Course unit title:	Power System Control and Stability		
Course unit code:	AEEE455		
Type of course unit:	Technical Elective		
Level of course unit:	Bachelor (1st Cycle)		
Year of study:	4		
Semester when the unit is delivered:	8 (Spring)		
Number of ECTS credits allocated :	6		
Name of lecturer(s):	Dr Nicholas Christofides		
Learning outcomes of the course unit:	1. Identify the importance of power system control and stability. 2. Associate the physical aspects of different categories of power system stability phenomena. 3. Identify factors causing different stability problems and analyse techniques used to deal with stability problems. 4. Investigate methods for power system stability and control. 5. Analyse synchronous generator characteristics and investigate simulation models in relation to power system stability studies. 6. Investigate transients and small signal analysis problems.		
Mode of delivery:	Face-to-face		
Prerequisites:	AEEE350, AEEE351, AEEE352	Co-requisites:	
Recommended optional program components:	None		
Course contents:	1. Introduction to Power System Stability: Requirements of a reliable electrical power service, Consequences to system stability after a disturbance on the system 2. Control of Real Power and Frequency: power and frequency control, The turbine governor, division of load between generators, Power-frequency characteristic of an interconnected system, small capacity systems. 3. Control of Voltage and Reactive Power: voltage control, reactive power control, Generation and absorption of reactive power, Relationship between voltage, power and reactive power, tap-changing transformers, reactive power injection, Voltage collapse and consequences, Voltage control in distribution networks, long transmission lines 4. Power System stability: The stability problem, Rotor dynamics, swing equation, power angle equation, Synchronizing power coefficients, Equal area criterion of stability, Multi-machine stability studies, Step by step procedure of the swing curve 5. Transient and Small Signal Analysis: rotor angle, Consideration of time, Computer calculation methods for transient stability studies, Factors affecting transient stability		
Recommended and/or required reading:	1. Power System Analysis, Grainger J., Stevenson, W.D., Chang G.W., McGraw Hill, 2016 2. Hughes Electrical and Electronic Technology, 12e, Edward Hughes, John Hiley, Ian McKenzie-Smith, Keith Brown, Pearson, 2016 3. Power System Control and Stability, Anderson P. ,Fouad A., Second Edition, Wiley, 2002		

Textbooks:	1. Power System Dynamics: Stability and Control, J. Machowski, J. Bialek, J.Bumby, WileyBlackwell, 2ND, 2008 2. Electrical Power System Essentials, Pieter Schavemaker, Lou van der Sluis, Wiley, 1st, 2008 3. Power Systems Modelling and Fault Analysis, N. Tleis, Newnes, 2008 4. Electrical Machinery Fundamentals, S. Chapman, Prentice Hall, 2005 5. Electrical Power Systems Quality, Dugan R.C., Santoso S, McGraw-Hill Professional, 2ND, 2002 6. Power Systems Electromagnetic Transients Simulation, Arrillaga, J., Watson, N, Institution of Engineering and Technology, 1st, 2002 7. Electric Power Systems, Weedy B. M., Cory B.J. et all, 5th ed, Wiley, 2012 8. Power System Stability and Control, Prabha Kundur, McGraw Hill, 1994 9. Power System Dynamics and Stability, Sauer P. and Pai M., Prentice Hall, first edition, 1997
References:	
Planned learning activities and teaching methods:	Students are taught the course through lectures (3 hours per week) in classrooms via projector presentations and by the use of the whiteboard. Following major lecture topics and chapters, mathematical problems and examples are solved during class. Exercises for assessed homework are also a standard practice for this course as well as at least one assignment. Lecture presentations are available for students to download via the university e-learning platform. Students are also advised to use the recommended course textbook or reference books for further reading and practice in solving related exercises. Further literature search is encouraged by assigning students to identify a specific problem related to some issue, gather relevant scientific information about how others have addressed the problem and report this information in written or orally. Students are assessed continuously and their knowledge is evaluated through tests with their assessment weight, date and time being set at the beginning of the semester via the course outline. Students are prepared for final the exam, by revision on the matter taught, problem solving and concept testing. Overall, the course assessment is both formative and summative and aims to comply with the subject's expected learning outcomes and the quality of the course.
Assessment methods and criteria:	• Assignments/Homework 10% • Tests 30% • Final Exam 60%
Language of instruction:	English
Work placement(s):	No