Syllabus

Course Description

SYSC4201 Ethics, Research Methods and Standards for Biomedical Engineering

Ethical theories, ethical decision-making, codes; human and animal experimentation, consent, practices of ethical review boards; research methods and regulations for design, manufacture, certification of medical devices; data collection, management, analysis, including security, confidentiality, privacy; bioethical dilemmas, impact of technology and research (social, political, financial).

Learning Outcomes

By the end of the class, students should be able to:

- justify a course of action in an ethical dilemma
- evaluate the ethics of research involving humans
- explain the purpose and results of statistical analysis, including common misinterpretation and misapplication of statistics
- describe the regulatory process for medical devices
- discuss the impact of biomedical technology with a multidisciplinary audience
- design an appropriate research methodology to investigate a research question

Course Website

Accessed through https://carleton.ca/culearn/

Instructor

Dr. Adrian D. C. Chan

www.sce.carleton.ca/faculty/chan

Note that email should be written from your Carleton 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.

Teaching Assistants
Mohamed Abdelazez (MohamedAbdelazez@cmail.carleton.ca)
John Harvey (jharvey@sce.carleton.ca)

Lectures and Problem Analysis Sessions

Lectures: Wednesday and Friday 11:30-13:00 Tory 240
Problem Analysis Sessions: Tuesday 16:00-17:30 Southam Hall 520

Textbooks

There are no mandatory textbooks for this course.

Online Statistics: An Interactive Multimedia Course of Study
Ropella, Kristina, Introduction to Statistics for Biomedical Engineers, Morgan & Claypool, 2007. (available online via Carleton Library)

Internet Encyclopedia of Philosophy

Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans


Marking Scheme

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Component</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>TCPS 2: CORE Tutorial (students must complete this tutorial to pass the course)</td>
<td>Last day of class (recommended to be completed end of January)</td>
</tr>
<tr>
<td>15%</td>
<td>Ethics Video</td>
<td>Two attempts, best mark used (one due mid February one due mid March)</td>
</tr>
</tbody>
</table>
Academic Accommodation

You may need special arrangements to meet your academic obligations during the term. 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 the [Student Guide](#).

**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 the [Student Guide](#).

**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 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 the [PMC website](#) for the deadline to request accommodations for the formally-scheduled exam (if applicable).

You can visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at [http://www2.carleton.ca/equity/](http://www2.carleton.ca/equity/)

**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.

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.
Course Outline

Week 1 (Jan 10 and Jan 12)
Course introduction
Introduction to ethics
Ethical theories

Week 2 (Jan 17 and 19)
Moral status
Common versus particular moralities
Ethical decision making
Research and library resources (Heather Macdonald)

Week 3 (Jan 24 and 26)
Research ethics
History of research ethics
Informed consent
Research involving humans
Confidentiality and privacy
Research methods

Week 4 (Jan 31 and Feb 2)
Research methods
Plagiarism

Week 5 (Feb 7 and Feb 9)
Introduction to statistics

Week 6 (Feb 14 and Feb 16)
Introduction to statistics
Reading Week (Feb 19 to 23)

Week 7 (Feb 28 and Mar 2)
Bivariate data

Week 8 (Mar 7 and Mar 9)
Probability
Receiver Operating Characteristic Curve

Week 9 (Mar 14 and Mar 16)
Sampling Distributions
Estimation

Hypothesis testing
Type I and Type II Errors

Week 10 (Mar 21 and Mar 23)
Medical Device Standards

Week 11 (Mar 28 and Apr 4; Mar 30 is a Holiday)
Testing Means
Technology and society

Week 12 (Apr 6 and Apr 11)
ERMSBE Conference