Course Title	Power Engineering				
Course Code	ECE320				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	3rd Year / 5th Semester				
Teacher's Name	TBA				
ECTS	6	Lectures / week	3 hours / 14 weeks	Laboratories / week	N/A
Course Purpose and Objectives	The objective of this course is to describe the basic concepts of power devices used in the conversion of mechanical to electrical power and the application of magnetic circuit analysis with respect to energy conversion principles. Students are also presented and exposed to the operation and application of electrical machines (transformers, DC motors, synchronous and asynchronous machines) in power systems and to the use of power electronics in these devices.				
Learning Outcomes	Upon successful completion of this course, students should be able to: • Explain the basic electrical principles that are necessary for power engineering • Analyse magnetic circuits using analytical techniques • Define the various types of electrical machines and their use in electro-mechanical energy conversion • Examine the methods by which electrical energy is converted from one voltage level to another using transformers • Identify the operation and application of electrical machines (synchronous machine, induction motors, DC motors)				
Prerequisites	ECE205	Co-requisites	None		
Course Content	Basics of power engineering: Introduction to power systems. Single and three phase circuits. Real, reactive, apparent power and power factor in AC circuits. Three-phase circuits and configurations (Wye and Delta connections). Magnetics, Electromagnetic Forces, Generated Voltage, and Energy Conversion: Overview of magnetic circuits and interactions with moving charges. Magnetic fields and flux. Ampere's Law and magnetic field intensity. Magnetic circuit approach and analysis. Magnetic circuit with air-gap. Reluctance in magnetic circuits. Introduction to energy conversion principles. Transformers: Types and construction of transformers. Single- and three-phase transformers. Theory of operation. The equivalent circuit of a real transformer. Voltage regulation and efficiency. The auto-transformer.				

	AC machinery: Rotating magnetic field. Induced voltage in AC machines. Torque. Power flow and losses. Synchronous machines: Construction of synchronous machine. Speed of rotation and internal generated voltage of a synchronous generator. Phasor diagram. Power and torque in synchronous generators. Effect of load changes. Equivalent circuit of synchronous motor. Induction motors: Construction of induction motors. Torque. Rotor slip concept. The equivalent circuit of an induction motor. Power and torque in an induction motor. Torque-speed characteristics. DC motors: DC machine principle of operation. Induced voltage and torque. Equivalent circuit. Torque-speed characteristics. Types of DC motors. Power Electronics: Introduction to power electronics and controllers. Basic operation of switching power converters and power conversion and control of converters used for motor drives and direct power converters.
Teaching Methodology	Face- to- face
Bibliography	S.J. Chapman, Electric Machinery and Power System Fundamentals, McGraw Hill, 2002. T. Wildi, Electrical Machines, Drives and Power Systems, 6th Edition, Pearson, 2006. C.I. Hubert, Electric Machines: Theory, Operating Applications, and Controls, 2nd Edition, Prentice Hall, 2002. E. Hughes, J. Hiley, K. Brown and I. Mc-Kenzie-Smith, Electrical and Electronic Technology, 10th Edition, Prentice Hall, 2008.
Assessment	Examinations 70% Assignments/Lab 20% Class Participation and Attendance 10% 100%
Language	English