

Florida International University
Department of Electrical and Computer Engineering
EEL-5285 Renewable Energy Utilization (Graduate Students)
Cross Listed with EEL-4930 Special Topics (Undergraduate Students)
Spring 2018

Course Catalog and Offering Information

- Name of Course: Renewable Energy Utilization
- Course Number: EEL 5285
- Schedule and Duration: Fridays from 2:00-4:30PM
- Classroom: EC 1114
- Course Instructor: Professor O. A. Mohammed, Dr. Tarek Youssef
- Office Hours: Fridays: 12:00 noon-2:00 PM

Course Description, Objectives and Outcomes

This course will introduce the student to a wide range of alternative energy technologies, help develop skills useful to the commercial and economic evaluation of alternative energy resources, and examine public policy issues affecting the development of these resources. The concept used for developing this course is that we need to provide practicing engineers and engineering students with knowledge on how:

- The common conventional and alternative resources and technologies for producing electrical power work and describe the role and the resource it plays in the current energy economy;
- Define key characteristics of wind power resources, solar power resources, and bioenergy resources and prepare a preliminary commercial assessment for a renewable power project;
- Compare economic and environmental factors associated with the production, distribution, and use of alternative energy sources to conventional approaches for generating electric power; and, describe key public policies affecting renewable power generation and identify the role played by these policies in shaping the electric power industry.

The course objectives, outcomes and the educational gaps to be addressed include:

- Understand the basics of how each renewable energy technology works. And how it can be utilized for electric energy production.
- Distinguish between the main types of renewable energy technology and what each can perform and the process of achieving that.
- Identify which might be the most appropriate technology for any given scenario
- Generating electricity from sustainable energy sources and keeping track of key public policies affecting renewable power generation and identify the role played by these policies in shaping the electric power industry and make a payback calculation for each technology.

Course Books and Lecture Materials

- Gilbert Masters “Renewable and Efficient Electric Power Systems,” John Wiley, 2004
- Lecture Notes by Professor Mohammed
- Many other readings for the class will be available in the form of articles and online links on the course webpage located at <http://www.aln.fiu.edu/courses>.
- Boyle, Renewable Energy: Power for a Sustainable Future (2nd Ed.), Oxford University Press.

Tentative Course Topics List (A new one will be handed soon)

A. Solar power

- Photovoltaic power
- Solar thermal power
- Passive solar design
- Generating AC and DC Power from Solar Designs
- Solar Power Assignments, related links

B. Wind power

- Wind Energy Harvesting
- Single Wind Generator
- Wind Farms
- Tools for analyzing projects
- Wind generation characteristics
- Generating Utility Energy Power from Wind Farms.
- Wind power and the transmission grid
- C. **Electric power smart grid basics with alternate energy**
 - Electric transmission
 - Economic dispatch and power markets
 - Connecting renewable power to the grid
 - Off-grid renewable power
- D. **Other power generation technologies**
 - Geothermal
 - Hydropower
 - Nuclear power
 - Coal, oil, natural gas
 - Electric generation and the environment
 - Energy storage and the hydrogen economy
 - Fuel cells and hydrogen utilization
 - Energy Policy and Planning
- E. **Public policy and alternative energy supplies**
 - The case for policy intervention
 - Renewables and electric power restructuring
 - U.S. green power experience
 - Feed-in tariffs
 - Renewable Portfolio Standards (RPS)
 - Renewable Energy Credit trading

Student Assessment

The assessment of the students in this course will be based on expected learning outcomes. Students will be examined on their ability to:

- Define and list common conventional and alternative resources and technologies for producing electrical power and describe the role that these resource plays in the current energy economy;
- Identify key characteristics of wind power resources, solar power, bioenergy and chemical resources,
- Prepare a preliminary commercial assessment for a renewable power project in residences and/or commercial sites;
- Compare economic and environmental factors associated with the production, distribution, and use of alternative energy sources in comparison to conventional approaches for generating electric power including nuclear power; and,
- Describe key public policies affecting renewable power generation and identify the role played by these policies in shaping the electric power industry.
- Study the combination of energy conservation measures along with the utilization of renewables in the practical operation of electric energy systems.

Course Grading

Projects/Homework, and Class Assignments	30%
Midterm Exam	30%
Final Exam	40%