

COURSE OUTLINE

ECE/BME 335 – Biosensors and Instrumentation

<https://bright.uvic.ca/d2l/home/72951>

Term – FALL 2020 (202009)

Instructor

Dr. Reuven Gordon
Phone: 250-472-5179
E-mail: rgordon@uvic.ca

Office Hours

Days: by appointment (send email request)
Time: by appointment
Location/Platform/link: <https://uvic.zoom.us/my/reuvenngordon>

Course Objectives

To teach the engineering principles of biosensors and biomedical instrumentation.

Learning Outcomes

- 1) Understand the regulation of biomedical instrumentation in Canada.
- 2) Differentiate between general biosensor characteristics used in evaluating performance (e.g., accuracy, resolution, precision, sensitivity, reproducibility, SNR, limit of detection, ROC performance)
- 3) Explain the principle of transduction and how it relates to physiological and biological processes.
- 4) Analyze basic circuits for electrical conditioning: filtering and amplification.
- 5) Understand analog to digital and digital to analog conversion for data analysis.
- 6) Perform basic digital signal analysis.
- 7) Build a basic biosensor system (e.g. ECG) and evaluate its characteristics in terms of transduction, signal conditioning and digital analysis.
- 8) Be aware of safety in biomedical instrumentation.

Syllabus

An introduction to biomedical instrumentation, devices, standards. Transduction and sensing mechanisms used in biosensors. Electronic signal filtering and amplification. Data acquisition and signal processing methods. An example of ECG. Safety considerations.

A-Section(s): A01 / CRN 10958,10463

B01

Days: TWF
Time: 8:30-9:20

Location/Platform/link:

<https://uvic.zoom.us/j/97182376916?pwd=S0tBNXE0YkE0QkJOMy9HQm11ZUxMUT09>

Lecture videos will be posted, and class time will be used for answering questions, doing problems, writing tests.

Lab: Due to COVID-19, a lab project will be done in lieu of an in-house lab. Students will purchase an ECG sensor module

(<https://www.digikey.ca/en/products/detail/dfrobot/SEN0213/6588616?s=N4lgTCBcDaIM4FMB2AGMBGAzCAugXyA> or equivalent) and a suitable Arduino kit (e.g. https://www.amazon.ca/s?k=B01D8KOZF4&i=electronics&ref=nb_sb_noss)

Required Textbook

Title: Principles of Biomedical Instrumentation
Author: Andrew G. Webb
Publisher: Cambridge
Year: 2018

Online Course Delivery:

As this course will be conducted online during this term, students will need to complete assignments/labs online. The students will require access to a computer. Assignments will need to be scanned and submitted online. For scanning by cell phone, students may wish to use CamScanner (<https://www.camscanner.com/>).

Assessment:

Tests:	50%	In-Class Dates: 23 Sept, 7 Oct, 21 Oct, 4 Nov, 18 Nov, 2 Dec
Labs	25%	
Final Exam	25%	

Note: Failure to complete all laboratory requirements will result in a grade of N being awarded for the course.
Failure to pass the final exam will result in a failing grade for the course.

The final grade obtained from the above marking scheme for the purpose of GPA calculation will be based on the percentage-to-grade point conversion table as listed in the current Undergraduate Calendar.

<https://www.uvic.ca/calendar/archives/202009/undergrad/index.php#/policy/S1AAgoGuV?bc=true&bcCurrent=14%20-%20Grading&bcGroup=Undergraduate%20Academic%20Regulations&bcItem=policies>

There will be no supplemental examination for this course.

https://www.uvic.ca/calendar/archives/202009/undergrad/index.php#/policy/S12Rxoz_N?bc=true&bcCurrent=13%20-%20Examinations&bcGroup=Undergraduate%20Academic%20Regulations&bcItem=policies

Note to students:

Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the Chair of the Department by email or the Chair's Assistant to set up an appointment.

Course Withdrawal Deadlines:

- September 22, 2020: Withdrawal with 100% reduction of tuition fees
- October 13, 2020: Withdrawal with 50% reduction of tuition fees
- October 31, 2020: Last day for withdrawal (no fees returned)

Accommodation of Religious Observance:

<https://www.uvic.ca/calendar/archives/202009/undergrad/index.php#/policy/r1q0gofdN?bc=true&bcCurrent=10%20-%20Accommodation%20of%20Religious%20Observance&bcGroup=Undergraduate%20Academic%20Regulations&bcItem=policies>

Policy on Inclusivity and Diversity:

Engineering: <https://www.uvic.ca/engineering/about/equity/index.php>

Academic Calendar:

<https://www.uvic.ca/calendar/archives/202009/undergrad/index.php#/policy/HkQ0pzdAN?bc=true&bcCurrent=%20General%20University%20Policies&bcGroup=General%20University%20Policies&bcItem=policies>

Standards of Professional Behaviour:

You are advised to read the Faculty of Engineering document Standards for Professional Behaviour, which contains important information regarding conduct in courses, labs, and in the general use of facilities.

<https://www.uvic.ca/engineering/assets/docs/professional-behaviour.pdf>

Academic Integrity

Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult the entry in the current Undergraduate Calendar for the UVic policy on academic integrity. https://www.uvic.ca/calendar/archives/202009/undergrad/index.php#/policy/Sk_0xsM_V?bc=true&bcCurrent=08%20%20Policy%20on%20Academic%20Integrity&bcGroup=Undergraduate%20Academic%20Regulations&bcItemType=policies

Equality:

This course aims to provide equal opportunities and access for all students to enjoy the benefits and privileges of the class and its curriculum, and to meet the syllabus requirements. Reasonable and appropriate accommodation will be made available to students with documented disabilities (physical, mental, learning) in order to give them the opportunity to successfully meet the essential requirements of the course. The accommodation will not alter academic standards or learning outcomes, although the student may be allowed to demonstrate knowledge and skills in a different way. It is not necessary for you to reveal your disability and/or confidential medical information to the course instructor. If you believe that you may require accommodation, the course instructor can provide you with information about confidential resources on campus that can assist you in arranging an appropriate accommodation. Alternatively, you may want to contact the Centre for Accessible Learning located in the Campus Services Building. <https://www.uvic.ca/services/cal/>. The University of Victoria is committed to promoting, providing, and protecting a positive, supportive, and safe learning and working environment for all its members.

Course Lecture Notes and Other Materials:

Unless otherwise noted, all course materials supplied to students in this course have been prepared by the instructor and are intended for use in this course only. These materials are NOT to be re-circulated digitally, whether by email or by uploading or copying to websites, or to others not enrolled in this course. Violation of this policy may in some cases constitute a breach of academic integrity as defined in the UVic Calendar. Content provided by instructor, including tests and exams, is copyrighted. Posting without permission is a violation of that copyright and not allowed by law.

Sexualized Violence Prevention and Response at Uvic:

UVic takes sexualized violence seriously, and has raised the bar for what is considered acceptable behaviour. We encourage students to learn more about how the university defines sexualized violence and its overall approach by visiting www.uvic.ca/svp. If you or someone you know has been impacted by sexualized violence and needs information, advice, and/or support please contact the sexualized violence resource office in Equity and Human Rights (EQHR). Whether or not you have been directly impacted, if you want to take part in the important prevention work taking place on campus, you can also reach out:

Where: Sexualized violence resource office in EQHR; Sedgewick C119

Phone: 250.721.8021

Email: svpcoordinator@uvic.ca

Web: www.uvic.ca/svp

Office of the Ombudsperson:

The [Office of the Ombudsperson](http://www.uvic.ca/ombudsperson) is an independent and impartial resource to assist with the fair resolution of student issues. A confidential consultation can help you understand your rights and responsibilities. The Ombudsperson can also clarify information, help navigate procedures, assist with problem-solving, facilitate communication, provide feedback on an appeal, investigate and make recommendations. Phone: 250-721-8357; Email: ombuddy@uvic.ca, Website: <https://uvicombudsperson.ca/>