

# COURSE SYLLABUS



COURSE TITLE: ECET 149 – Electricity and Machines  
CLASS SECTION: X0n  
TERM: Winter 2024  
COURSE CREDITS: 3  
DELIVERY METHOD(S): in-person

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 [Territorial Acknowledgement](#).

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: Course/Lab: Lindsay Stretch ([stretch@camosun.ca](mailto:stretch@camosun.ca))

Lab: John Yang ([yang@camosun.ca](mailto:yang@camosun.ca))

OFFICE: TEC269

HOURS: By Appointment

*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

---

Students will be introduced basic electrical theory, practice and devices. Topics include; resistance, capacitance, inductance, D.C. and A.C. circuits, the fundamentals of AC and DC electrical motors, generators, electrical voltage conversion and transmission. An introduction of electricity and magnetism will be provided as well as practice in electrical measurement. Topics covered will be, in part, electromechanical energy conversion, synchronous machines, induction machines, DC machines and special purpose motors, motor selection and speed control techniques.

PREREQUISITE(S): see calendar

CO-REQUISITE(S): see calendar

EXCLUSION(S): see calendar

## COURSE LEARNING OUTCOMES / OBJECTIVES

---

Through lecture, reading material and lab experiments the student will be introduced to some basic electronics concepts and passive components. Emphasis is on practical application of each topic. Evaluation will be based on the competency demonstrated by the student.

Upon successful completion of this course a student will be able to:

- Describe Voltage, Current and Resistance
- Calculate and measure the current in circuit made up of a battery and resistors
- Describe Capacitors and Inductors
- Understand the basic principles of the electromechanical energy conversion.
- Explain general principles of electric machine operation:
  - DC, AC (single phase, three phase, synchronous, induction)
- Understand the basics of speed control in motors.
- Understand and use transformers for basic voltage conversion
- Be able to identify the voltages and number of phases available to a site based on observations of local transmission lines and electrical entry name plate data.
- Describe methods of producing electricity
- Describe how AC power is produced and distributed to buildings
- Understand the concept and techniques for generation of rotating magnetic field.
- Explain the operation of synchronous machines.
- Explain speed control speed of a synchronous or induction motor using a variable frequency drive.
- Explain basic characteristics of induction motor.
- Select induction motor for different applications (Name plate data: voltage, phases, speed, power)
- Understand problems at motor starting and variable speed operation.
- Understand commutation process in DC machines.
- Identify differences in basic configurations of dc machines working both as generators and motors.
- Select motors for some special applications.

## REQUIRED MATERIALS & RECOMMENDED PREPARATION / INFORMATION

---

- Access to a PC, online resources.
- Course materials from D2L site
- Principles of Electronics (Multicolour) Mehta, Rohit – ebook about \$30 at Amazon.ca  
[https://www.amazon.ca/Principles-Electronics-Multicolour-Mehta-Rohit-ebook/dp/B06XKV3RPX/ref=sr\\_1\\_1](https://www.amazon.ca/Principles-Electronics-Multicolour-Mehta-Rohit-ebook/dp/B06XKV3RPX/ref=sr_1_1)
- Text (Recommended in pdf if available):  
Circuit Analysis with Devices: Theory and Practice  
Robins and Miller      ISBN 1-4018-7984-5
- Other (Optional)
  - Foundations of Electronics, Circuits and Devices 3rd Edition  
Russell L. Meade      ISBN 0-7668-0427-5
  - Introduction to Electric Circuit, 9th Edition  
Herbert W Jackson      ISBN 9-780195-438130

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

---

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

<b>1. Introduction</b>	<b>8 hours</b>
1.1. Electrical symbols and schematic diagrams	
1.2. Voltage, current, resistance and Ohms Law	
1.3. Series resistors, voltage divider rule	
1.4. Parallel resistors, current divider rule	
1.5. Power and energy, energy conversion	
1.6. Maximum power transfer theorem	
1.7. Superposition and Thevenin's theorem	
1.8. DC Measuring instruments and loading	
<b>2. Reactive components</b>	<b>9 hours</b>
2.1. DC Capacitors and RC	
2.2. AC Capacitors, C reactance and complex numbers	
2.3. DC Inductors and RL	
2.4. AC Inductors, L reactance and complex RL	
2.5. Complex RLC, series resonance	
2.6. Complex RLC, parallel resonance	
2.7. AC measurements, oscilloscope, phasor diagram	
2.8. True, reactive and apparent power	
2.9. Power factor and PF correction	
<b>3. Electromagnetism</b>	<b>5 hours</b>
3.1. Electromagnetism introduction	
3.2. Ideal transformer	
3.3. Transformer ratios, reflected Z	
3.4. Transformer losses, power, selection, rectification	
<b>4. DC motors and generators</b>	<b>4 hours</b>
4.1. Electromagnetics review	
4.2. Electric machine physical construction	
4.3. Series, shunt and compound wiring	
4.4. DC motor controller	
<b>5. AC motors and generators</b>	<b>11 hours</b>
5.1. Three-phase sine and graphical representations	
5.2. Three-phase induction motors	
5.3. Y-delta, primary R and autotransformer starting	
5.4. Three-phase synchronous motors	
5.5. Brushless DC and stepper motors	
5.6. VFD sine signal generation	
5.7. VFD specifications, V/Hz and FOC	
5.8. Single-phase motors	
5.9. Synchronous generators	
5.10. Induction generators	
5.11. Three-phase power distribution	
<b>6. Tests and review</b>	<b>7 hours</b>
<b>Total</b>	<b>44 hours</b>

## Lab Topics (Subject to change)

1. Intro Lab and Equipment
2. Ohm's Law and Series Resistive Circuits
3. Parallel and Combination Resistors
4. Series & parallel resistors
5. Max power, Thevenin theorem
6. Series/parallel caps, RC
7. Intro to AC Measurements
8. RL Circuits, stored energy
9. AC Measurements, Series RC
10. Transformers
11. DC motors
12. DC & AC Generators
13. AC synchronous motor
14. AC induction motor starting

---

Note: Lab attendance is mandatory and all reports must be submitted within one week after scheduled lab time unless special arrangements are made with the instructor.

---

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 notice is required. Deadlines can 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

DESCRIPTION	WEIGHTING
Assignments	20%
Labs (all labs/reports must be completed to pass this course)	20%
Midterm(s)	20%
Final Exam (must pass final exam to pass this course)	30%
Attendance/Participation/Quizzes	10%
<b>TOTAL</b>	<b>100%</b>

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>

## 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.

## COURSE GUIDELINES & EXPECTATIONS

---

IN THE LAB – Students are responsible for sanitizing their workspace prior to AND after the class. Lab cleanup begins **15 minutes before the end of the class**. Cleaning provisions will be supplied by Camosun where necessary.

A portion of your mark will be based on your respect for the college equipment, the cleanliness of your workstation, your participation in the cleaning crew and the cleanliness of the floor around your work station.

**Attendance is mandatory for all classroom/lab activities.** It is the student's responsibility to inform the instructor prior to being late or missing a class, or as soon as possible. Arriving late to class will result in a 20% demerit for any work graded that day.

**Professionalism:** "the skill, good judgment, and polite behavior that is expected from a person who is trained to do a job well" (Merriam Webster online). Students will be evaluated on the above as well as their ability to work well in a team.

Assignments and/or Quizzes are based on the lecture topics and hands on lab exercises.

## SCHOOL OR DEPARTMENTAL INFORMATION

---

1. A grade of 60% or more is required in all assessment items above to pass the course or to use this course to qualify as a prerequisite.
2. No late materials will be accepted past midnight of the last day of the course.
3. No opportunity will be available to write missed quizzes.
4. All late course material is reduced in mark by 50% and then an additional 10% per day

## 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	<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>

---

Support Service	Website
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>

---

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](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.