ENV130: Renewable Energy Resources (Online)

Fall 2012, UMPI

Instructor: Dr. Chunzeng Wang
Office: Room 306, South Hall; Phone: (207) 768-9412
Email address: chunzeng.wang@umpi.edu
Office hours: 10:00-11:0AM, Monday and Wednesday;
11:00-12:00AM, Tuesday and Thursday; or by appointments

Textbook (required): *Renewable Energy – Power for a Sustainable Future*
2nd edition, by Boyle Godfrey. Oxford University Press
Additional readings and course materials published on Blackboard

Course Description:

This course provides a comprehensive overview of major renewable energy resources, including solar, wind, hydro, geothermal, and bioenergy/biomass. The course aims to helping students understand fundamental scientific concepts and principles of energy conversion and storage involved in renewable energy production and usage, and evaluate availability, efficiency, and environmental impacts of major forms of renewable energy resources.

Student Objectives:

1) Understand fundamental scientific concepts and principles of renewable energy resources and related technologies.
2) Able to evaluate and assess availability, efficiency, and environmental impacts of various forms of renewable energy resources.

General Learning Objectives (as required for all GEC math and science courses):

1) Students will be able to draw valid conclusions from numerical data presented in a variety of formats.
2) Students will understand and be able to apply the scientific inquiry process to researchable questions or problems.

Course Instruction Methods and Requirements:

The course will be a dynamic combination of online lectures, at least a mandatory self-guided tour to a renewable energy producing facility (or join tours led and organized by your instructor if you live near Presque Isle), and reading assignments.

- ***Online lectures*** are PowerPoint (ppt) slides with lecture notes that focus on fundamentals of major renewable energy resources and energy conversion technology. ***Reading assignments*** will help you understand online lecture ppt (Each lecture note published on the Blackboard shows chapters/sections in the textbook as reading assignments; the Course Calendar below also shows chapters/sections as reading assignments for each lecture).

- ***A mandatory, self-guided tour*** to at least one renewable energy producing facility. The facility can be wind, solar, geothermal, biomass, hydropower, and any form of renewable energy facilities at industrial or family scales. If you feel you may have hard time to get permit to visit a facility or you need help to locate a facility, please contact the course instructor Dr. Chunzeng Wang. The instructor will organize and lead several tours around Presque Isle. So if you live near Presque Isle, you may join one or all the tours. In the end you must prepare and submit a tour report. The report shall include an introduction to the tour and moderate description of the facility visited – where it is located, when it was constructed, what company/family operates it (and its contact information), and **how it works**, so on. The report may include pictures so you shall take a camera with you. You may use Word or any word-processing software to prepare the report. The size/length of the report shall be at least 3 pages but no more than 6 pages; you may insert up to 6 pictures (using no more than 1.5 page room). The tour/tour report counts **20%** toward to your final grade. ***The tour with the tour report is an important component of this course.***
- ***Communication with your instructor:*** you shall check your maine.edu email account at least once every day. This email account is used by your instructor for announcements and notices. The best way to contact your instructor is to email him. You may also stop by his office in his office hour time, or make appointments. You shall login to the Blackboard often because it is where the teaching/learning materials are posted and exams are taken. Announcements and notices are also posted on the Blackboard by your instructor.

Exams and Grading:

Three exams are scheduled (see their schedule under Course Calendar below). Each exam will be set available for a limited time period (you will be noticed by email in advance). Exams 2 and 3 are ***not*** cumulative. Exam questions are based on contents covered by lecture ppts and notes. The last slide of each lecture ppt and the last paragraph of each lecture note list "***Things must know***", which is the guide for study for exams.

Final grade depends upon scores of the three exams and the tour report:

Exam 1 – 25%
Exam 2 – 25%
Exam 3 – 30%
Tour report – 20%

Useful web sites:

http://www.nrel.gov (US National Renewable Energy Laboratory)
http://en.openei.org (Open Energy Information)
http://globalenergyobservatory.org (Global Energy Observatory)
http://www.alternative-energy-news.info (Alternative Energy News)
http://www.altenergy.org (Alternative Energy)

Statements - University Polices and Services:

1. *Academic Honesty Statement:* The academic community of the University of Maine at Presque Isle recognizes that adherence to high principles of academic integrity is vital to the academic function of the University. Academic integrity is based upon honesty. All students of the University are expected to be honest in their academic endeavors. All academic work should be performed in a manner which will provide an honest reflection of the knowledge and abilities of each student. Any breach of

academic honesty should be regarded as a serious offense by all members of the academic community.

2. *Accommodations:* The University of Maine at Presque Isle provides reasonable accommodations upon request to qualified individuals with documented disabilities. Students with documented disabilities have a right to ask for accommodations and are encouraged to talk directly with the responsible faculty member, supervisor or other staff person to explore possible accommodations. For assistance with accommodations or academic support services, contact Mary Kate Barbosa, Director of Student Support Services, South Hall, at 768-9613 or by email at mary.barbosa@umpi.edu . A copy of the accommodations request form can be found at http://www.umpi.edu/current-students/sss/disability-services/registration.
3. *UMPI Writing Center:* Located on the first floor of South Hall, the writing center offers one-on-one consultations for writers at all levels of course work, at all stages of the writing process. Call 768-9615 or stop by to set up an appointment.
4. Tutoring: Student Support Services offers tutoring to all students for all courses via experienced professional and peer tutors. If you are interested in receiving tutoring, please contact Meghan Lightbown, SSS Assistant Director, at 768-9614.
5. All students are required to log on to the course's "Blackboard" page, found at http://www.courses.maine.edu. Please see http://www.learn.maine.edu/crs/bb5_guide.html for current Blackboard login info – if students have not already done so, they must activate their UMaine System email account before they can enter Blackboard. For further information, see the Quick Guide at http://www.learn.maine.edu/crs /bb5_guide.html.
6. Library services: Students have two resources for library services, both through the UMPI library pages and the University College resource pages. To access the UMPI library electronically, visit: http://www.umpi.edu/library . Students may contact Virginia Fischer, the Reference Librarian, directly by phone at 768-9602 or via email at virginia.fischer@umpi.edu. General contact information for the UMPI library can be found at http://www.umpi.edu/library/directory. Students will need their ID number to access databases or order and reserve texts. Remote access to University System resources is available through www.learn.maine.edu/ocls.

Class calendar:

Week	Topics	Lectures
Week 1 (9/3-9/7)	Basics of energy	Lecture 1: Energy overview: fossil fuels vs. renewable energy (Godfrey textbook Chapter 1, Sections 1.2 – 1.5)
Week 2 (9/10 – 9/14)	Basics of energy (cont.)	Lecture 2: Fundamentals of energy and energy conversion (Godfrey textbook Chapter 1, Section 1.1) Lecture 3: Electric energy, electricity, and generator (No reference to Godfrey textbook)
Week 3 (9/17-9/21)	Geothermal energy	Lecture 4: Geothermal energy (heat from the earth) (Godfrey textbook Chapter 9, Sections 9.1 – 9.6) Lecture 5: Low-T geothermal energy and heat pumps (Godfrey textbook Chapter 9, Section 9.3 "Ground source heat pumps")
Week 4 (9/24-9/28)	***Review and Exam 1***	***Exam 1 available day/date and time will be announced on Blackboard***
Week 5 (10/1-10/5)	Solar energy	Lecture 6: Solar thermal energy (Godfrey textbook Chapter 2, Sections 2.1 and 2.3)
Week 6 (10/8-10/12)		Lecture 7: Solar thermal energy – active and passive solar heating (Godfrey textbook Chapter 2, Sections 2.2 and 2.4 – 2.9) Lecture 8: Solar photovoltaics (Godfrey textbook Chapter 3, Sections

		3.1 – 3.6)
Week 7 (10/15-10/19)	Wind energy	Lecture 9: Wind energy (Godfrey textbook Chapter 7, Sections 7.1 – 7.2, and 7.8) Lecture 10: Wind turbines (Godfrey textbook Chapter 7, Sections 7.3 – 7.5)
Week 8 (10/22-10/26)	***Tours***	1) Guided tours to UMPI solar power station and wind turbine (dates will be announced later) 2) Self-guided tours can be on any dates.
Week 9 (10/29-11/2)	***Review and Exam 2***	***Exam 2 available day/date and time will be announced on Blackboard***
Week 10 (11/5-11/9)	Bioenergy (Biomass)	Lecture 11: Biomass classification and conversion to fuels (Godfrey textbook Chapter 4, Sections 4.1 – 4.8) Lecture 12: Woody biomass and its use in Maine (No reference to Godfrey textbook)
Week 11 (11/12-11/16)	***Tours***	1) A guided tour to Boralex biomass power station in Fort Fairfield (Date will be announced later). 2) Self-guided tours can be on any dates.
Week 12 (11/19-11/23)	Hydropower and hydroelectricity	Lecture 13: Hydropower and hydro-electric plants (Godfrey textbook Chapter 5, Sections 5.1 – 5.2, 5.4 – 5.10) Lecture 14: Hydropower – development and concerns (Godfrey textbook Chapter 5, Sections 5.3 and 5.12)
Week 13 (11/26-11/30)		
Week 14 (12/3-12/7)	Discussion	Lecture 15: Renewable energy: what is next?
Week 15 (12/10-12/14)	***Review and Exam 3***	***Exam 3 available day/date and time will be announced on Blackboard***