Instructor:
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Prerequisites: ECE 305 or equivalent

Power System Analysis, John, J. Grainger & W. D. Stevenson, McGraw-Hill

Course Learning Objectives:
Upon completion of this course, students will be able to:
• Develop equivalent circuits for a given power system for power flow analysis,
• Develop computer programs to perform power flow analysis on a power system,
• Define automatic generation control scheme on a power system and analyze generation control on a power system using simulation tools,
• Define generation dispatching on a power system and develop generation dispatching schemes using analysis packages,
• Define real time monitoring requirements on a power system,
• Define State Estimation problem and analyze state estimation of a power system using analysis programs,
• Define contingency analysis on a power system and perform contingency studies using a power flow analysis program.

Course Outline
1. Operation and Control of Power Systems (1wk)
2. Modeling of system components (3 wks)
3. Steady-State Power Flow Analysis (3 wks)
   - Formulation
   - Solution Methods
   - LTC control, generator limits
4. System Security - Contingency Analysis (1 wk)
5. Real-Time Generation Control (4 wks)
   - Automatic Generation Control
   - Economic Dispatch
6. System Voltage Control (1 wk)
7. Real-Time Monitoring - State Estimation (2 wks)
   - Formulation
   - Solution Algorithms

Grading:
Homework 20%
Term Proj. 15%
Quiz (2) 30%
Final 35%

**Homework**
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](http://www.ncsu.edu/policies/academic_affairs/pols_regs/REG205.00.4.php)).

**Quiz**
A quiz will be administered to the class. The quiz will be after completion of the core concepts of system analysis. 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](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**
Each student will conduct a system contingency assessment and restoration on a given test system. The student will prepare a written report and submit it with the supporting simulation and analysis work.

**Computational Tools:**
Matlab will be used for both the homework and the project.

**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, [http://www.ncsu.edu/policies/student_services/student_discipline/POL11.35.1.php](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 class 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](http://www.ncsu.edu/provost/hat/current/appendix/appen_k.html)).