

ENEE 4720, Section 0, POWER SYSTEM ANALYSIS AND DESIGN
Spring 2014

Course: ENEE 4720-0, CRN 25435
Title: Power System Analysis and Design
Class Schedule: T & R, 5:00 PM – 6:15 PM
Class Location: EMCS 402
Credit: 3.0
Professor: Preston Cooper & Dr. Ahmed Eltom
Office Location: EMCS 331
Office Phone: 706-618-8268 (PC), 423-425-4381 (AE)
Office Hours: By appointment
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ADA STATEMENT: Attention: If you are a student with a disability (e.g. physical, learning, psychiatric, vision, hearing, etc.) and think that you might need special assistance or a special accommodation in this class or any other class, call the Disability Resource Center (DRC) at 425-4006 or come by the office, 102 Frist Hall <http://www.utc.edu/disability-resource-center/>.

If you find that personal problems, career indecision, study and time management difficulties, etc. are adversely affecting your successful progress at UTC, please contact the Counseling and Career Planning Center at 425-4438 or <http://www.utc.edu/counseling-personal-development-center/index.php>.

2013-14 Catalog Data: ENEE 4720 Power System Analysis and Design (3)
Power system component modeling; transmission lines, transformers, load flow analysis, symmetrical components, and **fault analysis**. Prerequisites: ENEE 380 or equivalent.

ABET Criterion:

Contribution to Professional Component:

- Breadth of knowledge of electrical engineering topics
- Contributes to the 1.5 years of appropriate topics for EE

Relationship of course to program outcomes

- a) Ability to apply knowledge of math, engineering, and science
- c) Design power system component(s) to meet specific requirements
- e) **Ability to identify, formulate, and solve power system problems**
- k) Techniques, skills, and modern engineering tools necessary for engineering practice

Textbook: Glover J, Sarma M, Overbye, Power System Analysis and Design, fifth edition, Cengage Learning 2008

Software: Power World Simulator (Provided with Text)
ETAP Power Station (Provided in Room 402)

Reference: Stevenson W, Elements of Power System Analysis, 5th edition, McGraw-Hill, 1982, 1994.

Meetings: T, R 5:00 – 6:15 am, EMCS 402

Coordinator: Preston Cooper, Tel: 706-618-8268

Goals: After completing this course, the student will be capable of mathematically modeling the major elements of the power system and solving simple power flow problems to determine voltages and currents. Symmetrical component techniques will be mastered in order to provide the capability to analyze unbalanced faults.

Prerequisites by Topic:

1. Network analysis
2. Electromagnetic principles
3. Electrical machinery
4. Automatic control principles
5. Power and polyphase circuits

Topics Covered:

	Week No.
1. Electric Energy and the Environment.	1
2. System modeling and network calculations	2, 3
3. Transmission lines impedance and capacitance	4, 5
4. Current and voltage relationship on transmission lines	6
5. Load flow solution	7, 8, 9
6. Symmetrical three phase faults and symmetrical components	10, 11, 12, 13
7. Unsymmetrical faults	14, 15

Grading Policy:

The grade in the course will be based on a weighted average formed as follows:

Examinations (2)	40%
Comprehensive Final Exam	20%
Homework	20%
Design project(s)	20%

Letter grades will ordinarily be assigned as follows:

90	≤	A	
80	≤	B	< 90
70	≤	C	< 80
60	≤	D	< 70
		F	< 60

Class Attendance and Participation:

Class attendance and participation are very important to learning the material and are required. Class discussions will involve novel solution techniques, modeling helps, and problem solving. It is recommended that a full scientific calculator be brought to class.

Home Work:

Homework is due in one week from time assigned in class. Some of the homework problems require using Power World or ETAP Software. Assignments will be considered late after the beginning of class on the due date. Extension may be allowed with instructor approval. Late homework grade will be penalized 10% of the total value for each day or fraction thereof. **All assignments must be completed to receive a passing grade.**

Group study sessions for understanding and solving homework problems are strongly encouraged. However, each student is responsible for her/his own work and turning in the assignment.

Homework Format:

Use only one side of the page;

Begin each problem on a new page, and draw a box around the final answer. Each completed assignment should be **clearly presented** so that others can follow the solution process. The solution method is just as important to the grade as the final numerical solution. **Unreadable work will not be graded or credited.**

Missed Assignments:

If you miss a major assignment without either a certified medical excuse or prior instructor approval, a zero will be averaged into your grade.

Design Project

A design project will be assigned early in the semester. The project requires material which may not be covered in class. In some cases consultation with experienced engineers is recommended. The project is due on December 1. A progress report should be submitted no later than November 3.

Graduate Students:

The design project and/or paper requirements are different for graduate students. Their projects and/or papers require material, which may not be covered in this class. The student report and presentation are expected to demonstrate a sophisticated degree of analysis, synthesis, and evaluation of knowledge and/or skills.

Research Paper:

A semester long research project based on one of the course topics will be assigned to each graduate student. The project will require the reading of journal and conference papers. The IEEE Explorer data-base is an excellent search engine for finding papers along with downloadable pdf files of most papers. The database is accessible through the UTC library. Professor Sarla Margai at UTC library may help you with your research. Validation of solution methodologies must be performed on Standard Test Systems, which are provided by the IEEE Power Engineering Society on the IEEE website (www.ieee.org).

The student reports the results and methodologies used in a term paper. The paper shall be written in professional engineering style as if submitting it to a professional conference or journal. The length of the paper (including all written materials i.e. appendices and endnotes, but excluding the cover page) shall not exceed 16 pages. Double space, 10 pt, times-roman font, 0.5 inch first line indented format shall be used. The paper shall include an abstract, conclusions, and references. References shall be given in IEEE format.

The paper is **due by the last day of class**, no exceptions. An oral presentation may be required. Preliminary presentation will be held on the second week of November.

Policy regarding disabilities:

If you have a disability that may require special assistance or accommodations, or you have questions related to any accommodations for testing, note takers, readers, etc., please speak with me as soon as possible. All appropriate accommodation will be made, but must be arranged through the CAP office. Students may contact the Office for Students with Disabilities/College Access Program at 425-4006 with questions about services offered to UTC students with qualified disabilities

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