



University of Tehran
School of Electrical and Computer Engineering

Course:	8101? – Flexible Ac Transmission Systems & HVDC		
Course type:	Elective	EE*	Credit: 3
Level:	Graduate		
Co-requisite(s):	-		
Prerequisite(s):	Power Systems Analysis, Electric Reactive Power Control		
Prerequisite by topic:	Knowledge of fundamentals of Power Systems and concepts of Reactive power Control		
Textbook(s):	<p>[1] C. K. Kim, V. K. Sood, G. S. Ang, S. J. Lim, S. J. Lee, HVDC Transmission: Power Conversion Applications in Power Systems, IEEE Press, 2009.</p> <p>[2] N. G. Hingorani, L. Gyugyi, Understanding FACTS: Concepts and Technology of Flexible AC Transmission Systems, IEEE, 2000.</p>		
Coordinator:	Afsharnia, Saeed		
Goals:	To introduce the students to the concept of FACTS, and familiarise them with the basic design and principle of operation of HVDC systems.		
Outcome:	Understanding the power system control through various power electronic controllers including state of art FACTS controllers.		
Topics:	<p>1- Overview Concept of reactive power compensation, Review of series and shunt compensation, Concepts of transient stability and voltage stability, Power system oscillations.</p> <p>2- Flexible AC Transmission Systems (FACTS); Shunt Compensators: principle of operation, Control and characteristics of The Static Var Compensator (SVC); TCR, TSC, STATCOM, Series Compensators: Series compensation and voltage stability, Variable impedance type series compensators (TCSC) and switching converter type series converter (SSSC), Configurations, Control and characteristics, General applications Unified Power Flow Controllers : Objectives and principle of operation of voltage and phase angle regulations, Static phase shifter and its operating characteristics, Unified Power Flow Controller (UPFC) control and characteristics, Interline power flow controller: Principle of operation, Control</p>		

	<p>and characteristics</p> <p>3- HVDC Transmission : Evolution of HVDC Transmission, Comparison of HVAC and HVDC systems, Type of HVDC Transmission systems, Components of HVDC transmission systems, Required features of rectification circuits for HVDC transmission, Analysis of HVDC converter, HVDC system control features.</p>
Computer usage:	Matlab Simulink, PSCAD
Assignments:	-
Projects:	One research project
Grading:	final examination 60% research project 40%
Further readings:	<p>[1] P. Kundur, Power System Stability and Control, McGraw Hill, 1994.</p> <p>[2] K. R. Padiyar, HVDC Power Transmission Systems Technology and System Interactions, Mc Graw Hill, 1990.</p> <p>[3] Y. H. Song, A. T. Johns, Flexible AC Transmission Systems (FACTS), IEE, 1999.</p> <p>[4] Selected scientific papers</p>
Prepared by:	Afsharnia, Saeed
Date:	November 2017

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