

**The University of Texas at Tyler  
Department of Electrical Engineering**

**Course: EENG 4317 – Power Electronics (Elective)**

**Syllabus**

**Catalog Description:**

The use of solid state components in power systems; rectifying devices; diode circuits and rectifiers; controlled rectifier circuits; AC voltage controllers; Thyristor commutation techniques; DC choppers; speed torque characteristics of motors and loads; starting, braking and transient analysis of electric motors; introduction to HVDC. Three hours of lecture per week. Prerequisites: EENG 4309. **Prerequisite or Co-requisite:** EENG 4310.

Prerequisites: EENG 4309, prerequisite or co-requisite: EENG 4310

Credits: ( 3 hours lecture, 0 hours laboratory per week )

Text(s): M. H. Rashid, Power Electronics: Circuits, Devices, and Applications, Prentice Hall, 2004

Additional Material: Instructor's Lectures Notes

Course Coordinator: Hassan El-Kishky

Topics Covered:

- Introduction to Power Electronics
- Diode Circuits and Rectifiers
- Thyristors and Converters
- Controlled Rectifiers
- AC Voltage Controllers
- Thyristor Commutation Techniques
- DC Choppers
- PWM Inverters
- Static Switches
- Power Supplies
- DC Drives
- AC Drives
- Introduction to HVDC

Evaluation Methods: (only items in dark print apply):

1. Examinations / Quizzes
2. Homework
3. Report
4. Computer Programming
5. Project
6. Research Papers
7. Presentation
8. Course Participation
9. Peer Review

Course Objectives<sup>1</sup>: By the end of this course students will be able to:

1. Analyze uncontrolled rectifier circuits [1,5]
2. Analyze and design (conceptual) diode circuits and rectifiers [1,5]
3. Analyze and design (conceptual) single-phase controlled rectifier circuits (converters) [1,5]
4. Analyze three-phase controlled rectifier circuits [1,5]
5. Analyze AC Voltage Controllers and static switches [1,5]
6. Analyze DC choppers [1,5]
7. Analyze simple AC and DC drives controllers [1,5]

<sup>1</sup>Numbers in brackets refer to method(s) used to evaluate the course objective.

Relationship to Program Outcomes<sup>2</sup>: This course supports the following Electrical Engineering Program Outcomes, which state that our students will have:

Graduates of the electrical engineering curriculum of the University of Texas at Tyler will:

1. have the ability to apply knowledge of the fundamentals of mathematics, science, and engineering [1-7].
2. have the ability to use modern engineering tools and techniques in the practice of electrical engineering [1-7].
3. have the ability to analyze electrical circuits, devices, and systems [1-7].
4. have the ability to design electrical circuits, devices, and systems to meet application requirements [1-7].
5. have the ability to design and conduct experiments, and analyze and interpret experimental results;
6. have the ability to identify, formulate, and solve problems in the practice of electrical engineering using appropriate theoretical and experimental methods [1-6].
7. have effective written, visual, and oral communication skills [2]
8. possess an educational background to understand the global context in which engineering is practiced, including:
  - a. knowledge of contemporary issues related to science and engineering;
  - b. the impact of engineering on society;
  - c. the role of ethics in the practice of engineering;
9. have the ability to contribute effectively as members of multi-disciplinary engineering teams;
10. have a recognition of the need for and ability to pursue continued learning throughout their professional careers [1-7].

<sup>2</sup>Numbers in brackets refer to course objective(s) that address the Program Outcome.

Prepared By: Hassan El-Kishky

Date: 01/20/2011

**Note:** In reference to EE program outcome 4, design will be a minor focus in this course. Students will perform conceptual designs throughout the course.