Instructor: Dr. Mesut Baran  
Keystone, suite 100, Phone: 515-5081, Email: baran@ncsu.edu
This will be a team taught class; some of the main topics will be covered by experts from the industry.

Office Hours: M W: 3-4 pm
Or by appointment.

Prerequisites: ECE 451

Course Outline
This course will cover the basic protection schemes that are used to detect and interrupt the faults in a power system. The course outline is as follows:
1. Fault Current Analysis in a Power System  
2. Fault Current Interruption Devices: Circuit Breakers and Fuses  
3. Operating Principles of Relays  
4. Over Current Relaying Based Protection  
5. Distance Relays for transmission line protection  
6. Differential Relays for protection of transformers  
7. Machine protection  
8. Bus, Reactor and Capacitor Protection  
9. Wide Area Monitoring and Protection

Textbook:
Power System Relaying by Horowitz & Phadke  
Reference: Power System Analysis, Grainger & Stevenson  
Network Protection and Automation Guide, Alstom - Online

Grading:
Homework: 25%  
Term Proj.: 15%  
Quiz: 30%  
Final: 30%

Homework:
All homework assigned need to be turned in on time. Late homework will be accepted provided that student provides a good justification and turns in the homework within agreed time. 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).

Matlab will be the main computational tool for both the homework and the project

Quiz:
A quiz will be administered to the class. The quiz will be after completion of the main protection schemes. 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 and attached to the make up quiz in order to obtain credit.
**Class Project**
The project will be team based (if possible) - each team comprising of two students. Each team will implement (simulate) a protection scheme application using Matlab/Simulink. The goal of the project is to demonstrate/assess the effectiveness of the protection schemes considered. The students will be encouraged to come up with their project proposals and discuss it with the instructor for final approval on the scope. The team will prepare a written report and submit it with the simulation code, and present the project in class.

**Class Attendance**
Students are expected to attend the class. Student should notify the instructor if he/she has an excuse for not being able to attend. Students with excused absences are still expected to complete the missed work. Refer to the University’s Attendance Regulation at [http://policies.ncsu.edu/regulation/reg-02-20-03](http://policies.ncsu.edu/regulation/reg-02-20-03) for the University’s definition of excused absences.

**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://policies.ncsu.edu/policy/pol-11-35-01](http://policies.ncsu.edu/policy/pol-11-35-01). 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.

**N.C. State University Polices, Regulations, and Rules (PRR):**
"Students are responsible for reviewing the PRRs which pertain to their course rights and responsibilities. These include: [http://policies.ncsu.edu/policy/pol-04-25-05](http://policies.ncsu.edu/policy/pol-04-25-05) (Equal Opportunity and Non-Discrimination Policy Statement), [http://oied.ncsu.edu/oied/policies.php](http://oied.ncsu.edu/oied/policies.php) (Office for Institutional Equity and Diversity), [http://policies.ncsu.edu/policy/pol-11-35-01](http://policies.ncsu.edu/policy/pol-11-35-01) (Code of Student Conduct), and [http://policies.ncsu.edu/ regulation/reg-02-50-03](http://policies.ncsu.edu/ regulation/reg-02-50-03) (Grades and Grade Point Average)."

**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](http://www.ncsu.edu/provost/hat/current/appendix/appen_k.html).

**Anti Discriminatory Statement**
NC State’s policies and regulations covering discrimination, harassment, and retaliation may be accessed at [http://www.ncsu.edu/policies/campus_environ](http://www.ncsu.edu/policies/campus_environ) or [http://www.ncsu.edu/equal_op](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)
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.