This will be a team taught class; some of the main topics will be covered by experts from the industry.

Prerequisites: ECE 305 or equivalent

Course Outline
This course focuses on the electric power generation. Conventional heat engine based techniques as well as the new renewable energy based electric energy generation technologies will be introduced. The principals of main renewable electric energy systems (REES) -solar, wind, and fuel cells- will be covered. Economic and environmental aspects of the electric power generation will also be discussed.

The course outline is as follows:

1. Overview of Electric Power System (Ch3)
2. Conventional Electric Power Generation
   a. Fundamentals of Heat Engines
   b. Thermal Power Plants
3. Economics of Distributed Resources (Ch 5)
4. Photovoltaic (PV) Systems (Ch 7-9)
   a. Solar resource (selected topics from Chapter 7)
   b. PV cell physics, technologies, and electrical models (Chapter 8)
   c. Overview of PV systems (Sections 9.1 and 9.2)
   d. Grid-connected PV systems (Section 9.3)
5. Wind Power Systems (Ch 6)
   Wind resource, wind turbines, with emphasis on electrical components including generators, 3-phase power electronics, and interface to the grid.
6. Distributed Generation (Ch 4)
   Fuel Cells, Combined Heat & Power
7. Environmental Impacts of Electric Power Generation

(softcopy is available via library)

Grading:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>20%</td>
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<tr>
<td>Term Proj.</td>
<td>15%</td>
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<tr>
<td>Quiz</td>
<td>30%</td>
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<tr>
<td>Final</td>
<td>35%</td>
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Matlab/Simulink will be used for some of the homework assignments and for the project.
university policy on incomplete grades is located at http://www.ncsu.edu/policies/academic_affairs/grades_undergrad/REG02.50.3.php.

Student should complete the missing work that is required for the incomplete grade within the deadline given. In case the student misses the deadline, the course grade will be given based on the work that has been completed. If an extended deadline is not authorized by the instructor or department, an unfinished incomplete grade will automatically change to an F after either (a) the end of the next regular semester in which the student is enrolled (not including summer sessions), or (b) by the end of 12 months if the student is not enrolled, whichever is shorter. Incompletes that change to F will count as an attempted course on transcripts. The burden of fulfilling an incomplete grade is the responsibility of the student.

### ATTENDANCE

Attending the class regularly is required. Students should notify the instructor if she/he will miss the class. The instructor will keep track of attendance and this attendance record will be taken into account in grading, especially in border line cases.

### HOMEWORK

There will be 7-8 homework assignments which will be assigned as appropriate material is covered in the lectures. Homework will be posted on the course locker with the due dates. Only the University approved reasons will be accepted for late homework (See http://www.ncsu.edu/policies/academic_affairs/pols_regs/REG205.00.4.php).

### QUIZ

There will be one quiz. The quiz will be after completion of the core concepts of renewable energy systems. Only the University approved reasons will be accepted for missing a quiz (See http://www.ncsu.edu/policies/academic_affairs/pols_regs/REG205.00.4.php).

A make-up quiz will be administered at the mutual convenience of the student and the Instructor. In all cases, signed documentation must be provided to the Instructor to determine eligibility for the make-up exam.

### CLASS PROJECT

The project will be team based; if possible, each team will comprise of two students, one undergraduate and one graduate. The goal of the project is to design a REES for a given application. Undergraduate students will do the basic design and assessment of the system. Graduate students will, in addition to design, implement (simulate) the REES using Matlab/Simulink to further verify and assess the system. The team will prepare a written report and submit it with the simulation code.

### ACADEMIC INTEGRITY

Work in this course is to be done under the Academic Integrity Honor Pledge: "I have neither given nor received unauthorized aid on this test or assignment."

Students must abide by the Code of Student Conduct articulated at: http://www.ncsu.edu/policies/student_services/student_discipline/POL11.35.1.php

Evidence of copying, including copying of source code, or any other use of unauthorized aid will be investigated and potentially referred to the University judicial system as a violation of the **Code of Student Conduct**. The **minimum sanction** for a violation is a zero on an assignment. Recycling of projects from another resource will be considered an academic integrity violation.

### STUDENTS WITH DISABILITIES

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at 1900 Student Health Center, Campus Box 7509, 515-7653. For more information on NC State's policy on working with students with disabilities, please see this page (http://www.ncsu.edu/provost/hat/current/appendix/appen_k.html).

### ANTI-DISCRIMINATION STATEMENT
NC State’s policies and regulations covering discrimination, harassment, and retaliation may be accessed at http://www.ncsu.edu/policies/campus_environ or http://www.ncsu.edu/equal_op. Any person who feels that he or she has been the subject of prohibited discrimination, harassment, or retaliation should contact the Office for Equal Opportunity (OEO) at 515-3148.”

**EOL Students**

1. **Homework:**
   
   You can turn in your assignments and/or projects by either uploaded to course locker (preferred), or e-mail, fax or mail to EOL office. The submission should not postdate the announced deadline.

   **Email:** Send homework as an attachment to homework_eol@ncsu.edu

   **Fax:** 919.515.8415 (please put a cover page with your name and course number)

   **Mail:** (least preferred method) Address: Engineering Online, %Homework Coordinator, Campus Box 7547, NC State University, Raleigh, NC 27695-7547

2. **Exams**

   All exams are to be proctored UNLESS they are take-home exams. Both the quiz and the final will be in-class-type exams, so please submit your proctor identification form to EOL office. Contact EOL office concerning the exam process. Finally, note that if the proctor has not been approved, you will not be allowed to take the exam.

   The exams should be taken on the same day it is scheduled. If the proctor is not available on that day, you will have the next day window to schedule a time with the proctor.