COURSE SYLLABUS

CAMOSUN
COLLEGE

COURSE CODE: **ELEN 144**

COURSE TITLE: **SEMICONDUCTOR DEVICES 1**

CLASS SECTION:

TERM: **Summer 2024**

COURSE CREDITS: **4**

DELIVERY METHOD(S): **In-Person**

For COVID-19 information please visit https://camosun.ca/about/covid-19-updates

Camosun College requires mandatory attendance for the first class meeting of each course. If you do not attend, and do not provide your instructor with a reasonable explanation in advance, you will be removed from the course and the space offered to the next waitlisted student.

INSTRUCTOR DETAILS

NAME: John Yang

EMAIL: yang@camosun.ca

OFFICE: TEC 268

HOURS: To Be Determined

As your course instructor, I endeavour to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with me. Camosun College is committed to identifying and removing institutional and social barriers that prevent access and impede success.

CALENDAR DESCRIPTION

PREREQUISITE(S):   Reserved for DND *ELECSPEC* program
CO-REQUISITE(S):
EXCLUSION(S):

COURSE LEARNING OUTCOMES / OBJECTIVES

Upon completion of this course, the student will have an understanding of commonly used analog electronic components and circuits.

REQUIRED MATERIALS & RECOMMENDED PREPARATION / INFORMATION

- Electronic Devices 5th Edition (or newer)
  Floyd Thomas L.   ISBN 0-13-028484-X
- Laboratory Exercises, Handouts and Course Outline
  Typically available both online and in class

The following schedule and course components are subject to change with reasonable advance notice, as deemed appropriate by the instructor.

Time: 87 hours including lectures, labs, and exams *(Lecture: 4hrs/week; Lab: 2hrs/week; Final exam: 3hrs)*

WEEK	ACTIVITY or TOPIC	NOTES
1	**1. Diodes** (6 hrs) 1.1. The conductor and insulator 1.2. Doping –The semiconductor 1.3. N and P type materials 1.4. Biasing the PN Junction 1.5. Diode characteristics 1.6. Zener Diode characteristics 1.7. Light-emitting diodes 1.8. Photo diodes and laser diodes 1.9. Schottky diodes 1.10. Varactor, Tunnel and other miscellaneous diodes 1.11. Varistor and other commonly used diodes	Lab 01
2	1.12. Half and full wave rectifier circuits 1.13. Diode Applications	Lab 02
3	**2. Introduction to Bipolar Transistors** (BJTs) (8 hrs) 2.1. BJT construction 2.2. BJT operations 2.3. BJT characteristics 2.4. Biasing BJT's	Lab 03
4	2.5. Biasing BJT's 2.6. Temperature effects on biasing voltages 2.7. Troubleshooting transistor bias circuits	Lab 04
5	**3. BJT Transistor AC Amplifiers** (10 hrs) 3.1. Common emitter amplifier 3.2. Common collector amplifier 3.3. Common base amplifier 3.4. Class A amplifiers 3.5. Class B amplifiers 3.6. Class A/B amplifiers 3.7. Class C amplifiers 3.8. Types of distortion	Lab 05
6	3.9. Class A amplifiers 3.10. Class B amplifiers 3.11. Class A/B amplifiers 3.12. Class C amplifiers 3.13. Types of distortion **(Week 6 or Week 7 schedule** depending on the semester and/or "**Reading Break**")	Lab 06

WEEK	ACTIVITY or TOPIC	NOTES
7	3.9. Class A amplifiers 3.10. Class B amplifiers 3.11. Class A/B amplifiers 3.12. Class C amplifiers 3.13. Types of distortion **Midterm Exam** (2 hrs)	Lab 07
8	4. **Field Effect Transistors** (FETs) (10 hrs) 4.1. JFET characteristics 4.2. JFET biasing 4.3. JFET amplifiers	Lab 08
9	4.4. D type MOSFETs 4.5. E type MOSFETs 4.6. MOSFET amplifiers	Lab 09
10	5. **Amplifier Frequency Response** (4 hrs) 5.1. Low Frequency Amplifier Response 5.2. High Frequency Amplifier Response 5.3. Total Amplifier Frequency Response 5.4. Frequency Response of Multistage Amplifiers 5.5. Switching characteristics	Lab 10
11	6. **Thyristors and Unijunction Devices** (6 hrs) 6.1. Introduction to thyristors 6.2. Shockley diodes (or Four-layer diodes) 6.3. SCR characteristics 6.4. Diac's characteristics 6.5. Triac's characteristics 6.6. SCS, UJT, PUT, and IGBT	Lab 11
12	7. **Oscillators** (5 hrs) 7.1. Feedback Oscillators 7.2. Wien bridge oscillator 7.3. RC phase shift oscillator 7.4. The Twin-T Oscillator 7.5. Colpitts oscillator 7.6. Harley and other oscillators 7.7. Crystal controlled oscillators 7.8. Relaxation oscillator	Lab 12
13	8. **Unregulated and Regulated Power Supplies** (5 hrs) 8.1. Zener regulator 8.2. Emitter follower regulator 8.3. Variable feedback regulator 8.4. Linear and Switching regulator 8.5. Other IC regulators 8.6. Basic power supply design 8.7. Determining power supply component values	Lab 13

WEEK	ACTIVITY or TOPIC	NOTES
14	Course Review	(Lab makeup)
15	FINAL EXAM	

LABS	2 hrs/Lab
Lab 01 Be familiar with MULTISIM, the simulation software	
Lab 02 Introduction to Diodes and Diode Characteristics	
Lab 03 Clippers (Limiters) and Clampers	
Lab 04 Zener Diodes and Their Characteristics	
Lab 05 Introduction to Bipolar Junction Transistors (BJTs)	
Lab 06 A Simple DC-biased BJT Amplifier Design	
Lab 07 Voltage-divider Biased BJT Circuits	
Lab 08 BJT ac Amplifiers	
Lab 09 Introduction to Junction Field-Effect Transistor (JFET)	
Lab 10 JFET Amplifiers Design	
Lab 11 Introduction to Thyristors Circuits	
Lab 12 Oscillator Circuits	
Lab 13 Introduction to Voltage Regulation Circuits	

Students registered with the Centre for Accessible Learning (CAL) who complete quizzes, tests, and exams with academic accommodations have booking procedures and deadlines with CAL where advanced noticed is required. Deadlines scan be reviewed on the CAL exams page. http://camosun.ca/services/accessible-learning/exams.html

EVALUATION OF LEARNING

DESCRIPTION		WEIGHTING
Quizzes		5%
Assignments		15%
Labs		20%
Midterm Exam		20%
Final Exam		40%
	TOTAL	100%

If you have a concern about a grade you have received for an evaluation, please come and see me as soon as possible. Refer to the Grade Review and Appeals policy for more information. http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf

COURSE GUIDELINES & EXPECTATIONS

A passing grade must meet following three criteria:

1) Overall lab mark is equal to or greater than 60%;
2) Overall theoretical mark (assignments, tests, final exam) is equal to or greater than 60%;
3) The final exam mark is equal to or greater than 50%.

SCHOOL OR DEPARTMENTAL INFORMATION

- Electronics and Computer Engineering Department (link)

- School of Trades & Technology (link)

STUDENT RESPONSIBILITY

Enrolment at Camosun assumes that the student will become a responsible member of the College community. As such, each student will display a positive work ethic, assist in the preservation of College property, and assume responsibility for their education by researching academic requirements and policies; demonstrating courtesy and respect toward others; and respecting expectations concerning attendance, assignments, deadlines, and appointments.

SUPPORTS AND SERVICES FOR STUDENTS

Camosun College offers a number of services to help you succeed in and out of the classroom. For a detailed overview of the supports and services visit http://camosun.ca/students/.

Support Service	Website
Academic Advising	http://camosun.ca/advising
Accessible Learning	http://camosun.ca/accessible-learning
Counselling	http://camosun.ca/counselling
Career Services	http://camosun.ca/coop
Financial Aid and Awards	http://camosun.ca/financialaid
Help Centres (Math/English/Science)	http://camosun.ca/help-centres
Indigenous Student Support	http://camosun.ca/indigenous
International Student Support	http://camosun.ca/international/
Learning Skills	http://camosun.ca/learningskills
Library	http://camosun.ca/services/library/
Office of Student Support	http://camosun.ca/oss

Support Service	Website
Ombudsperson	http://camosun.ca/ombuds
Registration	http://camosun.ca/registration
Technology Support	http://camosun.ca/its
Writing Centre	http://camosun.ca/writing-centre

If you have a mental health concern, please contact Counselling to arrange an appointment as soon as possible. Counselling sessions are available at both campuses during business hours. If you need urgent support after-hours, please contact the Vancouver Island Crisis Line at 1-888-494-3888 or call 911.

COLLEGE-WIDE POLICIES, PROCEDURES, REQUIREMENTS, AND STANDARDS

Academic Accommodations for Students with Disabilities

The College is committed to providing appropriate and reasonable academic accommodations to students with disabilities (i.e. physical, depression, learning, etc). If you have a disability, the Centre for Accessible Learning (CAL) can help you document your needs, and where disability-related barriers to access in your courses exist, create an accommodation plan. By making a plan through CAL, you can ensure you have the appropriate academic accommodations you need without disclosing your diagnosis or condition to course instructors. Please visit the CAL website for contacts and to learn how to get started: http://camosun.ca/services/accessible-learning/

Academic Integrity

Please visit http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.13.pdf for policy regarding academic expectations and details for addressing and resolving matters of academic misconduct.

Academic Progress

Please visit http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.1.pdf for further details on how Camosun College monitors students' academic progress and what steps can be taken if a student is at risk of not meeting the College's academic progress standards.

Course Withdrawals Policy

Please visit http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.2.pdf for further details about course withdrawals. For deadline for fees, course drop dates, and tuition refund, please visit http://camosun.ca/learn/fees/#deadlines.

Grading Policy

Please visit http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.5.pdf for further details about grading.

Grade Review and Appeals

Please visit http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf for policy relating to requests for review and appeal of grades.

Mandatory Attendance for First Class Meeting of Each Course

Camosun College requires mandatory attendance for the first class meeting of each course. If you do not attend, and do not provide your instructor with a reasonable reason in advance, you will be removed from the course and the space offered to the next waitlisted student. For more information, please see the "Attendance" section under "Registration Policies and Procedures" (http://camosun.ca/learn/calendar/current/procedures.html) and the Grading Policy at http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.5.pdf.

Medical / Compassionate Withdrawals

Students who are incapacitated and unable to complete or succeed in their studies by virtue of serious and demonstrated exceptional circumstances may be eligible for a medical/compassionate withdrawal. Please visit http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.8.pdf to learn more about the process involved in a medical/compassionate withdrawal.

Sexual Violence and Misconduct

Camosun is committed to creating a campus culture of safety, respect, and consent. Camosun's Office of Student Support is responsible for offering support to students impacted by sexual violence. Regardless of when or where the sexual violence or misconduct occurred, students can access support at Camosun. The Office of Student Support will make sure students have a safe and private place to talk and will help them understand what supports are available and their options for next steps. The Office of Student Support respects a student's right to choose what is right for them. For more information see Camosun's Sexualized Violence and Misconduct Policy: http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.9.pdf and camosun.ca/sexual-violence. To contact the Office of Student Support: oss@camosun.ca or by phone: 250-370-3046 or 250-3703841

Student Misconduct (Non-Academic)

Camosun College is committed to building the academic competency of all students, seeks to empower students to become agents of their own learning, and promotes academic belonging for everyone. Camosun also expects that all students to conduct themselves in a manner that contributes to a positive, supportive, and safe learning environment. Please review Camosun College's Student Misconduct Policy at http://camosun.ca/about/policies/education-academic/e-2-student-services-and-support/e-2.5.pdf to understand the College's expectations of academic integrity and student behavioural conduct.

Changes to this Syllabus: Every effort has been made to ensure that information in this syllabus is accurate at the time of publication. The College reserves the right to change courses if it becomes necessary so that course content remains relevant. In such cases, the instructor will give the students clear and timely notice of the changes.