Online ELEG 5473 Control of Electric Power System

Text: Modern Power System Analysis, D.P. Kothari and I.J. Nagrath, McGraw-Hill, 4th edition 2011.

Instructor: Roy McCann, Ph.D., P.E.

Study of control systems analysis and design as applied to electric power systems: Modeling, dynamics, and stability of three-phase power systems. Design and implementation of control systems related to generation, transmission and distribution.

There are presently in use a wide variety of technologies for controlling electric power systems. In many cases these systems have been operational for decades. In other cases, very recent technological innovations in power electronics have resulted in newly deployed stability and control circuits throughout the world. This course will cover the "classical" machine and control approaches. In addition, aspects related to "smart grid" technologies such as SCADA networks and inclusion of increasing amounts of renewable generation is covered.

Outline

1. Modeling Electrical Systems and *dq0* Transformations
   Sections 4.6 – 4.7
2. Introduction Power Flow Control
   Sections 6.1 – 6.4
3. Optimal System Operation
   Sections 7.1 – 7.6
4. Automatic Generation and Voltage Control
   Sections 8.1 – 8.10
5. Power System Stability
   Sections 12.1 – 12.11
6. Power System Security
   Sections 15.1 – 15.7
7. Voltage Stability
   Sections 16.1 – 16.7
8. Power System Compensation
   Sections 18.1 – 18.10
9. Intro to Fault Protection and Reliability
   Handouts
10. Intro to SCADA Networks
    Handouts

Class Project

A Matlab-Simulink based class project is required for the course. The topic can be selected by the student or a problem provided by the instructor can be used. The purpose is to more deeply explore the implementation details than what can be accomplished in the homework assignments.

Grading:

4 homework assignments	40% (combined)
Narrative Report	30%
Design Project (counts as final exam)	30%

Overall course grades will be assigned based on an overall assessment of the student's mastery of the subject matter and participation in classroom discussions and presentations. As a general guideline, the approximate course grade breakdown:

>85% → A >70% →B >50% → C <50% → D or F

Conduct

Students are required to be aware of and comply with the University of Arkansas policies for academic integrity as described at http://www.uark.edu/campus-resources/rlee/honesty.html.

Behavior in class is required to conform to University standards of conduct. In particular, the University faculty, administration and staff are committed to providing an equal educational opportunity to all students. The University of Arkansas does not condone discriminatory treatment of students or staff on the basis of age, disability, ethnic origin, marital status, race, religious commitment, sex, or sexual orientation in any of the activities conducted upon this campus.

Schedule Summer 2016

HW-1 Due 6/14
HW-2 Due 6/21
HW-3 Due 6/28
HW-4 Due 7/7
Narrative Report (Security, Smart grid and SCADA) due 7/12
Design Project (Simulink 2-area LFC) Due 7/19
All course materials must be turned in no later than 7/25