Electrical and Computer Engineering Department
EE 6560 - Power System Protection   3 Credits
Spring 2015

Thursday: 7:00 pm – 9:30 pm       Engineering Education Center Room: 211

Instructor: Paul J Nauert, PE    Cell: 314-605-9196     Email: nauertpj@mst.edu
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Catalog Description: Protective relaying incorporating electromechanical, solid state and computer
relaying methods for high voltage transmission systems; instrument transformers; generator,
transformer, line and bus protection; effect of system grounding; pilot protection and out of step
relaying principles.

Prerequisite by topic: Symmetrical components; per-unit system; fault analysis; synchronous
generator, transformer, and transmission line modeling. Course(s) in Power System Analysis.


References:

Office Hours: Tuesdays and Thursdays: 3-4 pm (or by appointment)

Course Outline:
1. Introduction; general philosophy of power system protection; review of: per unit system, phasor
diagrams, and symmetrical components; instrument transformers; basic design principles of
relays; AC and DC schematics; and system grounding principles. (6 to 7 weeks) Blackburn
Chapters 1-7.
2. Distribution feeder protection (1-2 weeks) Chapter 12 partial.
3. Substation equipment protection (3 weeks) Chapters 9, 10.
4. Transmission line protection; pilot protection (3 weeks) Chapters 12, 13, 14 partial, and 15
partial.
5. Generator protection; power plant auxiliaries; intertie of distributed generation (time permitting)
Chapters 8, 11 partial, and 14 partial.

Course objectives:
1. Understand the challenges of electric power system protection.
2. Learn the means of protecting power system components from both an equipment and
configuration perspective.
3. Be able to apply the various vintages of protective relaying technology.
4. Learn the importance of power system protection to the reliability of the power system.
5. Understand the interaction of the relay engineer with planning, design, and operations.

Learning the materials in this course is an important step toward a rewarding career as a power
engineer.

Grading Content: About

- Quizzes 20%
- Tests / Final 50%
- Homework / Participation 20%
- Project / Presentation 10%

Final Grades Basis
A: 90% - 100%;   B: 80% - 89+%;   C: 70% - 79+%;   D: 60% - 69+%
Class Policies:
• **Attendance:** Whether distance or an on-campus student, I prefer you attend each lecture during my live delivery. This is our primary interaction, and I expect you to be engaged.
• Quizzes are delivered via Blackboard. Individual work required.
• Read the Blackburn chapters prior to the lecture.
• Homework is due by noon Thursday of the week after it is assigned (e.g. 1/22 assignment is due by noon 1/29), unless otherwise announced. You must submit all work electronically; include your name in the file title. Homework will be checked as to effort and number of problems presented.
• Late homework will not be accepted except for emergencies.
• All submitted homework must reflect and show signs of individual effort. However, you are allowed to work in groups to get a better grasp of the problem solution strategies. That does not mean you can copy each other’s work.
• Tests and quizzes will be open notes unless otherwise announced. You must work individually on tests and quizzes. Bring a calculator.
• You are encouraged to participate in our weekly problem Webex. Or setup an appointment during my office time.

The following points apply only to the distance students:
• The tests / quizzes will be posted by the Video Communications Center. Distance students will get 10 minutes scan and post their test / quiz.

Useful points:
• Learning is a joint responsibility between the teacher and the student.
• Performance is a function of competence, motivation, and environment.
• Ask questions in class even if it means disrupting the lecture.
• Most of us learn by doing, so do the homework. It’s ok to work in teams on homework, but quizzes and tests require individual work.
• Maintain a communication line with me. Tell me if you are having any problems in the class.

Important Dates to Remember:

- **Test 1** Thursday, February 26, 2015
- **Test 2** Thursday, April 2, 2015
- **Projects due:** Thursday, April 23, 2015
- **Final exam** Will announce later