



## Course Syllabus

<b>Course Code</b>	<b>Course Title</b>	<b>ECTS Credits</b>
ECE-360	Electric Machines	6
<b>Prerequisites</b>	<b>Department</b>	<b>Semester</b>
ECE-102	Engineering	Fall, Spring
<b>Type of Course</b>	<b>Field</b>	<b>Language of Instruction</b>
Required	Engineering	English
<b>Level of Course</b>	<b>Lecturer(s)</b>	<b>Year of Study</b>
1 <sup>st</sup> Cycle	Dr Andreas Michaelides	3 <sup>rd</sup>
<b>Mode of Delivery</b>	<b>Work Placement</b>	<b>Co-requisites</b>
Face-to-face	N/A	None

### Course Objectives:

The main objectives of the course are to:

- Engage in a thorough analysis of major electromechanical principles adapted by various types of electric machines as transformers, motors and generators.
- Study the functional properties of the different types of electric machines to provide the understanding for their specific applications and the knowledge for their operation.
- Support the later by experimental presentations of the machines during the lecture.
- Focus on widely known types of machines, dc motors/generators, AC induction motors with respect to their industrial application.
- Introduce the student to the process of synchronizing a generator with the three phase grid and the process of operating devices of the power system.
- Provide basic knowledge about the control of electric machines through power electronics.

### Learning Outcomes:

After completion of the course students are expected to:

- Comprehend the significance of electrical energy, its creation up to its utilization.
- Assess the elementary machine principle.(change between different energy forms)
- Analyze different electromechanical processes resulting from the magnetic circuit.
- To perform extensive calculations on usual DC machines.
- Differentiate among common armature winding modes of industrial DC machines.

- Assess the functional principle of the Three-Phase and Induction machines.
- State the operational transition from motor to generator and vice versa.
- Classify most frequent types of motors and generators used for domestic and industrial purposes, to assess their functioning and operate them.

**Course Content:**

- Magnetic circuits and magnetic materials
- Transformers
- Electromechanical-energy-conversion principles
- Introduction to rotating machines
- Synchronous generator
- Synchronous motor
- Polyphase induction machines
- Single phase induction motor
- DC machines ,commutation
- Wave winding, Lap winding, Simplex,/Duplex winding
- Variable-reluctance machines
- Stepper motors
- Single-and two-phase motors
- Introduction to power electronics
- Speed and torque control

**Learning Activities and Teaching Methods:**

Lectures, in-class examples and exercises. Presentation of functioning machines in class

**Assessment Methods:**

Homework, semester project, exams, final exam.

**Required Textbooks / Readings:**

<b>Title</b>	<b>Author(s)</b>	<b>Publisher</b>	<b>Year</b>	<b>ISBN</b>
Electric Machinery	A.E.Fitzgerald C.Kingsley Jr. S.D.Umans	McGraw Hill	2003	9780073660097
Electric Machinery Fundamentals	S.J.Chapman	McGraw Hill	2005	9788120325036

**Recommended Textbooks / Readings:**

<b>Title</b>	<b>Author(s)</b>	<b>Publisher</b>	<b>Year</b>	<b>ISBN</b>
Electric Machines: Theory, Operating Applications & Control	C.I.Hubert	Prentice Hall	2001	9780130612106