University of Tehran
School of Electrical and Computer Engineering

Course:	**Power Systems Advanced Protection**		
Course type:	Main Course for Power Systems and High Voltage branch	EE*	Credit: 3
Level:	Graduate		
Co-requisite(s):			
Prerequisite(s):	Power Systems Relays and Protection		
Prerequisite by topic:	Basic knowledge of power systems protective relays		
Textbook(s):	***1- S. H. Horowitz A. G. Phadke and J. K. Niemira, "Power System Relaying", John Wiley and Sons Inc., 2014.*** ***2- H. Ungrad W. Winkler and A. Wiszniewski, "Protection Techniques in Electrical Energy Systems", Marcel Dekker Inc., 1995.*** ***3- Electricity Training Association, "Power System Protection, Vols. 1-3", IEE, London, 1995.*** ***4- W. A. Elmore, "Pilot Protective Relaying", Marcel Dekker Inc., 2000.*** ***5- G. Ziegler, "Numerical Distance Protection, Principles and Applications", Wiley, 2011***		
Coordinator:	Majid Sanaye-Pasand		
Goals:	Become familiar with the following topics: 1. Power system abnormal conditions and transient faults and differentiating them from normal conditions 2. Designing secure and dependable relays for different system elements 3. CT and CVT transient behaviors and their effects on protective relays' performance 4. Technical challenges of applying distance relays for transmission lines and cables 5. Pilot and wide area protection algorithms 6. Power system frequency, voltage and transient instability prevention using local and centralized protection schemes		

Outcome:	Students who pass the course successfully will be able to 1. Analyze power system transient faults 2. Learn Instrument transformers transient errors and their effects on protective relays mal-functions 3. Coordinate overcurrent relays 4. Apply distance relay for different transmission lines and cables configurations and problematic situations 5. Design various transmission system pilot protection methods 6. Learn various power system wide area protection algorithms 7. Improve power system stability/resiliency by applying proper local/centralized protective schemes
Topics:	1- Introduction 2- Analysis of transient faults 3- Instrument transformers transient errors 4- Application and coordination of OC and DOC relays 5- Transmission lines and cables distance protection and its limitations 6- Transmission systems pilot protection 7- Wide area protection of power systems 8- Power systems stability/resiliency improvement using appropriately designed protective schemes
Computer usage:	Running simulations by EMTP, EMTDC/PSCAD and Matlab
Assignments:	Seven assignments
Projects:	One final project
Grading:	Exercises and final project: 50% Midterm and Final exam: 50%
Further readings:	Selected papers
Prepared by:	Majid Sanaye-Pasand
Date:	November 1, 2017

*EE: Electrical Engineering CE: Computer Engineering IT: Information Technology