

School of Management, Engineering and Technology
Department of Electrical Engineering and Renewable Energy
REE 413: Electric Power Conversion Systems

Catalogue Description (2009/2010):	Review of power switching devices. Single- and three-phase rectifiers, particularly controlled rectifiers. DC-DC converters; buck, boost, buck-boost, Cuk. AC-AC converters. Inverters. Inverter control; square-wave, pulse-width modulation. Harmonic distortion. Resonant converters. Charge controllers. Maximum power point trackers.		
Hours/Credits: (Lecture-Lab-Total)	(3-0-3)		
Class Schedule:	Twice weekly 110 minute lectures, one eight-week term (Summer)		
Prerequisites:	EE 419, REE 412		
Required Text:	N. Mohan, "Power Electronics: Converters, Applications, and Design," Wiley, 3 rd Ed., 2002, ISBN: 0471226939		
Reference Text:	None		
Course Coordinator:	Frank Rytkonen		
Regular Instructors:	Frank Rytkonen, Curt Edmondson		
Course Objectives:	<p>Upon completion of the course, a student should be able to:</p> <ul style="list-style-type: none"> • Select components, explain component characteristics, model components, and design circuits for the control and conversion of electrical energy. • Use computers to design and simulate switch-mode DC-DC and DC-AC power converters with power semiconductor devices, distributed generation sources, batteries, and varying environmental and load conditions. • Describe algorithms used in maximum power point tracking and charge control and their respective advantages and disadvantages • Design control systems for power electronic converters, including those used in maximum power point tracking and charge control • Determine and mitigate total harmonic distortion and electromagnetic interference produced by power electronic converters • Perform active power factor correction using power electronic converters • Discuss uses of power electronic converters in distributed energy generation and energy efficiency applications 		
Topics Covered:	<ul style="list-style-type: none"> • Active rectification • DC-DC converters • Inverters • Modeling and control of power electronic converters • Resonant converters • Maximum power point tracking and charge control • Applications 		
Relevant Program Outcomes:	<p>(a) an ability to apply knowledge of mathematics, science, and engineering (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability (e) an ability to identify, formulate, and solve engineering problems (g) an ability to communicate effectively (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (l) an ability to apply the fundamentals of energy conversion and applications</p>		
Required or Elective:	Required		
Criterion 5:	Engineering Topics		
Prepared By:	Frank Rytkonen	Updated:	5/7/10

