

The University of Texas at Tyler
Department of Electrical Engineering

EENG 5340: Advanced Topics in EE: Power Electronics

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: Graduate Standing, General Power Systems

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: Conference/Journal Articles and/or Access to Simulation Software

Course Coordinator: Hassan El-Kishky, Associate Professor, Electrical Engineering

Topics Covered: (paragraph of topics separated by semicolons)

1. Introduction to Power Electronics
2. Diode Circuits and Rectifiers
3. Thyristors and Converters
4. Controlled Rectifiers
5. AC Voltage Controllers
6. Thyristor Commutation Techniques
7. DC Choppers
8. PWM Inverters
9. Static Switches
10. Power Supplies
11. DC Drives
12. AC Drives
13. Introduction to HVDC

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

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

Course Objectives¹: 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]

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

Relationship to Program Outcomes (only items in dark print apply)²: This course supports the following Electrical Engineering Program Outcomes, which state that our students will:

1. Possess a breadth and depth of knowledge in electrical and computer engineering. Students will possess and be able to apply knowledge and principles at a graduate level in two or more of the following areas utilizing modern engineering tools: electronics, power systems, controls, advanced engineering mathematics, signal processing, communications, real-time systems, computer systems, electromagnetic and power electronics. [1-7]
2. Possess and demonstrate oral and written communication skills: Students will be adequately prepared for entrance into advanced careers or into a doctoral program through reports, papers, publications, or presentations. [1-7]
3. Demonstrate the capability to perform independent learning and investigation: Students will successfully address electrical or computer engineering problems through independent research activity in coursework or a thesis. [1-7]

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

Contribution to Meeting Professional Component: (in semester hours)

Mathematics and Basic Sciences:		hours
Engineering Sciences and Design:	3	hours
General Education Component:		hours

Prepared By: Hassan El-Kishky

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