AEEE521 - Power Transmission Lines

Course Title	Power Transmission Lines				
Course Code	AEEE521				
Course Type	Technical Elective				
Level	MSc (Level 2)				
Year / Semester	1 or 2				
Teacher's Name	Dr Nicholas Christofides				
ECTS	8	Lectures / week	-	Laboratories/week	-
Course Purpose	To analyse the overhead transmission lines in terms of their electrical parameters and apply circuit analysis techniques and theorems to calculate these parameters. Furthermore, to distinguish between short, medium and long transmission lines and to calculate series impedance and shunt admittance for these lines.				
Learning Outcomes	By the end of the course, students must be able to: 1. Identify the types and parameters of transmission lines 2. Associate series impedance elements of transmission lines. 3. Associate shunt admittance elements of transmission lines. 4. Distinguish between short, medium and long transmission lines and show how to represent them for modelling applications. 5. Analyse current and voltage variations and perform power flow calculations.				
Prerequisites	none	Co-requisites	none		
Course Content	1. **Transmission line parameters:** line resistance, line inductance of a single conductor, single/three-phase lines and double-circuit lines, flux linkage, corona discharges 2. **Series Impedance of Transmission lines:** Resistance, Inductance: of a conductor due to internal flux, a single-phase two-wire line, of composite conductor lines, of three-phase lines with equilateral/unsymmetrical spacing, of bundle conductors, Flux linkages of one-conductor in a group, Use of tables 3. **Capacitance of Transmission Lines:** Electric field of long, straight conductor, Potential difference between two points due to a charge, Capacitance: of a two-wire line, of a three-phase line with equilateral/Unsymmetrical spacing, effect of earth on capacitance, Parallel circuit three-phase lines 4. **Current and Voltage Relations on a Transmission Line:** Representation of lines, Short / medium / long lines, Equivalent circuit of a long line				

	5. **Power Flow Calculations:** Power flow through a transmission line, reactive compensation of TL 6. **Transient Analysis of Transmission Lines:** Transmission line transients, Travelling waves and reflections The Department, through its Research Policy acknowledges the importance of the synergies between research and teaching. As a result, students can be assigned to investigate further on a topic in order to better interpret something or identify current/new methods and practices. Through such activities, students can enter in the research culture and environment with the overall aim being to make them aware and to trigger ideas for the senior project and future postgraduate studies. Where just and fit, students are encouraged to participate in research projects that could complement their senior project requirements.
Teaching Methodology	The course is taught through lectures (3 hours per week) in classrooms or lectures theatres supported by the whiteboard and the overhead projector. Examples on subject delivered during the lectures are solved and open-ended discussion is encouraged. Further exercises can be assigned for practise or as homework. The lecture presentations are available on the e-learning platform for students to download along with other peripheral material such as past tests and exams, links and guides. Students are expected to take in-class hand-written notes. Students are also advised to use the subject's main textbook or reference books for further reading and practice in solving related exercises. Further literature research is encouraged by assigning to students a specific problem related to some issue and they are expected to gather relevant scientific information about how others have addressed the problem and report this information in written or orally.
Bibliography	• Power System Analysis, Grainger J., Stevenson, W.D., Chang G.W., McGraw Hill, 2nd edition, 2016 • Electrical Power System Essentials, Pieter Schavemaker, Lou van der Sluis, Wiley, 2nd edition, 2017 • Power Systems Modelling and Fault Analysis, N. Tleis, Newnes, 2nd edition, 2019 • Power Systems Electromagnetic Transients Simulation, Arrillaga, J., Watson, N, Institution of Engineering and Technology, 1st, 2002 • Electric Power Systems, Weedy B. M., Cory B.J. et all, 5th edition, Wiley, 2012 • Power Systems Analysis and Design, J. Duncan Glover, T. Overbye, M.S. Sarma 6th edition, 2020. • Power Systems Analysis, Saadat H., McGraw Hill, 3rd edition, 2011
Assessment	The assessment is continuously via mid-term tests and mini-assignments with the respective assessment weight, date and time being set at the beginning of the semester via the course outline or aurally discussed. Students are prepared for the final exam by revision and recapitulation and

	by solving exercises. The final assessment of the students is formative and summative and is in line with the subject's expected learning outcomes and course level. The coursework and the final exam grades are weighted 40% and 60%, respectively, and compose the final grade of the course. Various approaches are used for the continuous assessment of the students, such as mid-term written tests, oral presentations, quizzes, design assignments and design projects. An indicative weighted continuous assessment of the course is shown below: • Assignment 10-15% • Homework 10% • Mid-Term written exams 60-70% • Mini design project 15-20% • Presentation 10-15% The criteria considered for the assessment of each type of the continuous assessment and the final exam of the course are: (i) the comprehension of the fundamental concepts and theory of each topic, (ii) the application of the theory in solving related problems and (iii) the ability to apply the above knowledge in more complex design problems.
Language	**English**