COLBY COMMUNITY COLLEGE

Syllabus

Course Number/Title: AE 181 Small Wind Turbines

Year: Fall 2012

Department: Applied Technologies

Credit Hours: 3

Required Texts: *Wind Power for Dummies*
By Ian Woofenden
Wiley Publishing, 2009

Days/Time: Online

Instructor: Derek Reilley

Office Hours: 8:00 to 5:00

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Course Placement: Freshman/Sophomore

Prerequisite: None

RATIONALE

Small wind turbines are becoming more prominent in the rural environment as the use for turbines 100 Kw and less are being erected for the residence and farm applications. Much of what is being taught in the wind energy field applies to large commercial applications. This course targets development of the small wind turbine industry.

COURSE DESCRIPTION

This course will begin with a general overview of small wind and some basics of electricity. It will progress through wind energy principles, site evaluation, installation, and maintenance issues on small wind turbines.

The Online Schedule.

Each week will consist of a minimum of two chapters from *Wind Power for Dummies*. This is an eight-week course broken down into eight separate modules. Each module will begin on Thursday and end on Wednesday. All individual assignments are due at the end of each module on Wednesday at 11:59 pm Central Standard Time. Please see the following for a breakdown of a module:

Day 1 – Thursday

Day 2 – Friday

Day 3 – Saturday

Day 4 – Sunday

Day 5 – Monday

Day 6 – Tuesday

Day 7 – Wednesday

Each week you will complete the reading assignment, 2 Discussion Questions (with exception of week 8), and Responsive Posts to other student answers. There will be four exams and a (1) day boot camp on campus.

COURSE LEARNING OBJECTIVES ASSESSED:

Colby Community College (CCC) uses the North American Board of Certified Energy Practitioners (NABCEP) to help guide the college in learning outcomes. These outcomes are created to define a general set of knowledge, skills and abilities typically required for small wind system practitioners, and to help ensure safety, quality and consumer acceptance of small wind installations throughout the U.S. This also helps define the requirements for the assessment and credentialing of practitioners. Below are the eight objectives contained in the North American Board of Certified Energy Practitioner's (NABCEP's) Small Wind Energy Installer.

1. Conducting a Wind Energy Site Assessment
2. Working Safely with Small Wind Energy Systems
3. Selecting a Final System Design
4. Adapting the Mechanical Design
5. Adapting the Electrical Design
6. Installing Subsystems and components at the site
7. Performing a System Checkout and Inspection
8. Maintaining and Troubleshooting

CCC Student Learning Outcomes (NABCEP) to be measured in this course:

1. Conducting a Wind Energy Site Assessment (1.5) Determine the location and impact of buildings, trees, local terrain, and other obstacles at the client's site, and suggest solutions to overcome their interference.
2. Conducting a Wind Energy Site Assessment (1.6) Identify whether the site is suitable for a wind system.
3. Conducting a Wind Energy Site Assessment (1.8) Determine the minimum acceptable tower height for the client's site based on terrain and obstacles.

COURSE COMPETENCIES

- The student will understand basic electrical terminology and how it relates to small wind turbines.
- The student will understand the basic anatomy of a small wind turbine to include rotor orientation, over speed and control, braking, generators, drive trains, slip rings, and blade pitch.
- The student will know how to calculate power in the wind using air density, wind speed, and swept area.
- The student will understand how to estimate a wind turbines performance using the swept area method, the power curve method, and manufacturer's data.
- The student will have an understanding of types of turbine towers, how they are erected, and how tower height is a function of turbine productivity.
- The student will be familiar with different types of small wind turbines to include both horizontal and vertical axis turbines.
- The student will have a basic understanding of site analysis and a checklist of items that need to be reviewed in order to properly evaluate a turbine site for maximum productivity.
- The student will have a basic understanding of turbine installation to include foundations, guying, and how the turbine is connected to the utility grid.

- The student will have a basic understanding safety procedures and tools related to small wind turbine construction and maintenance.
- The student will have a basic understanding of operation, performance, and maintenance of a small wind turbine.

METHOD OF INSTRUCTION

This course will utilize CCC's e-college online learning system. Class readings will be followed by answering discussion questions and responding to other student posts. There will be four written exams and a final on-campus, hands-on boot camp.

Method of Evaluation and Point Values

Assignment	Week Due	Percent
Answer each DQ (two per week)	Weeks 1-7	14%
Exams (four)	2,4,6,8	50%
Boot Camp	8	36%
Total		**100%**

Grading Scale

100-90	A
89-80	B
79-70	C
69-60	D
59 or <	F

Discussion Questions

Each week we will post two Discussion Questions (DQ) to the message board. You must respond to the first DQ by Thursday, and the second DQ by Saturday of each week. Your response should be 100 words and contain a well thought out and detailed answer. Please proofread your response for errors. Week 8 will not have Discussion Questions.

Attendance & Participation for Online Courses: Colby Community College views class attendance as a mandatory activity. This view is continued in our online classes. Students are expected to participate, **at least 3 days out of each 7-day week (Responsive Posts)**. Students must post two responsive posts on each of the 3 days to earn full participation points. The original answering of a Discussion Question does not count toward participation requirements. We reserve the right to withdraw any student for poor attendance. The student is withdrawn failing. This policy can be found in the Colby Community College handbook.

Student Work Policy

All projects, assignments, and exams shall be completed solely by the student enrolled in this class. Plagiarized work or work that violates U.S. copyright laws is unacceptable. As a student enrolled in a Colby Community College online course, you will respect the privacy of other users. It is your responsibility to respect the copyrights of the computer software used by CCC.

Copyright Policy

The materials in this course fall under the protection of all intellectual property, copyright and trademark laws of the U.S. The course materials in this class should be used for educational purposes only and should not be de distributed beyond the confines of this course.

Electronic Communications Privacy Act

This can be found online at http://fedlaw.gsa.gov/legal7.htm.

The following protects the instructor's intellectual property:

Digital Millennium Copyright Act (DCMA)

The PowerPoint note files that are available online are copyrighted and the intellectual property of the instructor. PowerPoint note files cannot be used in any way by the student for financial gain. The note files are protected 70 years after the death of the author or 95 years from the date of their publication.

SYLLABUS INFORMATION DISCLAIMER

I reserve the right to change any information contained in this document, when necessary, with adequate notice given to the student. Notice shall be given in the classroom during class. No other notice is required. It is the students' responsibility to stay current with any changes, modifications, adjustments or amendments that are made to this document.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

According to the Americans Disabilities Act, it is the responsibility of each student with a disability to notify the college of his/her disability and to request accommodation. If a member of the class has a documented learning disability or a physical disability and needs special accommodations, he/she should contact Student Support Services, which is located in the Student Union.

An Equal Employment/Educational Opportunity Institution

CCC does not discriminate on the basis of race, color, national origin, sex, disability or age in its programs, activities, and employment. The following persons have been designated to handle inquiries regarding the non-discrimination policies:

Title IX Coordinator: Keegan Nichols, Vice President of Student Affairs

(785) 460-5548

Section 504 ADA: Keegan Nichols, Vice President of Student Affairs

(785) 460-5490

Laws and Policies

The student is protected by **FERPA** (Family Education Rights and Privacy Act) which protects student records including personal contact information, health information and grades. www.ed.gov

ADA (American with Disabilities Act) can be found at www.fedlaw.gsa.gov/legal7.htm

DCMA (Digital Millennium Copyright Act of 1998) protects the instructor's intellectual property, which includes PowerPoint note files.

The Technology, Educations and Copyright Harmonization Act (TEACH) of 2002 provides educators with a separate set of rights (in addition to fair use), to display or show and perform or play others' works regardless of medium, to a distance learner online with no limitations and no permissions required. **Fair Use of Copyright Act (1976) Section 107** includes "fair use" exceptions in utilizing copyrights media for teaching, scholarship and research.

The digital materials used for this course come with the legal permissions and releases of copyright holders. These course materials should be used for educational purposes only; they should not be distributed electronically or otherwise beyond the confines of this course.

Students own copyright to what they create.

Reference Materials

- *Wind Power, Renewable Energy for Home, Farm, and Business by Paul Gipe*
- *Home Power Magazine, June& July 2011, Issue 143*
- *Wind Energy Basics, A Guide to Home- and Community-Scale Wind Energy Systems by Paul Gipe*

<u>You will receive an email prior to the first day of class that will contain login instructions</u>!

Each week you will complete the reading assignment, 2 Discussion Questions, and Responsive Posts. Your boot-camp assignment will be posted in the online classroom ASAP.