Engineering Technology –ECET Option

Course Number and name: ET 382 Solar 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 - Solar energy systems, including topics in thermal-solar and photovoltaic. Theory, practical applications, safety considerations and the economics of solar energy systems compared to conventional 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);
- To learn the engineering theory foundations which enable the generation of energy from RET sources; an
- To gain an understanding of the cost-benefit ratio and economics of various RET compared to traditional sources; and understand some of the various obstacles associated with actual implementation of production and distribution of RET facilities in large and small scale systems;
- To introduce social and environmental 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:

TOPICS	**HRS.**
• Environmental factors, sensors, test and measurement devices	3
• Solar electrical energy principles	9
• Photovoltaic theory and application	9
• Solar thermal theory and applications	9
• Social, political and economic issues	4
• Miscellaneous topics	4
• Tests and Quizzes, Review, Problem Solving and Examples	8

Laboratory Projects: This class had a weekly laboratory session. There was approximately twelve laboratory sessions per semester with each laboratory of two hours and thirty minutes. Laboratory exercises are done in conjunction with the text readings and the lecture materials. The laboratories are designed to apply the theory of solar energy technologies. A *formal* lab write-up is required by each group. **Equipment utilized by the students include (but is not limited to):** Digital Multimeters, Oscilloscopes, variety of sensors (thermocouples, pyronometers, flow meters, etc.), solar PV panels, solar thermal panels (air and water) , batteries, and "balance of system" components.

Example of topics for laboratories might have included:

- Outdoor lighting in a residence can significantly add to the electric bill if the lights outside around the house are left on during the night. A solar-powered system, however, can be a good solution for providing this service with free electricity from the sun. This lab exercise is about designing and sizing a simple solar-rechargeable battery system for powering a total of eight 24-V light fixtures.
- Design and size a stand-alone system for a small rural home based on a list of electrical items that need to be powered.

Prepared by: Thomas Jenkins **Date: 9/1/10**