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| Course Title | Electrical Principles | | | | |
| Course Code | AEEE170 | | | | |
| Course Type | Compulsory | | | | |
| Level | BSc (Level 1) | | | | |
| Year / Semester | 1st (Fall) | | | | |
| Teacher's Name | Dr. Alexis Polycarpou, Dr. Christos Themistos | | | | |
| ECTS | 5 | Lectures / week | 3 | Laboratories/week | 1 |
| Course Purpose | The aim of the course is to familiarize students with various concepts and principles of electrical systems. | | | | |
| Learning Outcomes | By the end of the course, students must be able to:<br>1. Identify and explain the meaning of the basic quantities such as resistance, voltage, current, power, and energy.<br>2. Specify the symbol and the units of the basic quantities such as resistance, voltage, current, power, and energy.<br>3. Identify and explain the role of basic electrical system components: Generator, Resistive and Motor Loads, Transmission line, Transformer, Grounding in protection, and Fuses.<br>4. Understand sinusoidal wave parameters such as period, frequency Peak, average and RMS values, and express complex numbers to Cartesian representation using trigonometric functions.<br>5. Evaluate the circuit impedance through analysis of simple series ac circuit analysis, R-L, R-C, and R-L-C circuits.<br>6. Outline the concept of electrical generation principles for operation of Renewable Energy Sources (solar, wind, biomass, tidal wave).<br>7. Use waveforms to describe the transient response of capacitor RC circuits (charging and discharging). | | | | |
| Prerequisites | NONE | Corequisites | None | | |
| Course Content | Course contents:<br>• 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.<br>• Basic electrical quantities and units, resistance, current, voltage, power energy efficiency, charge, Ohms law.<br>• DC circuits resistors in series, voltage divider, parallel resistive circuits, current divider, parallel-series circuits current and voltage calculation, KVL, KCL.<br>• Basic multiplication factor conversions<br>• Sinusoidal wave theory and parameters (period, frequency, Peak, average and RMS values). Express complex voltage and current vectors to | | | | |

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| | Cartesian representation using trigonometric functions.<br>• Resistive Capacitive and inductive AC circuit steady state analysis (RLC series and parallel circuits). Calculation of generated current and power dissipated.<br>• Renewable energy sources, description of the electrical generation and operation of each one.<br>• Capacitor transient response, charging and discharging theory and graphs, voltage dependency, Describe the operation cycle of DC batteries.<br>• **Laboratory work:** Individual and small group experiments performed with the use of Electronic boards, components, measuring instruments and simulation packages. Experiments include the design, construction on breadboards and analysis of the circuits and devices taught in theory. Testing is performed using signal measuring equipment such as digital meters and oscilloscopes. The performance of the designed circuits is also simulated and the results are evaluated and compared with the experimental analysis. |
| Teaching Methodology | 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.<br>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. Laboratory experiments are carried out in small groups and lab reports are required two weeks after the laboratory class resulting in a cumulative mark.<br>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.<br>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. |
| Bibliography | **Textbooks:**<br>• Electrical and Electronic Principles and Technology, John Bird , 6th edition, 2017, ISBN 978-1-315-56187-5.<br><br>**References:**<br>• Hambley AR, *Electrical Engineering: Principles & Applications*, Third Edition, Prentice-Hall, 2005.<br>• PPT presentations provided by lecturer. |
| Assessment | The Students are assessed via continuous assessment throughout the duration of the Semester, which forms the Coursework grade and the final written exam. The coursework and the final exam grades are weighted 40% and 60%, respectively, and compose the final grade of the course. An indicative weighted continuous assessment of the course is shown below: |

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| | • Mid-Term written exams 67%<br>• Laboratory Work 33%<br>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 constrains and revision timetable.<br>The final assessment of the students is formative and summative and is assured to comply with the subject's expected learning outcomes and the quality of the course. |
| Language | **English** |