Power Protection Systems

Course Description
This course provides the study of power system faults and application of relays for power system protection; review of symmetrical components as applied fault currents; introduction to digital filtering and microprocessor based relaying and use of computer simulation for application of relays.

Student Learning Objectives
- Understand the basics of power systems protection
- Understand instrument transformer, grounding schemes and symmetrical components
- Analyze fault detection and identification
- Understand and analyze distribution protection
- Learn the computer simulation tools to analyze, evaluate and design protection systems
- Understand and analyze bus and transmission protection fundamentals
- Design of protection systems

Major Course Requirements
Attend all classes and labs. Regular completion of all reading, homework, and laboratory experiments which extend along the semester is essential. In addition, there will be two midterm exams and a final exam.

Grading Policy
Your course grade will be determined by your performance in the homework assignments, lab experiments, classroom attendance/participation, two midterm exams, and a final exam. The distribution of points is as follows:

1. Homework Assignments---15%.
2. Lab experiments/reports---25%
3. Attendance/Participations---10%
4. Two mid-term exams---30% (15% each).
5. Final Exam -- 20%.

Grade scale
A: 100-90, B: 89-80, C: 79-70, D: 69-60, and F: 59-0.

Required or Recommended Readings

Textbook:
**Course Policies**

**Attendance/tardiness**
You must attend all classes. You are responsible for any materials covered or handed out or announcements made in your absence. Records of your attendance will be maintained. Students missing classes without the instructor's permission may be withdrawn from the course. Tardiness without the prior consent of the instructor is not accepted.

**Absence from class**
Students are responsible for all materials assigned and covered in class. If a student is absent, it is his/her responsibility to get the notes, etc. If there are assignments, it is the student’s responsibility to obtain them. Absence is not an excuse for assignments not turned in as due.

**Late work and Make-up Exams**
Late assignments are not normally accepted. The student will receive a zero on assignments that are turned in after the due date unless a written permission (by email) is secured (from the instructor) prior to the due date. Permission will be granted only in extreme situations. Assignments may be turned in before the due date (they may be left in my mailbox, sent with a classmate, mailed, etc.). Note that hardware or software failure or machine unavailability does not merit an extension on the assignment. No make-up exams are allowed without prior permission of the instructor (Very difficult to obtain).

**Lab Experiments**
The goal of the laboratory sessions is to analyze and verify the theoretical ideas learned in the classroom. All theoretical analysis and data calculations must be done before the lab – this makes performing the experiments much easier.

**Lab Reports**
Students must submit a written report a week after each experiment is performed. You will not receive credit for any late reports unless you secure a written permission (by email) from the instructor prior to the due date. Reports may be turned in before the due date (they may be left in my mailbox, sent with a classmate, mailed, faxed, etc.). Guidelines for lab reports will be distributed during the second week of the semester.

**Grading Error**
All questions concerning a test score or grading of a returned test or assignment must be resolved within one week. It is advisable to keep all of your work until the end of the semester. In case of any recording errors or doubts, you may produce them for correction or verification.

**Email Address**
You must supply the instructor with a current email address and check your email account daily. You supply your email address by sending an email message by the end of the first week to bora.karayaka@tamucc.edu. In the subject area, type ENTC 4435.

**Cell Phone/Electronic Device Usage**
Any cell phone and electronic device usage during the class times is not permitted.

**Academic Integrity/Plagiarism.**
University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in F.
Dropping a Class
I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. Please consult with me before you decide to drop to be sure it is the best thing to do. Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Nov 2nd, 2012 is the last day to drop a class with an automatic grade of “W” this term.

Safety
The safety of students, faculty, staff and visitors to the ET laboratories is a major issue. You must follow safety procedures and use personal protective equipment as required.

Food and Drinks
Eating/drinking is not permitted in the class.

Classroom/professional and ethical behavior
Students are expected to behave in an ethical and professional manner in all class and lab activities. If you feel uncertain about a particular activity, please speak to me BEFORE problems arise. Ethical behavior is a requirement for passing this course.

Academic Advising
The College of Science and Technology requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. The College's Academic Advising Center is located in Center for Instruction (CI 350), and can be reached at 825-5777.

Grade Appeals
As stated in University Rule 13.02.99.C2, Student Grade Appeals, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Rule 13.02.99.C2, Student Grade Appeals, and University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules Web site at http://www.tamucc.edu/provost/university_rules/index.html. For assistance and/or guidance in the grade appeal process, students may contact the Office of Student Affairs.

Disabilities Accommodations
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call or visit Disability Services at (361) 825-5816 in Driftwood 101.

If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.
Syllabus

Tentative Course Schedule (Subject to change)

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Readings</th>
<th>Topics</th>
<th>Exams</th>
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<tr>
<td>1</td>
<td>8/24</td>
<td>Ch. 1&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Fundamentals of protection</td>
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<tr>
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<td>8/29</td>
<td>Ch. 2&lt;sup&gt;1&lt;/sup&gt;</td>
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<td>3</td>
<td>9/05</td>
<td>Notes</td>
<td>Mathematical tools- Symmetrical components</td>
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<tr>
<td>4</td>
<td>9/12</td>
<td>Notes</td>
<td>Mathematical tools- Symmetrical components</td>
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<td>9/19</td>
<td>Ch. 12&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Bus Protection</td>
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<td>9/26</td>
<td>Ch. 12&lt;sup&gt;1&lt;/sup&gt;</td>
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<td>Mid 1</td>
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<td>10/03</td>
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<td>10/10</td>
<td>Ch. 11&lt;sup&gt;1&lt;/sup&gt;</td>
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<td>10/17</td>
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<td>Ch. 10&lt;sup&gt;1&lt;/sup&gt;</td>
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<td>10/31</td>
<td>Ch. 10&lt;sup&gt;1&lt;/sup&gt;</td>
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<td>Ch. 14&lt;sup&gt;1&lt;/sup&gt;</td>
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<td>Ch. 4&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Applications of distance relays</td>
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<td>15</td>
<td>11/28</td>
<td>Notes</td>
<td>Distribution system protection</td>
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<td>16</td>
<td>12/05</td>
<td>Notes</td>
<td>Discussions on NERC and Generator utility interconnection standards</td>
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<td>17</td>
<td>12/09</td>
<td>Friday, December 9, 2010—8:00 am</td>
<td>FINAL</td>
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<sup>1</sup>: Textbook 1

Engineering Library Resources
The Mary and Jeff Bell Library houses substantial engineering reference materials available for research and coursework support. Designated coursework will require access and use of these resources as a portion of the grade for assigned work.

Instructional Methods and Activities
Methods and activities for instruction include; lectures, group discussions, homework assignments/solutions, lab experiments/exercises, and software simulation.

Pre-requisite
ENTC3415 (Circuit Analysis II).

Note: This syllabus represents an outline for the course. Changes may be necessary and will be announced in class.