

**Course Number and name:** ET 384 Wind and Water Energy Technologies

**Credits & Contact Hours:** 3cr. (2+3p) Each week has two lectures of 50 min. plus a two and one-half hour weekly laboratory session. Total semester contact hours are approximately 45 hr.

**Instructor's name:** Thomas Jenkins

**Textbook:** G. Boyle, "*Renewable Energy: Power for a Sustainable Future*", Oxford University Press, second edition

**References:** G. Masters, "*Renewable and Efficient Electric Power Systems*", Wiley, 2004, ISBN 0-471-28060-7

**Specific Course Information:**

**Course Catalog Description -** Wind and water based energy technologies on small and large scale. The theory, practical applications, safety and economic considerations of hydro- and wind energy systems.

a) **Prerequisite** – Math 121

b) This course can be used as a technical elective for ECET, MET, IET, and IET degrees

**General Course Goals:** The main goals and objectives of this class are:

- To learn the engineering and technology terminologies associated with renewable energy technologies (RET) especially wind and water (hydro, hydrokinetics, OTEC, and geothermal);
- To learn the engineering theory foundations which enable the generation of energy from wind and water sources;
- To gain an understanding of the cost-benefit ratio and economics of various wind and water technologies compared to traditional sources;
- To understand some of the various obstacles associated with actual implementation of production and distribution of wind and water facilities in large and small scale systems;

To introduce social, environmental, and governmental policy issues related to basic human needs and ideas of sustainability

**Related ABET Objectives and Outcomes:** The department of Engineering Technology and Survey Engineering ECET option has an objective of having its graduates possess the following skills and knowledge.

a. **an appropriate mastery of the knowledge, techniques, skills and modern tools of their disciplines;** including:

1. Digital circuit analysis and design techniques, analysis of analog and digital electronics, architecture and applications of microcomputer systems, local area networks, **and the building, testing, operation and maintenance of electronic, instrumentation**, communications, control, and/or computer systems (both hardware and software). **Also ABET 2.b, 2.c, 2.d, 2.f**

4. **The use of** statistics and probability, transform methods, discrete and/or Boolean **mathematics, algebra**, trigonometry and/or calculus mathematics **in support of the analysis, design, and application of electronic, instrumentation, communications, control**, and/or computer systems.

**Course topics and lecture hours devoted to each topic:**

<b>TOPICS</b>	<b>HRS.</b>
• Intro, Environmental factors, sensors, test and measurement devices	3
• General electrical energy principles	9
• Basic fluid theory	2
• Hydro (fluid-water) energy production theory and application	9
• Wind electrical energy production theory and applications	9
• Social, political and economic issues	4
• Miscellaneous topics	2
• Tests and Quizzes, Review, Problem Solving and Examples	8

**Laboratory Projects:** This class has not had a laboratory component until fall 2011. Until that time, the class consisted of 3cr. composed entirely of lectures. Homework was stressed with included applied and hands-on components as well as simulated systems.

**Equipment utilized by the students include (but is not limited to):** Digital Multimeters, Oscilloscopes, variety of sensors (thermocouples, pyrometers, flow meters, etc.), wind turbines, hydroelectric turbines and generators, batteries, and “balance of system” components.

**Prepared by: Thomas Jenkins**

**Date: 9/1/10**