

# COURSE SYLLABUS



COURSE TITLE: ECET 250E- Linear Circuits-1

CLASS SECTION:

TERM: 2023F

COURSE CREDITS:4

DELIVERY METHOD(S): Lecture

Camosun College campuses are located on the traditional territories of the Ləkʷəŋən and W̱SÁNEĆ peoples. We acknowledge their welcome and graciousness to the students who seek knowledge here.  
Learn more about Camosun's

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The COVID-19 pandemic has presented many challenges, and Camosun College is committed to helping you safely complete your education. Following guidelines from the Provincial Health Officer, WorkSafe BC, and the B.C. Government to ensure the health and wellbeing of students and employees, Camosun College is providing you with every possible protection to keep you safe. Our measures include COVID Training for students and employees, health checks, infection control protocols including sanitization of spaces, PPE and ensuring physical distancing. For details on these precautions please follow this link: <http://camosun.ca/covid19/faq/covid-faqs-students.html>. However, if you're at all uncomfortable being on campus, please share your concerns with your Instructor. If needed, alternatives will be discussed.

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*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: Dr. Sahitya Yadav, Kandur

EMAIL: [KandurS@camosun.ca](mailto:KandurS@camosun.ca)

OFFICE: TEC 215

LECTURE HOURS: 4hrs /week

LAB HOURS: 2.5hrs /week

OFFICE HOURS: 2hrs /week

*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

Public holidays:

Week 1	Sep 4 <sup>th</sup> Monday	labour day
Week 5	Oct 2 <sup>nd</sup> Monday	National Day for Truth and Reconciliation
Week 6	Oct 9 <sup>th</sup> Monday	Thanksgiving Day
Week 11	Nov 13 <sup>th</sup> Monday	Remembrance Day

Exam dates:

Exam Type	Exam Date and Time	Syllabus
Quiz-1	21 <sup>st</sup> September 2023, Week 3- Lec 4	Chapter -1: Basic elements and definitions (Q,I,V,P,W)
Term test-1	11 <sup>th</sup> October 2023, Week 6-Lec 4	Chapter-1, 2 and 3
Quiz-2	1 <sup>st</sup> November 2023, Week 9 -Lec 4	Chapter 4 (Theorems) and 5(Capacitors and RC)
Term test-2	15 <sup>th</sup> November 2023, Week 11 Lab	Chapter 4,5,6,7 (Theorems, Capacitors, RC, RL, RLC, phasors, and AC analysis)
Quiz-3	29 <sup>th</sup> November 2023, Week 13- Lec 4	Chapter 8,9,10
Final Exam	As per college date	Week 1 to Week 14

**PREREQUISITE(S):** Restricted to students taking the Engineering Bridge Program

**CO-REQUISITE(S):** None

**EXCLUSION(S):** None

## COURSE LEARNING OUTCOMES / OBJECTIVES

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Upon completion of this course the student will be able to:

At the end of the course, student should be able to demonstrate knowledge of basic electronic circuit theory, linear circuit analysis techniques, operational amplifiers, three phase systems and transformers.

Students should be able to apply the theory to laboratory hands on exercises.

## REQUIRED MATERIALS & RECOMMENDED PREPARATION / INFORMATION

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- Alexander and Sadiku: Fundamentals of Electric Circuits 5<sup>th</sup> / 6<sup>th</sup> edition, McGraw-Hill  
FREE TEXT: <http://www.allaboutcircuits.com/>
- Laboratory documents, course notes and practice problems (Available on D2L)

## COURSE SCHEDULE, TOPICS, AND ASSOCIATED PREPARATION / ACTIVITY / EVALUATION

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### Course outline:

#### INTRODUCTION and OBJECTIVE of the course

Electronic system model. Linear vs non-linear systems. Lab equipment Charge and current, voltage, energy, and power. Passive and active elements.

- BASIC ELEMENTS AND DEFINITIONS**  
Charge and current, voltage, energy, and power. Passive and active elements.
- RESISTIVE CIRCUITS**  
Ohm's law. Kirchhoff's laws. Series and parallel resistive circuits.
- ANALYSIS METHODS**  
Nodal and mesh analysis of resistive circuits.
- NETWORK THEOREMS**  
Superposition, Thevenin's and Norton's theorems, maximum power transfer.
- ENERGY-STORAGE ELEMENTS**  
Capacitors and inductors-energy storage, series and parallel connection.

6. **SIMPLE RC AND RL CIRCUITS**  
Source-free RC and RL circuits, time constants and dc steady state response. Response to a constant forcing function, unit step function, step response.
7. **SECOND-ORDER CIRCUITS**  
Second-order equations, natural and forced responses, parallel and series RLC circuits.
8. **SINUSOIDAL EXCITATION AND PHASORS**  
Properties of sinusoids, complex excitations, phasors, impedance and admittance, Kirchhoff's laws and impedance combinations.
9. **AC STEADY-STATE ANALYSIS**  
Nodal and mesh analysis, network theorems, phasor diagrams.
10. **AC STEADY-STATE POWER**  
Average power, RMS values, power factor, complex power, power measurements
11. **OPERATIONAL AMPLIFIERS**  
Definitions. Ideal vs Real op-amp. Linear function of op amps. Non-linear function of op amp. Op amp applications
12. **TRANSFORMERS**  
Mutual inductance, ideal transformer, reflected impedance.
13. **THREE-PHASE CIRCUITS**  
Y and  $\Delta$  connections, balanced three-phase circuits.

**Labs (Subject to change):**

1. Hands on Experience with Lab equipment
2. Implementation of simple circuits using breadboard, resistances and dc power supply
3. Introduction to circuit analysis using NI simulation software – MULTISIM
4. Resistive dc circuits
5. Investigation of Thevenin's theorem and maximum power transfer
6. First order transient circuits
7. Second order circuits
8. Investigation of ac resistive and resistive-capacitive circuits
9. Investigation of ac resistive-inductive circuits
10. Investigation of an RLC circuit in ac series and parallel resonance
11. Power in ac
12. Simple Op Amp Circuits
13. Transformers

**Lesson Plan:**

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

Week	Topic
1	Introduction to Linear circuits 1 Introduction to all lab equipment's Introductions to Electronic system model, Linear vs non-linear systems. Chapter 1- Charge and current, voltage
2	Lab 2 explanation Chapter 1- power and energy Classification of elements Chapter 2 Ohm's Law , series circuits

Week	Topic
3	Lab 3 explanation, Parallel circuits KVL and KCL Series and parallel circuits Quiz 1
4	Voltage division rule- lab 4 explanation Review of Chapter 2 Chapter 3- Mesh and Nodal Analysis
5	Lab 5 discussion, Chapter 4- Theorems- Thevenin's Maximum power transfer theorem Source transformation Norton's theorem
6	Term Test 1 Super position theorem Chapter 5 – capacitors Capacitors and inductors-energy storage, series and parallel connection.
7	Lab 7 explanation, Source-free RC and RL circuits, time constants and dc steady state response. Response to a constant forcing function, unit step function, step response
8	Lab 8 explanation, Second-order equations, natural and forced responses, parallel and series RLC circuits.
9	Lab 9 explanation, Quiz 2 Properties of sinusoids, complex excitations, phasors, impedance and admittance
10	Lab 10 explanation, , Kirchhoff's laws and impedance combinations
11	Lab 11 explanation, Term test 2 Nodal and mesh analysis, network theorems, phasor diagrams.
12	Lab 12 explanation, Average power, RMS values, power factor, complex power, power measurements
13	Lab 13 explanation, Definitions. Ideal vs Real op-amp. Linear function of op amps. Non-linear function of op amp. Op amp applications Quiz 3
14	Mutual inductance, ideal transformer, reflected impedance. Y and $\Delta$ connections, balanced three-phase 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). <http://camosun.ca/services/accessible-learning/exams.html>

## EVALUATION OF LEARNING

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Description	Weight %
Quizzes	10
Problem sets	5
Labs	20
TermTest (1 and 2)	30
Final exam	35
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](http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf) policy for more information.  
<http://camosun.ca/about/policies/education-academic/e-1-programming-and-instruction/e-1.14.pdf>

## COURSE GUIDELINES & EXPECTATIONS

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### GRADING ACCORDING TO COLLEGE POLICY (GPA)

**A minimum of 60% must be achieved in both the theory and lab portions to pass the course.** Less than 60% in either portion will result in a failure of the entire course and **minimum of 50% must be achieved in Final exam to pass the course.**

All labs and lab reports must be completed satisfactorily to obtain credit for the course. Please submit the lab reports as per the due date in d2L. Late labs will be penalized by 10% per day. You are required to attend and be on time for ALL labs. Failure to attend a lab without a valid excuse may result in being assigned a failing grade for that lab. If you cannot attend a lab (for a valid reason) please inform your lab instructor (ahead of time if possible) and arrange to make it up.

### Lecture Attendance

To get the most out of this course, students are expected to attend all classes and be on time. It is your responsibility to acquire all information given during a class missed, including notes, hand-outs, changed exam dates etc.

### Exam Procedures

All exams must be written at the scheduled times with the exception of students requiring an accommodation by CAL. It is understood that emergency circumstances do occur (e.g. severe illness or family emergency); for such circumstances accommodation may be offered at the discretion of the instructor, provided the student:

- notifies the instructor in advance of the exam (not after), and
- provides documented evidence of the circumstance (e.g. medical certificate).

If an exam is missed with an excused absence, it is up to the instructor's discretion as to how the mark will be made up. In most cases, an oral exam will be scheduled for the student as soon as possible.

Be sure not to make travel plans for the end of semester until the final exam schedules are finalized and posted. Please ask any family members who might make travel plans on your behalf to consult you before booking tickets.

Please note: the use of cell phones during a test or quiz is not allowed and may result in a zero for that assessment.

## Study Habits

Good and regular study habits are essential to do well in this course. You should plan on a weekly minimum of 5 hours outside of scheduled class time for the completion of readings, assignments and for general studying. Joining a study group can help make this more achievable.

Lecture presentations will be uploaded to the course website. These should be used as a study guide, not as your sole source of information. You will need to write down additional key words for examples and explanations given during lecture and review text and videos to support your understanding. It is also recommended practice to transform lecture notes into a study-friendly format after each lecture, incorporating additional information from your textbook. Study these notes before the next class to prepare yourself for new material, which will often build on previously covered material.

Please take advantage of office hours if you need extra clarification and help.

## SCHOOL OR DEPARTMENTAL INFORMATION

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Electronics and computer Engineering

## STUDENT RESPONSIBILITY

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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

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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/>.

Academic Advising	<a href="http://camosun.ca/advising">http://camosun.ca/advising</a>
Accessible Learning	<a href="http://camosun.ca/accessible-learning">http://camosun.ca/accessible-learning</a>
Counselling	<a href="http://camosun.ca/counselling">http://camosun.ca/counselling</a>
Career Services	<a href="http://camosun.ca/coop">http://camosun.ca/coop</a>
Financial Aid and Awards	<a href="http://camosun.ca/financialaid">http://camosun.ca/financialaid</a>
Help Centres (Math/English/Science)	<a href="http://camosun.ca/help-centres">http://camosun.ca/help-centres</a>
Indigenous Student Support	<a href="http://camosun.ca/indigenous">http://camosun.ca/indigenous</a>
International Student Support	<a href="http://camosun.ca/international/">http://camosun.ca/international/</a>
Learning Skills	<a href="http://camosun.ca/learningskills">http://camosun.ca/learningskills</a>

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Library	<a href="http://camosun.ca/services/library/">http://camosun.ca/services/library/</a>
Office of Student Support	<a href="http://camosun.ca/oss">http://camosun.ca/oss</a>
Ombudsperson	<a href="http://camosun.ca/ombuds">http://camosun.ca/ombuds</a>
Registration	<a href="http://camosun.ca/registration">http://camosun.ca/registration</a>
Technology Support	<a href="http://camosun.ca/its">http://camosun.ca/its</a>
Writing Centre	<a href="http://camosun.ca/writing-centre">http://camosun.ca/writing-centre</a>

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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.

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## COLLEGE-WIDE POLICIES, PROCEDURES, REQUIREMENTS, AND STANDARDS

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### 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](http://camosun.ca/sexual-violence). To contact the Office of Student Support: [oss@camosun.ca](mailto: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.