Heartland Community College
STEM and Business
Course Syllabus for students

Course prefix and number: REEC 140
Course title: Renewable Energy Concepts
Credit hours: 3
Contact hours: 4 (Lecture hours: 2 Lab hours: 2)

Days and times the course meets: T TR 8:00AM-11:50AM WDC 1001

Catalog Description:
Prerequisite: REEC 110 with a grade of C or better, and ELTC 102 with a grade of C or better. Renewable Energy Concepts explores the technologies used in renewable energy systems. The course will cover making, distributing and installing renewable energy systems. Specific systems include, photovoltaic, wind, geothermal, solar heating and biomass. Lab activities will include proper set up and installing renewable energy systems, measure energy usage and controlling renewable energy systems.

Instructor Information:
Instructor name: chris miller
Phone number to contact instructor: 268-8855
Instructor e-mail address:chris.miller@heartland.edu
Location of instructor's office: wdc 1213
Hours and days of instructor's office hours: T, TR 12:30PM-3:00PM
Website: http://www.technology.heartland.edu/faculty/chrism/ and Blackboard

Textbook(s):
Required:
Warmke, Jay. Understanding Photovoltaics. BRS Press, 2016.

Supplies:
Download freeware software, (Energy Periscope)

Relationship to Academic Development Programs and Transfer:
Renewable Energy Concepts was designed to meet the specific needs of an Associate of Applied Science degree and not necessarily as a transfer course, particularly in relation to the Illinois Articulation Initiative. This course may transfer to various institutions in a variety of ways. Please see an academic advisor for an explanation concerning transfer options.

Learning Outcomes:

Outcomes	General Education Outcomes	Range of Assessment Methods
1.Correctly measure electrical energy usage.		Graded Lab/Assignment
2. Identify the key stages of electrical generation using photovoltaic cells.		Exams/Quizzes/Assignment
3. Be able to properly measure current and voltage in common renewable electrical generation equipment.		Assignment/ Final Project
4. Identify the most appropriate renewable energy electrical generation system given specific installation parameters.	PS2	Final Project

Course/Lab Outline:

1. Basic Energy Generation
2. Basic Renewable Energy Generation
3. Electrical Generation Using Wind
4. Electrical Generation Using Photovoltaic Cells
5. Energy Distribution
6. Power Management
7. Building Energy Systems
8. Current Trends in Renewable Energy
9. Future Trends in Renewable Energy

Method of Evaluation (Tests/Exams, Grading System):

Exams / Quizzes	30%
Assignments	30%
Labs	30%
Final Project	10%

Grades will be based on the following scale:

90 – 100%	A
80 – 89%	B
70 – 79%	C
60 – 69%	D
Below 60%	F

Required Writing and Reading

Documentation is an important part of this course. All labs are to include descriptive comments within the write-up/answer section relating to each lab. The final project will require technical support of the constructed project. Students will be expected to read assigned selections from the textbook and or labs, articles or other course related materials, at a minimum of 25 pages per week. Estimate is based on a 16 week course schedule. Please note if your class is not a 16 week class your weekly reading assignment will be increased.

Week to Week Course Calendar:

Visit Blackboard or Website for most current schedule

Date	Videos	Objectives	Readings	Labs / Activities	Homework
1-17-17 #1		ETA-I 1.1 NABCEP 1.1 1.4, 1.9 NABCEP 2.1 NABCEP 2.2 NABCEP 2.4	**UP Ch 1** Introduction to Photovoltaics **PS Ch 1** Introduction	Class Syllabus Sign Class Policies Preclass assessment **SAFETY** HCC video Basic Safety in the Workplace Arc Flash video Sign Lab Safety sheet Energy, Power, Work Definition Handout Energy Usage / kW/h of home simplex group activity no actual lab Lighting Load Profile Activity	Bring in electric bill Contact electric company get day by day electrical usage **Questions Ch 1**
1-19-17 #2		ETA-I 2.1-2.5 NABCEP 3.2 NABCEP 4.1	**UP Ch 2** Solar Cells and Solar Modules **PS Ch 2** Solar Radiation	Reading an Electric Bill energy usage Kill A Watt Lab In Class Activity Solar Irradiance Reading Lab-Dayster meter NREL Lab Solar Irradiation Lab Solar Position Calculator Lab	Kill a watt home activity Basic Mulitmeter measurements Lab **Questions Ch 2** Quiz Ch 1 Visit these websites Dsireusa.org Nabcep.org Awea.org
1-24-17 #3		ETA-I NABCEP 4.4 NABCEP 4.8	**UP Ch 3** Types of Photovoltaic Systems **PS Ch 3** Site Planning Preplanning	CD-rom Watch video on Solar Pathfinder Solar Pathfinder Activity PV System Site Survey Information Sheet cd-rom Solar Pathfinder Assistant Software Lab v4.0 activity ELTR2334un02lab03 pathfinder ELTR2334un02lab04 PV Watts ELTR2334un02lab05 Magnetic declination	Worksheet on Solar Fundamentals BotR PV System Site Survey Information Sheet cd-rom Your Dwelling **Questions Ch 3** Quiz Ch 2
1-26-17 #4		ETA-I NABCEP 6.1	**UP Ch 4** Basic Electrical Concepts **PS Ch 4** System Components and Configuration	Identify system components sheet AE S 400W and Angel 1kW systems need to finish up **Roof trainer Lab day 1 Enphase** **Enphase 208v BOS wiring lab** **Enphase roof rafter lab** **Article grounding compendium** **Groundfault power article** Eltr2334un02lab06 pv array	**Questions Ch 4** Quiz Ch 3
1-31-17		ETA-I NABCEP 2.4	**UP Ch 5** Parts of PV	Solar type identification	**Questions Ch 5** Quiz Ch 4

#5		NABCEP 5.1 5.2 NABCEP 5.4	System **PS Ch 5** Cells, Modules Arrays	Air Vent Solar Roof vent install need to write lab need to modify the panels to code 11W Solar Panel Temp Translation Lab **Roof trainer Lab day 2** **Soladeck manual** **Solarmount manual** Eltr2334unit04lab	
2-02-17 #6		ETA-I 3.7 NABCEP 2.4	**UP Ch 6** Conducting a Site Survey **PS Ch 6** Batteries	Deep Cycle battery charger lab SOC Eltr2334un08lab02 batterie s Lead Acid Battery Characteristics Article?? **Roof trainer Lab day 3** **Weeb module** BOS	**Questions Ch 6** Math Problems are everywhere when solar power is concerned.doc Quiz Ch 5
2-07-17 #7		ETA-I	**UP Ch 7** Designing the System **PS Ch 7** Charge Controllers	Build a small array using Evergreen cells Day 3 Charge Controller Lab Solar Panel Checking Activity Small 30w panel shading/ heating effect lab need to finish **Roof trainer Lab day 4** Commissioning	**Questions Ch 7** Quiz Ch 6
2-09-17 #8			**Midterm**		
2-14-17 #9		ETA-I	**UP Ch 8** Paperwork **PS Ch 8** Inverters	Group activity look at waveform of square verse ideal sine wave Group activity install a small inverter system and measure the load and unloaded voltage and currents	**Questions Ch 8** NEC Article 690 I short sentence exercise
2-16-17 #10		ETA-I NABCEP 7.4	**UP Ch 9** Installing the Balance of Systems **PS Ch 9** System Sizing	Standealone systemsizing.doc p.I StandAloneSystemSizing.xls p.II / handouts Load Analysis Critical Analysis Battery Bank Sizing Array Sizing Complete PV System Sizing.doc BoR system activity	**Questions Ch 9** AES Solar Estimator Exercise SMA string sizing tool NEC Article 690 II short sentence exercise Quiz #6
2-21-17 #11		ETA-I NABCEP 7.5 NABCEP 8.2	**UP Ch 10** Testing and Commissioning the System **PS Ch 10** Mechanical Integration	Project Activity Day 400W	**Questions Ch 10** SMA string sizing tool NEC Article 690 III short sentence exercise Quiz #7

2-23-17 #12	Jerry Noel .PPT Ampacity exercise MREA Jerry Noel .PPT sizing example MREA	ETA-I 3.1.1-3.1.1.6.2 3.2 – 3.2.2 NABCEP 8.1 NABCEP 8.3	**UP Ch 11** System Maintenance & Troubleshooting **PS Ch 11** Electrical Integration	Project Activity Day 400W Article 690 activity Chapter 11 overview of the system .doc	**Questions Ch 11** NEC Article 690 IV short sentence exercise Quiz #8
2-25-17 #13		ETA-I 3.6 NABCEP 2.3	**PS Ch 12** Utility Connection	Project Activity Day 1000W Grid Commercial Load Calculation activity	NEC Article 690 V short sentence exercise Quiz #9
2-28—17 #14		ETA-I NABCEP 2.3	**PS Ch 13** Permitting and Inspection	Project Activity Day 100W Grid	NEC Article 690 VI-VII short sentence exercise Quiz #10
3-02-17 #15		ETA-I NABCEP 8.7	**PS Ch 14** Commissioning, Maintenance, and troubleshooting		NEC Article 690 VIII-IX short sentence exercise Eltr2334unit02lab7 NEC Quiz #11
3-07-17 #16		ETA-I NABCEP 8.9		**Final**	
3-09-16 #17				NABCEP TEST / ETA TEST	
		ETA-I NABCEP 7.3,8.4,8.6,9.6, 9.10,10.5 more involved detail	**UP =** Understanding Photovoltaics 2016 Ed. **PS** = Photovoltaic Systems 2nd Ed.		

Syllabi disclaimer

Any changes to the syllabus, course or schedule will clearly be document and provided to the student.

Mid-term Withdrawal Policy:

Students are expected to attend class during the regularly scheduled times and participate in both the lectures and labs. It is the responsibility of the student to keep up with all posted materials. Meaningful and timely participation is required for success in this course. Any student who is not participating in the course and making reasonable attempts to successfully complete all course

activities (labs, exams, homework, quizzes, usw.) will be withdrawn from the course at midterm. You will be dropped from the class and receive a grade of "W".

Participation (or Attendance)

I take attendance, though it does not have an associated point value. Participation and attendance is critical for your success.

Late work / Deadlines

You must be present at all exams when they are assigned. I will not allow you to make up a test. **Only** if you have an exemption from me, confirmation by voice or email, prior to the exam will I consider allowing you to take it at a different time.

Assignments must be turned in on the date due. Unless otherwise stated the homework assignment will be due the following week it was assigned. I will not accept late work.

My polices: REEC 140 Renewable Energy

To avoid confusion and problems for all of us, this is a supplemental policies sheet used in conjunction with the syllabus.

30% of your grade comes from tests. You must be present at all exams. I will not allow you to make up a test. **Only** if you have an exemption from me, confirmation by voice or email, prior to the exam will I consider allowing you to take it at a different time.

Exam 1 = 15%
Final = 15%

30% of your grade will come from assignments and reading / activity assessments. Assignments must be turned in on the date due. Unless otherwise stated the homework assignment will be due the following week it was assigned. I will not accept late work.

Assignments =15%
Reading / Activity Assessments =15%
The following must be done in order for the assignment to be accepted:

- No torn up paper, no spiral paper
- Must be completed in either pencil, or black, blue ink.
- It must be legible: readability, grammatically, and numerically professionally done
- In upper right hand side the following must appear
  - Name
  - Date assignment is due
  - Chapter and question numbers
- You must show every step in your solution of the problem. If there is no work shown the entire assignment will not be counted.

30% of your grade will come from labs. Labs must be turned in on the due date, typically the week after in which it was assigned. No lab will be allowed after taking the exam in which it was used to prepare for. If you cannot complete the lab during in class time, the lab will be open for open lab time to complete.

The following must be done in order for the assignment to be accepted:

- Lab clean up. You are responsible for lab clean up and returning of equipment. If you do not put equipment away and more importantly the components correctly away you will not get credit for that lab.
- Your name must be included on the program you are submitting.
- Your name and date shall be on every lab.
- You must follow the guidelines provided for the activity being completed

10% of your grade will come from a final project. If it is not turned in according to the directions and or not submitted on the final due date it will not be accepted. Please see final project info on website for the specific information.

All answers must be clearly denoted if in doubt it will be wrong!
Grades will be based on the following scale:

100 – 90% A
89 – 80% B
79 – 70% C
69 – 60% D
Below 60% F

Name: _____ Date:_____