

# ECE 7841: Advanced Topics in Power Electronics

## Course Description

Advanced topics of power electronics, beginning with utility and vehicle applications and evolving into advanced circuit topologies and control.

**Prior Course Number:** 844

**Transcript Abbreviation:** Adv Top Pwr Elec

**Grading Plan:** Letter Grade

**Course Deliveries:** Classroom

**Course Levels:** Graduate

**Student Ranks:** Masters, Doctoral

**Course Offerings:** Autumn

**Flex Scheduled Course:** Never

**Course Frequency:** Even Years

**Course Length:** 14 Week

**Credits:** 3.0

**Repeatable:** No

**Time Distribution:** 3.0 hr Lec

**Expected out-of-class hours per week:** 6.0

**Graded Component:** Lecture

**Credit by Examination:** No

**Admission Condition:** No

**Off Campus:** Never

**Campus Locations:** Columbus

**Prerequisites and Co-requisites:** Prereq: 5025 (624).

**Exclusions:** Not open to students with credit for 844.

**Cross-Listings:**

**Course Rationale:** Existing course.

**The course is required for this unit's degrees, majors, and/or minors:** No

**The course is a GEC:** No

**The course is an elective (for this or other units) or is a service course for other units:** Yes

**Subject/CIP Code:** 14.1001

**Subsidy Level:** Doctoral Course

## Course Goals

State-of-the-art power electronics circuits and control methods will be introduced
Circuit analysis and simulation skills will be enhanced
Practical design guidelines will be utilized in multiple week projects

## Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
FACTs devices and other applications of power electronics in electric power system	6.0							
Vehicle applications of power electronics	3.0							
Advanced circuits 1: isolated dc/dc converters	3.0							

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Advanced circuit 2: multilevel inverters	3.0							
Advanced circuit 3: Z-source inverter/converters	3.0							
Circuit application example: MW solar power plant	3.0							
Multiple-week project	21.0							

## Representative Assignments

Review of current literature on various topics related to course content; present a summary to class.
Multi-week projects related to various aspects of power electronics circuit analysis, control and design.

## Grades

Aspect	Percent
Mid semester exam	25%
Final exam	25%
Homework	15%
Multi-week projects.	35%

## Representative Textbooks and Other Course Materials

Title	Author
<i>Class notes that will be uploaded into CARMEN</i>	
<i>current publications and industry standards in technical journals such as IEEE</i>	

## ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
**	a	An ability to apply knowledge of mathematics, science, and engineering.
*	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
***	c	An ability to design a system, component, or process to meet desired needs.
*	d	An ability to function on multi-disciplinary teams.
**	e	An ability to identify, formulate, and solve engineering problems.
*	f	An understanding of professional and ethical responsibility.
*	g	An ability to communicate effectively.
*	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
*	i	A recognition of the need for, and an ability to engage in life-long learning.
**	j	A knowledge of contemporary issues.
**	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

## Additional Notes or Comments

Updated abbreviation, prereqs, exclusions, goals and topics to conform to university format 3/29/12

Prepared by: Betty Lise Anderson