Course Information Package

Course Unit Title	**ELECTRICAL SCIENCE**		
Course Unit Code	AEEE103		
Course Unit Details	BSc Mechanical Engineering (Required Courses)		
Number of ECTS credits allocated	5		
Instructor/Semester	Dr Alexis Polycarpou /Spring		
Learning Outcomes of the course unit	By the end of the course, the students should be able to: 1. Demonstrate basic knowledge in Electrical System components: Generator, Resistive and Motor Loads, Transmission line, Transformer, Grounding in protection, and Fuses. 2. Perform systematic analysis of linear resistive circuits. Recognize simple resistor topologies. Analyzing series and parallel circuits. Use of voltage and current divider rule. Analyze resistor topologies circuits using Kirchhoff's Law. 3. Make power consumption and energy dissipation calculations. Compute energy costs of electrical appliances. Energy Efficiency Certificate parameters, Perform multiplication factor conversions. 4. Identify parameters of sinusoidal waves such as period, frequency Peak, average and RMS values, and express complex numbers to Cartesian representation using trigonometric functions. 5. Present and examine the concept of impedance and simple series ac circuit analysis, R-L, R-C, and R-L-C circuits. 6. Capacitor transient response, charging and discharging. 7. Introduction to Renewable Energy Sources.		
Mode of Delivery	Face-to-face		
Prerequisites	NONE	Co-requisites	NONE
Recommended optional program components	None		
Course Contents	• Introduction to the course, System components: Generator operation, resistive steady state and transient inductive motor loads and Load, Transmission line, Transformer, Importance of protection devices, operation of Fuses, importance of ground cable, Electricity generation in Cyprus. • Basic electrical quantities and units, resistance, current, voltage, power energy efficiency, charge, Ohms law. • DC circuits Resistors in series, voltage divider, Parallel resistive circuits, current divider, Parallel-series circuits current and voltage calculation, KVL, KCL. • Power consumption and energy dissipation calculations for premises		

	and individual electrical appliances. Energy Efficiency Certificate parameters, basic multiplication factor conversions. • Sinusoidal wave theory and parameters (period, frequency, Peak, average and RMS values). Express complex voltage and current vectors to Cartesian representation using trigonometric functions. • Resistive Capacitive and inductive AC circuit steady state analysis (RLC series and parallel circuits). Calculation of generated current and power dissipated. • Capacitor transient response, charging and discharging theory and graphs, voltage dependency, use of capacitor as high energy starting device in mechanical applications. • Renewable Energy Source technologies (Solar, Wind, Tidal, Wave, Geothermal).
Recommended and/or required reading:	
Textbooks	• Hambley AR, *Electrical Engineering: Principles & Applications*, Third Edition, Prentice-Hall, 2005
References	• J. Nilsson, S. A. Riedel, Introductory Circuits for Electrical and Computer Engineering, Prentice Hall 2002 • Richard C. Dorf, James A Svoboda, Introduction to electric circuits, 6th edition, Wiley, 2004. • PPT presentations provided by the lecturer.
Planned learning activities and teaching methods	Students are taught the course through lectures (3 hours per week) in classrooms or lectures theatres, by means of traditional tools or using computer demonstration and on 1 hour per week laboratory experiments. Auditory exercises, where examples regarding matter represented at the lectures, are solved and further, questions related to particular open-ended topic issues are compiled by the students and answered, during the lecture or assigned as homework. Topic notes are compiled by students, during the lecture which serve to cover the main issues under consideration. Students are also advised to use the subject's textbook or reference books for further reading and practice in solving related exercises. Tutorial problems are also submitted as homework and these are solved during lectures or privately during lecturer's office hours. Students are prepared for final exam, by revision on the matter taught, problem solving and concept testing and are also trained to be able to deal with time constraints and revision timetable. The final assessment of the students is formative and is assured to comply with the subject's expected learning outcomes and the quality of the course.
Assessment methods and criteria	Tests 25% Laboratory 15% Final Exam 60% 60%
Language of	English

instruction	
Work placement(s)	NO