Course Title	Circuits and Electronics I				
Course Code	ECE205				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	2nd Year / 3rd Semester				
Teacher's Name	TBA				
ECTS	6	Lectures / week	3 hours / 14 weeks	Laboratories / week	N/A
Course Purpose and Objectives	This course introduces students to designing and analyzing elementary DC Electric Circuits. The resistor, capacitor and inductor and their behavior in DC / AC circuits is studied. The basic principles and the analysis methods of DC and AC circuits are presented. By the end of the course, students should have the necessary background required for designing analogue filters, studying Electronics.				
Learning Outcomes	Upon successful completion of this course, students should be able to: • Define purpose and role of circuits and electronics in engineering, including key differences between analog and digital circuits, their implementations, and methods of approximating digital behavior with analog systems • Use units of measurement, and describe electric charge and the basic electrical quantities • Use circuit laws related with resistors, inductors and capacitors and describe circuit topologies and use systematic circuit analysis techniques such as mesh/nodal methods. • Analyze and design DC circuits transient circuits containing resistors, capacitors and inductors and apply basic network theorems • Describe the characteristics of sinusoidal AC voltages / currents and the response of basic circuit elements in AC circuits and analyze AC circuits and calculate the various forms of power. • Design and analyze series and parallel resonant circuits and various types of analogue filters				
Prerequisites	MAT150, PHY110	Co-requisites	None		
Course Content	History and Overview: Electronics engineering uses or benefits from electronic devices and circuits. Contributors to circuits and electronics and their achievements to this knowledge area. Key differences between analog and digital systems, their implementations, and methods for				

	approximating digital behaviour with analog systems. What is an electric circuit, basic components, Units of measurements (SI units), Powers of ten, conversions between and within systems of units. Current and Voltage: Atoms and their structure, Current, Voltage, Conductors and Insulators. Resistance: Resistance of circular wires, temperature effects, resistor types, conductance, variable resistors, Ohm's law, power, energy, efficiency. Series circuits, voltage sources in series, Kirchhoff's voltage law, voltage divider, parallel circuits, Kirchhoff's current law, current divider, voltage sources in parallel, open and short circuits, Series parallel networks, ladder networks,. Capacitors: Electric field, capacitance, dielectric strength, leakage current, capacitor types, charging/discharging a capacitor, transient analysis, time constant, capacitors in series and in parallel, energy stored in a capacitor. Inductor: Time constant, inductor in series and in parallel, energy stored in an inductor, resistive-inductive-capacitive networks with DC inputs. Methods of Circuit Analysis and Network Theorems: Overview of analysis methods for DC electric circuits and basic network theorems. Current sources, current sources in parallel, Branch current analysis, Mesh analysis, Nodal analysis, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem. Sine Waves: Sinusoidal AC voltage characteristics and definitions - frequency, period, cycle, amplitude, average and effective value. General format for sinusoidal voltage and current, phase shifting. Basic electric elements in AC circuits: Response of basic resistive, capacitive and inductive circuits to a sinusoidal voltage or current, frequency response of the basic

<table>
<tr><td></td><td>elements, Average power, Apparent power, Reactive power, the power triangle, power factor.

Series and Parallel AC circuits:

Impedance and the phasor diagram, series circuits, voltage divider, frequency response of the R-C circuit, admittance and susceptance, parallel ac networks, current divider rule, frequency response of parallel R-L network, analysis methods for series/parallel ac circuits, equivalent circuits. Mesh/Nodal analysis, bridge networks, superposition theorem, Thevenin’s theorem and Norton’s theorem.

Resonance and Analogue filters:

Series resonance circuits, the quality factor, selectivity, decibels, filters, R-C low/high pass filters, pass band filters, stop band filters, Bode plots.</td></tr>
<tr><td>Teaching Methodology</td><td>Face - to – face</td></tr>
<tr><td>Bibliography</td><td>J.W.Nilsson & S.A.Riedel , Electric Circuits, Prentice Hall

Robert L. Boylestad, Introductory Circuit Analysis, Prentice Hall International

Hubert, Electric Circuits AC/DC, McGraw Hill</td></tr>
<tr><td>Assessment</td><td><table><tr><td>Examinations</td><td>55%</td></tr><tr><td>Assignments/Lab</td><td>35%</td></tr><tr><td>Class Participation and Attendance</td><td>10%</td></tr><tr><td></td><td>100%</td></tr></table></td></tr>
<tr><td>Language</td><td>English</td></tr>
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