposes only and will not be returned to students.

The final examination is for evaluation purposes only and will not be returned to students. You will be able to make arrangements with the instructor or with the department office to see your marked final examination after the final grades have been made available.

Week-by-Week breakdown
Please note that topics per week are subject to change:

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Content</th>
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<tbody>
<tr>
<td>1</td>
<td>Tuesday, Jan 8</td>
<td>Course Outline, Instruction to Biomedical / Clinical</td>
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<tr>
<td>Date</td>
<td>Topic</td>
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<td>Tuesday, Jan 15</td>
<td>Canadian Health Care System</td>
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<td>Tuesday, Jan 22</td>
<td>Introduction to Clinical Engineering, Technology Management</td>
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<td>Tuesday, Jan 29</td>
<td>Health Technology Management</td>
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<td>Tuesday, Feb 5</td>
<td>Capital Equipment Procurement, Device Standards</td>
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<td>Tuesday, Feb 12</td>
<td>Mid-Term Exam</td>
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<td>Tuesday, Feb 19</td>
<td>Winter Break – No Class</td>
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<td>Tuesday, Feb 26</td>
<td>Sensors and Medical Technology Overview</td>
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<tr>
<td>Tuesday, Mar 5</td>
<td>Patient Safety &amp; Risk Management</td>
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<td>Tuesday, Mar 12</td>
<td>Risk Reporting, Liability, Incident Investigation</td>
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<td>Tuesday, Mar 19</td>
<td>Education, Research &amp; Development, Telemedicine Technologies</td>
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<td>Tuesday, Mar 26</td>
<td>Site Visit: University of Ottawa Heart Institute</td>
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<td>Tuesday, Apr 2</td>
<td>Strategic Technology Planning</td>
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<td>Tuesday, Apr 9</td>
<td>Review</td>
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<td>April 12 – 27</td>
<td>Final Exam Time, Date, Location TBD</td>
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* Denotes Problem Analysis session week

**General Regulations**

**Attendance:** Students are expected to attend all lectures and lab periods. The University requires students to have a conflict-free timetable. For more information, see the current *Undergraduate Calendar, Academic Regulations of the University, Section 1.2, Course Selection and Registration and Section 1.5, Deregistration.*

**Health and Safety:** Every student should have a copy of our Health and Safety Manual. A PDF copy of this manual is available online: [http://sce.carleton.ca/courses/health-and-safety.pdf](http://sce.carleton.ca/courses/health-and-safety.pdf)

**Deferred Term Work:** Students who claim illness, injury or other extraordinary circumstances beyond their control as a reason for missed term work are held responsible for immediately informing the instructor concerned and for making alternate arrangements with the instructor and in all cases this must occur no later than three (3.0) working days after the term work was due. The alternate arrangement must be made before the last day of classes in the term as published in the academic schedule. For more information, see the current *Undergraduate Calendar, Academic Regulations of the University, Section 2.6, Deferred Term Work.*

**Appeal of Grades:** The processes for dealing with questions or concerns regarding grades assigned during the term and final grades is described in the *Undergraduate Calendar, Academic Regulations of the University, Section 2.7, Informal Appeal of Grade and Section 2.8, Formal Appeal of Grade.*
**Academic Integrity:** Students should be aware of their obligations with regards to academic integrity. Please review the information about academic integrity at: [https://carleton.ca/registrar/academic-integrity/](https://carleton.ca/registrar/academic-integrity/). This site also contains a link to the complete Academic Integrity Policy that was approved by the University's Senate.

**Plagiarism:** Plagiarism (copying and handing in for credit someone else's work) is a serious instructional offense that will not be tolerated.

**Academic Accommodation:** You may need special arrangements to meet your academic obligations during the term. You can visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at [http://www.carleton.ca/equity/](http://www.carleton.ca/equity/) For an accommodation request, the processes are as follows:

- **Pregnancy obligation:** write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details see [https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf](https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf)

- **Religious obligation:** write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details see [https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf](https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf)

- **Academic Accommodations for Students with Disabilities:** 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](mailto: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). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult [https://carleton.ca/pmc/students/dates-and-deadlines/](https://carleton.ca/pmc/students/dates-and-deadlines/) for the deadline to request accommodations for the formally-scheduled exam (if applicable).

- **Survivors of Sexual Violence:** As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton’s Sexual Violence Policy. For more information
about the services available at the university and to obtain information about sexual violence and/or support, visit: https://carleton.ca/sexual-violence-support/.

- **Accommodation for Student Activities**: Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, see https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf

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