



Course Name: Introduction to Renewable Energy

Lead Faculty: **Louise Petruzzella**

School: **Shoreline Community College**

Delivery Mode(s) for Intro to RE Course (i.e. face-to-face, online, hybrid, etc): **Online**

Course Duration (semester, trimester, quarter, short-course, etc.): **One quarter**

of credits for the Intro to RE course: **5**

Program Name: **Clean Energy Technology & Entrepreneurship**

When did the program start? **2008**

What geographic area do your students come from? **Primarily Puget Sound/ Western Washington**

Number of Students in Program: **35-40 at any given time**

Demographics: Percentage distribution

Gender

Male: **81%**

Female: **19%**

Ethnicity: **65% White, 13% Asian/Pacific Islander, 21% Other/Unknown**

What percentage if known - Veterans: **15%**

Degree(s)/ Diplomas(s) / Certificate(s) Offered: **One- year Certificate of Proficiency & two year Applied Arts & Sciences Associates degree**

How Many Faculty teach renewable energy courses at your college (note if FT or PT)? **6 PT faculty**

Description of Your Facilities (be sure to note any special lab facilities used for hands-on training):

Zero Energy House Technical Features

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The Zero Energy House is a 700 (approx) square foot zero energy home prototype.

The home was originally built as a DOE solar decathlon contest entry by WSU students in 2005. It was moved to Shoreline's campus in 2007. The home is constructed on a raised post structure.

Currently the structure is neglected and unused. The exterior finishes of the structure are deteriorating. The systems are in need of maintenance and retro-commissioning.

The most notable features of the structure are its "green features". These include:

Solar PV

- **3 KW System on Roof currently active and net metering**
- **600 Watt PV on pylon - with disconnect in "off" position that back-feeds system - this may be why we thought the system was "off"**
 - **The two inverters feed a master controller which is storing data on a small hard drive on the desk**
- **A roof mounted weather station recording weather data**
- **Multiple "loose PV panels"**
- **Small (sub-residential size) Solar Thermal domestic water system. This is set up for "in-person" demos.**

Water Conservation features:

- **Approx 3000 Gal. rainwater catchment cistern system - it is full up to the top**

Envelope - HVAC

- **Well insulated/sealed envelope R-32?**
- **1 Ton Heating/Cooling Ductless Split System**

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- 50 CFM +/- Energy Recovery Ventilator

Operating System

- Internet is in the house - need a wireless router
- No phone - I say just get Skype and use that
- Fridge is on, lights work, etc

Description	Uses - Location - Supplemental Information	Cost	Disposition
Zero Energy House			
ZEH structure has numerous assets as described in Appendix B	NRG 161, NRG 200, Future Outreach, Future Community Learning	\$15000	Neglected. In need of paint and cleaning
Building Science-Energy Efficiency			
HOBO Dataloggers: Temperature, RH, Lighting On-Off, Motor On-Off - (8)	NRG 163	Owned	ZEH
KILL-A-Watt Dataloggers - (2)	NRG 161, 163	Owned	ZEH
Carbon Monoxide Sensor	NRG 161	Owned	ZEH
Fluke Thermal IR Camera	NRG 161, 163	Owned	ZEH
Blower Door (2)	NRG 161	Owned	ZEH
Solar PV			
Fluke Clamp-On Amp Meter	NRG 105, 120, NRG 220, NRG 123, 223	Owned	ZEH

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Solar Eyes (4?)	NRG 105, 120, NRG 220, NRG 123, 223	Owned	ZEH
(8) 240W PV Panels	NRG 105, 120, NRG 220, NRG 123, 223	In-Kind	
(4) Microinverters	NRG 105, 120, NRG 220, NRG 123, 223	In-Kind	
Loose PV Panels	NRG 105, 120, NRG 220, NRG 123, 223	Owned	ZEH
Meter Body	NRG 105, 120, NRG 220, NRG 123, 223	Owned	ZEH
Training Roof	NRG 105, 120, NRG 220, NRG 123, 223	\$3000U pgrade?	Roof requires safety railings to be used
Computer Lab			
30+ Computers			
Sketchup	NRG xxx	\$500 per year?	
Trane Trace 700	NRG 162, 163, 200	\$200 per year	1401 and Library
Autodesk Design Review	NRG 102, 162, 163, 180, 200	Owned	

Have you conducted a job market assessment? If yes, what were the findings?

Energy Management and Systems Technology (Classification of Instructional Programs (CIP) Code 15.0503) is a rapidly growing field in Washington State. Shoreline Community College formerly classified its CET students under CIP Code 46.9902 (Construction Trades, Other). In order to stay relevant in this emerging market, the curriculum was fully redesigned to meet the specifications of an energy management and systems technology program; likewise, the CIP Code for classifying enrolled students was updated to 15.0503. As defined by IPEDS, an Energy Management and Systems Technology/Technician program, “prepares individuals to apply basic engineering principles and technical skills in support of engineers and other professionals engaged in developing energy-efficient systems or monitoring energy use. [This] includes instruction in

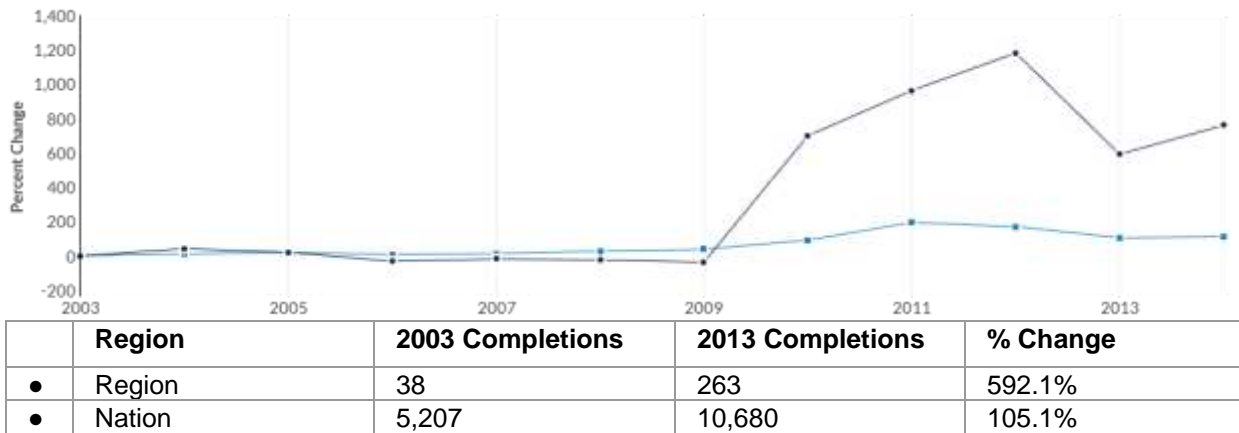
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principles of energy conservation, instrumentation calibration, monitoring systems and test procedures, energy loss inspection procedures, energy conservation techniques, and report preparation” (Source: IPEDS). While growth in Energy Management and Systems Technology declined in 2012, recent economic analyses have shown consistent job growth since 2013. As can be seen in the graph and chart in Figure 1, the Greater Seattle Area considerably surpasses the nation in Energy Management and Systems Technology jobs (Source: EMSI 2016 Q2 Dataset):

Figure 1 - Regional Trends in Energy Management and Systems Technology:



	Region	2003 Completions	2013 Completions	% Change
•	Region	38	263	592.1%
•	Nation	5,207	10,680	105.1%

As can be seen in Figure 2, the overall growth in related jobs is anticipated to be steady through 2020, with an overall 8.1% change over 2016-2020, according to EMSI (Source: EMSI 2016 Q2 Dataset):

Figure 2 – Energy Management and System Technology Growth:			
11,475	12,402	927	8.1%
2016 Jobs	2020 Jobs	Change (2016-2020)	% Change (2016-2020)

According to the Economic Development Council of Seattle & King County, “[The] Seattle metropolitan area ranks 13th for the size of our clean economy among the 100 largest metro areas in the U.S. The fastest growing clean economy sectors in Seattle/King County are renewable energy, biofuels/biomass, smart grid, remediation, and public transit....With our abundance and variety of resources ranging from wind to sunshine to water, the King County area is a natural location for clean tech innovation....In fact, just the Seattle metro area alone has seen clean tech employment far surpass the national average, and ranks in the top 20 in the U.S. As an area that actively supports green thinking, King County is poised to lead the world in clean technology” (Economic, 2016).

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What do you think makes your program successful? **The CET program continues to remain successful because of our dedicated faculty. The instructors our experts in their fields and are passionate about supporting students. While their teaching status is part-time, they are all fully committed to ensuring students reach their academic and career goals. We are also fortunate to have a vibrant and devoted advisory committee. Our committee members hire our students, provide job shadows, arrange tours, and meet three times per academic year to inform the program concerning trends and relevant industry needs. Overall, we remain enthusiastic in our desire to train our students for positions in the emerging technologies of the Clean Energy industry.**

What are your industry ties? (If you have an industry advisory board, please describe its size and composition).

General Manager	EarthHeat, Inc.
Governor’s Clean Tech Sector Lead	WA State Department of Commerce
Mechanical Engineer	PAE
Energy Engineer	ATS Automation
Mechanical Designer, Sr. Associate	DLR Group
Strategic Solutions Director	Trane
	EarthHeat, Inc
Mechanical Engineer	Taylor Engineering, LLC
Exec Dir/Excellence of Clean Energy	Centralia College
Healthy Home Inspector	King County Housing
Facilities Manager	Hines for Amazon Global Real Estate & Facilities
Ph.D., LEED AP, Principal Engineer	
PE, CSI	Burman Design
Senator	32nd Legislative District, Shoreline
Founder, CEO	A & R Solar

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Account Manager UPDATEcheckLinkedIn	Trane Commercial Systems
Asst.Training Director/Instructor	NW WA Electrical Industry JATC
Alternative Energy Director/Labor Rep	IBEW Local 46
Senior Engineer	Coffman Engineers, Inc.
President & CEO	CleanTech Alliance
Instructor, CET	Shoreline Community College
Director, Clean Energy Tech	Shoreline Community College
EIT, BEMP, HBDP, CEM, LEED AP BD+C	Sazan Group
Dean, Math/Science/Engineering	Shoreline Community College
PE, CEM®, CMVP®, LEED® Green Associate	Hargis Engineers
Energy Services	Hargis Engineers
	Economic Development Council
Artisan Electric	

Do you offer internships? What is your placement rate? **Students can arrange internships for credit but it is not necessary to complete an internship to graduate. Internships are difficult to secure.**

Program Link: <http://www.shoreline.edu/science/clean-energy-technology/>

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