

School of Management, Engineering and Technology
Department of Electrical Engineering and Renewable Energy
REE 412: Photovoltaic Systems

Catalogue Description (2009/2010):	The solar resource, sun charts, site assessments. Grid-connected and stand-alone systems. Module and array performance. PV system components including batteries, modules, charge controllers, maximum power point trackers, inverters. Economic considerations including investment tax credits, present-value analysis, IRR. Advanced PV materials.		
Hours/Credits: (Lecture-Lab-Total)	(3-0-3)		
Class Schedule:	Twice weekly 75 minute lectures		
Prerequisites:	EE 343		
Required Text:	R.A. Messenger, J. Venture, "Photovoltaic Systems Engineering," CRC Press, 2 nd Ed., 2003		
Reference Text:	"2005 NEC," 1st Ed., Thompson Delmar Learning, ISBN: 0877656231 G.M. Masters, "Renewable and Efficient Electric Power Systems," Wiley-Interscience, 2004 J. Dunlop, "Photovoltaic Systems," American Technical Publishers, 2007		
Course Coordinator:	Robert Bass, Ph.D.		
Regular Instructors:	Robert Bass & Jonathan Cohen (co-teach), Slobodan Petrovic, Ph.D		
Course Objectives:	<p>Upon completion of the course, a student should be able to:</p> <ul style="list-style-type: none"> • understand the solar resource • perform site assessments, conservation principles and load analysis • perform economic analysis for energy system proposals • use simulation software to model energy system performance and economics • size a PV system for both grid-tied and battery-based systems • understand the effects of temperature, insolation and shading on PV IV characteristics • design mechanical and electrical PV sub-systems • apply appropriate codes and standards in the design of an energy system • prepare a bid to a customer for the installation of a custom PV system 		
Topics Covered:	<ul style="list-style-type: none"> • The Solar Resource • Economics of Photovoltaic Systems • Photovoltaic Systems Design • Physics of Photovoltaic Materials, Cells and Modules 		
Relevant Program Outcomes: <i>Delete those that don't apply</i>	<p>(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 within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability (d) an ability to function on multi-disciplinary teams (e) an ability to identify, formulate, and solve engineering problems (g) an ability to communicate effectively (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context (j) a knowledge of contemporary issues (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:	Robert Bass, Ph.D.	Updated:	April 26, 2010