CAMOSUN COLLEGE
Electronics & Computer Engineering Technology

ECET 120 Renewable Energy Systems

This course provides the foundation for the analysis and design of renewable energy (RE) systems including: solar PV, wind, solar thermal, hydroelectric, tidal, wave, geothermal, bioenergy and fuel cell technologies. The course examines energy generation from renewable sources as well as energy storage systems.

Instructor Information

Name	Joyce van de Vegte
Office	TEC 208
Phone	250-370-4438
Email	vandevegte@camosun.ca

Learning Outcomes

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 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
- specify 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 technologies and integration
- demonstrate competence in RE system design and operation in the laboratory

Materials

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)
Website	D2L website for ECET 120

Assessment

Class presentation	10%
Tests	30%
Labs	20%
Final exam	40%

Dates

Problem set 1 solutions posted	(week 4)	Monday 29 January 2018
Test 1	(week 5)	Wednesday 7 February 2018
Problem set 2 solutions posted	(week 8)	Monday 26 February 2018
Test 2	(week 9)	Wednesday 7 March 2018
Problem set 3 solutions posted	(week 12)	Monday 26 March 2018
Test 3	(week 13)	Wednesday 4 April 2018
Final exam		16 - 24 April 2018

Course Content

Topic	**Reference**	**Estimated Time (hours)**
Introduction	Section 1.1 Sections 6.5-6.7 Sections 13.1-13.2 [Chapter 1]	2
Solar photovoltaic	Section 1.3 Chapter 3 Sections 4.1-4.3 Chapter 5 Section 6.3 [Chapter 3]	7
Hydrogen fuel cells	Chapter 12 [Section 10.6]	6
Wind	Section 1.4 Chapter 7 Chapter 8 Sections 13.3-13.4 [Chapter 7]	7
Solar thermal	Sections 4.4-4.5 Chapter 5 Section 10.4 [Chapter 2]	4
Energy storage	Sections 6.1-6.2 [Chapter 10]	5
Hydroelectricity	Section 1.6	1*

	Sections 11.1-11.3 [Chapter 5]	
Tidal	Section 11.4 [Chapter 6]	1*
Wave	Section 11.5 [Chapter 8]	1*
Geothermal	Section 1.5 Sections 10.1-10.3 Section 10.5 [Chapter 9]	1*
Bioenergy	Section 1.7 Chapter 9 [Chapter 4]	1*
Nuclear	Section 1.2 [Section 1.1]	0.5
Integration and the grid	Chapter 14 [Chapter 10]	1
Conservation	[Section 10.7]	0.5
Review, tests and holidays		9
Total (no classes during reading break)		42
* These topics will be covered by class presentations, during lab time.		

Labs

Activity	**Time (weeks)**
1 Generation of DC and AC Voltage and Inverters	1
2 Sign up for presentation and meet your group. Photovoltaic Solar Energy: IV Characteristic and Dynamic Resistance	1
3 Photovoltaic Solar Energy: Panel Efficiency	1
4 Photovoltaic Solar Energy: Camosun College Solar Panels	1
5 Hydrogen Fuel Cell: Electrolysis of Water	1
6 Hydrogen Fuel Cell: Performance	1
7 Wind Energy: Generated Voltage and Power	1
8 Wind Energy: Tip Speed Ratio, Blade Pitch and Gearing	1
9 Solar Thermal Water Heating	1
10 Battery Charging and Discharging	1
11 Class Presentations (hydro, tidal, wave)	1
12 Class Presentations (geothermal, bioenergy)	1
13 Available for exam review	1

Lab attendance

Unless otherwise noted, the Group A labs will take place from 15.30 – 17.20 in TEC 227, and the Group B labs will take place from 14.30 – 16.20 in TEC 229. Note that lab attendance is mandatory and 10% per day will be deducted for lab reports that are handed in late.

Week Number	**Group A**	**Group B**
1	Wednesday 10 January	Thursday 11 January
2	Wednesday 17 January	Thursday 18 January
3	Wednesday 24 January	Thursday 25 January
4	Wednesday 31 January	Thursday 1 February
5	Wednesday 7 February	Thursday 8 February
6	reading break	reading break
7	Wednesday 21 February	Thursday 22 February
8	Wednesday 28 February	Thursday 1 March
9	Wednesday 7 March	Thursday 8 March
10	Wednesday 14 March	Thursday 15 March
11	Wednesday 21 March	Thursday 22 March
12	Wednesday 28 March	Thursday 29 March
13	Wednesday 4 April	Thursday 5 April
14	Wednesday 11 April	Thursday 12 April