

**ABET COURSE SYLLABUS**

**EPOW-4010: Power Engineering Fundamentals**

**Course Catalog Description:** Study of the principal components of electric power systems as individual pieces of equipment and as parts of a system. Balanced 3-phase circuits, per unit quantities. Circle diagrams, control of voltage, and power flow. Unbalanced faults. Symmetrical components. The study includes physical modeling and the use of standard software simulation tools.

**Pre-Requisite Courses:** ECSE-2010

**Co-Requisite Courses:** None

**Prerequisites by Topic:**

1. Magnetic field, Faraday’s law, Ampere’s law , Lenz’s law
2. Analysis of electric circuits
3. Three-phase systems
4. Phasors
5. Complex algebra

**Textbook:** Power Systems Analysis by John Granger and William Stevenson  
(and/or other required material)

**References:** The above textbook and class notes

**Course Coordinator:** Leila Parsa

**Overall Educational Objective:** The course is designed to introduce the fundamental concepts of component characteristics and their combination in a power system. In this course Modern techniques of power system analysis are discussed.

**Course Objectives:**

1. Understand the basics of power consumption and delivery
2. Understand the operation of the elements in power system such as transformers and synchronous generators
3. Calculate the line parameters and for short, medium and long transmission lines as well as their voltage and current equations
4. Understand the basics of network calculations and power flow
5. Understand the faults in a power system and symmetrical components
6. Analyze power system stability

**How Course Objectives are Assessed:** Homeworks  
Exams  
Course project

**Relation to EE/CSE/EPE Outcomes**

**N = none**  
**M = moderate**  
**H = high**

Outcome	Level	Demonstrate Proficiency
	N, M, H	e.g. Exams, projects, HW
Mathematics, science and engineering	H	HW, exams
Basic disciplines in Electrical Engineering	N	
Depth in Electrical Engineering	H	HW, exams
Basic disciplines in Computer & Sys. Eng.	N	
Depth in Computer and Systems Eng.	N	
Electromagnetics, electromechanics, power semiconductors	H	HW, exams
Power system behavior	H	HW, exams
Electrical energy conversion	H	HW, exams
Conduct experiments and interpret data	N	

Identify, formulate and solve problems	H	HW, exams
Design a system, component or process	N	
Communicate in written and oral form	M	HW, exams
Function as part of a multi-disciplinary team	N	
Preparation for life-long learning	H	Semester long course project
Ethical issues; safety, health, public welfare	N	
Humanities and social sciences	N	
Laboratory equipment and software tools	N	
Variety of instruction formats	M	

**Topics Covered:**  
**(number of hours or classes for each)**

- Basic concepts 1 class
- Transformers 2 classes
- Synchronous Machines 2 classes
- Transmission Lines 3 classes
- Network Calculation 4 classes
- Power Flow 4 classes
- Fault studies on Power System 4 classes
- Symmetrical components 4 classes
- Stability of Power System 4 classes

**Computer Usage:** some

**Laboratory Experiences:** None

**Design Experiences:** None

**Independent Learning Experiences:** Students are asked to do a research of their interest on topics related to renewable energy, microgrids and their integration with the network.

**Class/Lab Schedule:** Mondays and Thursdays 4:00-5:50 pm (Fall 2006)

**Contribution to the Professional Component:**

- (a) College-level mathematics and basic sciences: 0 credit hours
- (b) Engineering Topics (Science and/or Design): 4 credit hours
- (c) General Education: 0 credit hours

<b>Prepared by:</b>	Leila Parsa
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