

# Syllabus

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## Course Description

Bioinstrumentation and biological signals; instrumentation systems, noise, and electrical safety; bioelectric signals; biomagnetic signals; measurement of flow and pressure; data acquisition; signal processing; biomedical imaging technologies; amplifier design for biosensors; major physiological systems and associated measurements.

Prerequisites: (SYSC 3600 or SYSC 3500) and (ELEC 2507 or ELEC 3605) and (fourth-year status in Biomedical and Electrical Engineering or fourth-year status in Biomedical and Mechanical Engineering). Lectures three hours a week, laboratory/problem analysis three hours alternate weeks.

## Course Website

[www.sce.carleton.ca/courses/syisc-4203/f11](http://www.sce.carleton.ca/courses/syisc-4203/f11)

## Instructor

Dr. Adrian Chan

[www.sce.carleton.ca/faculty/chan](http://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.

Office hours: TBD

## Teaching Assistant

Shermeen Nizami

[shermeen@sce.carleton.ca](mailto:shermeen@sce.carleton.ca)

## 1 Lectures and Laboratories

### Lectures

Wednesdays and Fridays 11:30 - 13:00 Location TBD

### Laboratories

Section A1E Friday (even weeks) 14:30 - 17:30 Location MC6070

Section A2E Friday (even weeks) 8:30 - 11:30 Location MC6070

Note first laboratories start on Friday Sept 23

### **Textbooks**

Webster JG, Medical Instrumentation: Application and Design, 4th edition, Wiley, 2009.

### **Marking Scheme**

10% Quizzes

15% Laboratories

15% Design project

20% Midterm

40% Final exam

### **Notes**

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

Students are expected to attend all lectures and lab periods as required. 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.

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 visit the [Equity Services website](#).

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 visit the [Equity Services website](#).

Students with disabilities requiring academic accommodations in this course must register with the Paul Menton Centre for Students with Disabilities for a formal evaluation of disability-related needs. Registered PMC students are required to contact the Centre, 613-520-6608, every term to ensure that I receive your Letter of Accommodation, no later than two weeks before the first assignment is due or the first in-class test/midterm requiring accommodations. If you require accommodation for your formally scheduled exam(s) in this course, please submit your request for accommodation to PMC by November 11th 2011 for Fall term (December exams).

You can visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at <http://carleton.ca/equity/accommodation>.

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 Graduate 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](http://www.sce.carleton.ca/courses/health-and-safety.pdf).

*Last updated August 3, 2011*

# Course Outline

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## **Week 0 (Sept 9)**

- Course introduction
- Origin of Biopotentials (Chapter 4)

## **Week 1 (Sept 14 and Sept 16)**

- Origin of Biopotentials continued

## **Week 2 (Sept 21 and Sept 23)**

- Biopotential electrodes Chapter (5.1 - 5.7)

## **Week 3 (Sept 28 and Sept 30)**

- Biopotential amplifiers (Chapter 6.1 - 6.3, 6.5 - 6.6, 6.8)

## **Week 4 (Oct 5 and Oct 7)**

- Measurement of flow and volume of blood (Chapter 8.1 - 8.2, 8.4, 8.8, 10.6)

## **Week 5 (Oct 12 and Oct 14)**

- Blood pressure and sound (Chapter 7.1 - 7.3, 7.5, 7.7, 7.9 - 7.10, 7.13)
- Midterm #1

## **Week 6 (Oct 19 and Oct 21)**

- Blood pressure and sound (Chapter 7.1 - 7.3, 7.5, 7.7, 7.9 - 7.10, 7.13)

## **Week 7 (Oct 26 and Oct 28)**

- Sampling and quantization (notes)

## **Week 8 (Nov 2 and Nov 4)**

- Sampling and quantization (notes)
- Midterm #2

## **Week 9 (Nov 9 and Nov 11)**

- Measurements of the respiratory system (Chapter 9.1, 9.4 - 9.6)

**Week 10 (Nov 16 and Nov 18)**

- Medical Imaging Systems (Chapter 12.1, 12.5 - 12.13)

**Week 11 (Nov 23 and Nov 25)**

- Electrical safety (Chapter 14.1 - 14.9)

**Week 12 (Nov 30 and Dec 2)**

- Filters, signal enhancement, and noise reduction (notes)
- Review

*Last updated August 4, 2011*