

## COURSE OUTLINE

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### ECE 330 – Electronic Circuits I

Term – SPRING 2020 (202001)

#### Instructor

Mr. Alexandros Dimopoulos

E-mail: adimopou@uvic.ca

#### Office Hours

Days: Wednesday

Time: 12:30 – 13:30

Location: EOW 419

#### Course Objectives

This course is an introduction to the use of diodes and transistors in electronic circuits. The focus of the course is on analog applications with an emphasis on voltage amplifiers. The intent is to help students build a solid foundation onto which they may later build skills in analog design, digital design, and power systems design.

#### Learning Outcomes

- Design a single-stage voltage amplifier which meets a set of given specifications
- Describe the operating modes of transistors and their applications
- Apply appropriate diode and transistor models in order to solve circuits
- Describe the use of diodes in power rectification and signal conditioning
- Employ SPICE software as a design aid
- Construct diode and transistor circuits and diagnose their faults

#### Syllabus

Course topics are covered in chapters 4,5,6,7 of the textbook.

1. Diodes
  - a. Diode characteristics and models
  - b. Large signal applications: voltage rectification, signal conditioning
  - c. Small signal model
  - d. Zener diodes, voltage regulation
2. Bipolar Junction Transistors (BJT)
  - a. What is a transistor?
  - b. BJT structure and operation
  - c. I-V characteristics
  - d. BJT circuits at DC
  - e. Real devices: temperature effects, breakdown
3. Field Effect Transistors (FET)
  - a. Basic concept and taxonomy of FETs
  - b. MOSFET structure and operation
  - c. MOSFET I-V characteristics
  - d. JFET
  - e. Real devices and limitations

- f. FET circuits at DC
- 4. Single Transistor Amplifiers
  - a. Why amplifiers?
  - b. Basic principles:
    - i. Voltage transfer characteristics and signal swing
    - ii. Transistors as linear amplifiers
    - iii. Purpose of biasing networks
  - c. Small signal operation and models of transistors
  - d. Characterization of a voltage amplifier
  - e. Amplifier topologies: common emitter/source, common collector/drain, common base/gate
  - f. Biasing goals and strategies
  - g. Introduction to frequency response: coupling and bypass capacitors
  - h. Design process for a common emitter amplifier

#### Lectures

A01/CRN 20880

Days : TWF

Time : 11:30 – 12:20

Location : ECS 125

#### Labs

B02 Mon 13:30 – 16:20

B04 Mon 13:30 – 16:20

B06 Tue 13:30 – 16:20

B08 Tue 13:30 – 16:20

B10 Wed 13:00 – 15:50

B12 Wed 13:00 – 15:50

B14 Tue 16:30 – 19:20

B16 Tue 16:30 – 19:20

#### Lab TA

Ziyi Feng

Sahand Mosayyebpour

Jinlong Zhang

Yifeng Bie

Bharat Karri

TBA

Minh Tu Hoang

TBA

Labs take place in ELW B324 every two weeks and begin in the week of 3 February.

#### Required Textbook

Title: Microelectronic Circuits, 7<sup>th</sup> edition

Authors: A.S. Sedra, K.C. Smith

Publisher: Oxford University Press

Year: 2015

**Website: CourseSpaces will be used for this course**

**Calculators:** The use of a **non-programmable, non-graphing, non-communicating** calculator will be permitted during exams

#### Assessment:

Assignments:	15%	Due Dates: Fridays at 16:00
Labs	20%	
Mid-term	20%	Date: Friday 14 February
Final Exam	45%	

#### Note:

- Failure to complete all laboratory requirements will result in a grade of N being awarded for the course.
- Failure to satisfy one of two conditions will result in a failing grade for the course:
  - i. The grade of the final exam must be a passing grade
  - ii. The aggregate grade of the midterm and final exams must be a passing grade

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://web.uvic.ca/calendar2020-01/undergrad/info/regulations/grading.html>

**There will be no supplemental examination for this course.**

**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:**

- January 19: Withdrawal with 100% reduction of tuition fees
- February 9: Withdrawal with 50% reduction of tuition fees
- February 29: Last day for withdrawal (no fees returned)

**Accommodation of Religious Observance:**

<https://web.uvic.ca/calendar2020-01/undergrad/info/regulations/religious-observanc.html>

**Policy on Inclusivity and Diversity:**

<https://web.uvic.ca/calendar2020-01/general/policies.html>

**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>

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://web.uvic.ca/calendar2020-01/undergrad/info/regulations/academic-integrity.html>

**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:**

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.

**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](http://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](mailto:svpcoordinator@uvic.ca)

**Web:** [www.uvic.ca/svp](http://www.uvic.ca/svp)

**Office of the Ombudsperson:**

The [Office of the Ombudsperson](https://uvicombudsperson.ca/) 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](mailto:ombuddy@uvic.ca); Web: <https://uvicombudsperson.ca/>