

# COURSE SYLLABUS



COURSE TITLE: ECET 120 Renewable Energy Systems

CLASS SECTION: X01A, X01B

TERM: 2024W

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](#).

## INSTRUCTOR DETAILS

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NAME: Ian Browning

NAME:

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

EMAIL:

OFFICE: TEC 267

OFFICE:

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

## CALENDAR DESCRIPTION

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Students will gain the foundational knowledge necessary for the analysis and design of renewable energy (RE) systems including: solar photovoltaic (PV), wind, solar thermal, hydroelectric, tidal, wave, geothermal, bioenergy and fuel cell technologies. Students will examine energy generation from renewable sources as well as energy storage systems.

PREREQUISITE(S): C in ECET 140

## COURSE LEARNING OUTCOMES / OBJECTIVES

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

- describe characteristics of renewable energy (RE) resources;
- explain the principles of operation of RE systems, including solar photovoltaic (PV), hydrogen fuel cells, wind, solar thermal, hydroelectric, tidal, wave, geothermal and bioenergy;
- explain the benefits and limitations of RE systems vs conventional power generation;
- analyze the operation and efficiency of RE systems;
- calculate the energy inputs, outputs and efficiency of RE systems;
- explain differences between AC and DC power generation/distribution systems;
- propose a RE system based on stated energy supply requirements;
- describe characteristics of energy storage systems;
- analyze and give examples of RE case studies;
- assess challenges of RE integration;
- design, construct and operate an RE system in the laboratory.

## REQUIRED MATERIALS & RECOMMENDED PREPARATION / INFORMATION

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- Website: D2L website for ECET 120
- Optional Text: Renewable Energy Systems, Buchla, Kissell & Floyd  
(references from this text are provided in the table below)
- Optional Text: Renewable Energy: Power for a sustainable future, ed. Boyle  
(references from this text are provided in [ ] in the table below)

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

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The following schedule and course components are approximate and subject to change as deemed appropriate by the instructor.

HOURS (approx.)	ACTIVITY or TOPIC	OTHER NOTES
2	Introduction	Section 1.1 Sections 6.5-6.7 Sections 13.1-13.2 [Chapter 1]
9	Solar Photovoltaic	Section 1.3 Chapter 3 Sections 4.1-4.3 Chapter 5 Section 6.3 [Chapter 3]
5	Hydrogen Fuel Cells	Chapter 12 [Section 10.6]
6	Wind	Section 1.4 Chapter 7 Chapter 8 Sections 13.3-13.4 [Chapter 7]
4	Solar Thermal	Sections 4.4-4.5 Chapter 5 Section 10.4 [Chapter 2]
6	Energy Storage	Sections 6.1-6.2 [Chapter 10]
1*	Hydroelectricity	Section 1.6 Sections 11.1-11.3 [Chapter 5]
1*	Tidal	Section 11.4 [Chapter 6]
1*	Wave	Section 11.5 [Chapter 8]
1*	Geothermal	Section 1.5 Sections 10.1-10.3

HOURS (approx.)	ACTIVITY or TOPIC	OTHER NOTES
		Section 10.5 [Chapter 9]
1*	Bioenergy	Section 1.7 Chapter 9 [Chapter 4]
0.5	Nuclear	Section 1.2 [Section 1.1]
0.25	Integration and the Grid	Chapter 14 [Chapter 10]
0.25	Conservation	[Section 10.7]
6	Review, tests, and holidays	* These topics will be covered by class presentations, during lab time.

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 advance 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>

Lab posting and due dates are available on D2L.

LAB WEEK	LAB ACTIVITY
1	Generation of DC and AC Voltage and Inverters
2	Photovoltaic Solar Energy: IV Characteristic and Dynamic Resistance
3	Photovoltaic Solar Energy: Panel Efficiency
4	Photovoltaic Solar Energy: Camosun College Solar Panels
5	Hydrogen Fuel Cell: Electrolysis of Water
6	Hydrogen Fuel Cell: Performance
7	Wind Energy: Generated Voltage and Power
8	Wind Energy: Tip Speed Ratio, Blade Pitch and Gearing
9	Solar Thermal Water Heating
10	Battery Charging and Discharging
11	Class Presentations (hydro, tidal, wave)
12	Class Presentations (geothermal, bioenergy)

## EVALUATION OF LEARNING

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DESCRIPTION	WEIGHTING
Class presentation	10%
Tests (2) Test 1 (week 5): Test 2 (week 10):	30%
Labs	30%
Final exam: To pass the course, students must obtain a minimum of 50% on the final exam.	30%
<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>

## COURSE GUIDELINES & EXPECTATIONS

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- Attendance to all labs is **mandatory**.
- You are expected to arrive at the lab on time with the necessary tools etc. Marks will be deducted for excessive tardiness and lack of preparation.
- Students must obtain a minimum weighted average of **60% in theory evaluations** (tests, examinations etc.) in any course that is a pre-requisite for subsequent courses.
- Students must obtain a minimum weighted average of **60% in lab evaluations** (lab performance, reports, etc.) in any course that is a pre-requisite for subsequent courses.
- Students must obtain a minimum of **50% on the final examination** for a course in order to receive a passing grade.
- Failure to meet any one of these criteria will result in a student receiving a failing grade (F) for the course.
- All labs (laboratory work, reports, etc.) must be submitted prior to a student writing a final examination.
- Late assignments will have marks deducted; if handed in after assignments are returned to the class, then no mark will be awarded.
- Problem sets will be assigned but not graded. Solution sets will be posted.

## SCHOOL OR DEPARTMENTAL INFORMATION

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Electronics & Computer Engineering Technology  
Chair: James van Oort

## 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/>.

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>
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.

### 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.