

School of Management, Engineering and Technology  
Department of Electrical Engineering and Renewable Energy  
REE 454: Power Systems Protection & Control

Catalogue Description (2010/2011):	Protection systems overview; protective devices; coordination and sequencing of relays; grounding practices; impedance protection. Methods of power systems operation and control; load-frequency control, automatic generation control. Modeling power system protection and control using power system analysis software, emphasizing renewable resources.		
Hours/Credits: (Lecture-Lab-Total)	(3-0-3)		
Class Schedule:	One weekly 170 minute lecture, one term		
Prerequisites:	REE 453		
Required Text:	J. L. Blackburn, T.J. Domin "Protective Relaying: Principles and Applications," 3rd Ed., CRC Press, 2006		
Reference Text:	C.R. Mason, "The Art & Science of Protective Relaying," General Electric Network Protection and Automation Guide, 3 <sup>rd</sup> Ed., AREVA, 1987		
Course Coordinator:	Frank Rytkonen		
Regular Instructors:	Frank Rytkonen		
Course Objectives:	<p>Upon completion of the course, a student should be able to:</p> <ul style="list-style-type: none"> <li>• Explain the function and operation of protective system components</li> <li>• Apply components in electrical protection schemes</li> <li>• Balance system protection and reliability through design</li> <li>• Model protection schemes using power system analysis software</li> <li>• Design protection and control schemes based on system-specific characteristics</li> </ul>		
Topics Covered:	<ul style="list-style-type: none"> <li>• Instrument transformers and transducers</li> <li>• Protective relays</li> <li>• Protection fundamentals</li> <li>• Grounding for safety and reliability</li> <li>• Generator, transformer, bus, and line protection</li> <li>• Substation control</li> <li>• Ethical responsibilities of power system protection design, including industrial accident case studies</li> </ul>		
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  (f) an understanding of professional and ethical responsibility  (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:	Elective		
Criterion 5:	Engineering Topics		
Prepared By:	Frank Rytkonen	Updated:	5/7/10