

# **Birzeit University**

## **Department of Electrical and Computer Engineering**

### **Electric Machine Fundamentals – ENEE 4303**

**Instructor:** Dr. Ali Abdo (Office Masri 119)

**Textbooks:**

- Electric Machinery Fundamentals, By Stephen J. Chapman. 5<sup>th</sup> edition

**Course Description:**

Theory of electromagnetic conversion from electrical to mechanical and inversely. Transformers theory and Applications. Synchronous generator, synchronous motors, Single-phase and Three-phase induction motors (basic operation); DC generators and Motors (basic operation), Stepper motors.

**Objective:**

The course aims to understand the characteristics, construction and operation of AC and DC machines (motors and generators), such as synchronous machines, induction motors and DC motors and generators. The basic theory of transformers and its applications.

**Learning outcomes:**

1. To understand the characteristics, operation and underlying theories of AC and DC machines such as synchronous machines, induction motors and DC motors.
2. Familiarize students with electric machine types and transformers
3. To study the basic electronic devices used in power electronics
4. To provide basic knowledge on the power electronics components and circuits leading to voltage and speed control of AC and DC machines.
5. To provide basic knowledge and theories of ac and dc electric machinery and transformers.

**Course Outline:**

- 1. Introduction to Machinery Principles**
- 2. Transformers**
- 3. AC Machinery Fundamentals**
- 4. Synchronous Generators**
- 5. Synchronous Motors**
- 6. Induction Motors**
- 7. DC Machinery Fundamentals**
- 8. DC Motors and Generators**
- 9. Stepper motors and single phase induction motors.**

**Grading:**

<b>First &amp; Second Exams</b>	<b>45 %</b>
<b>Assignment or Project</b>	<b>15 %</b>
<b>Final Exam</b>	<b>40 %</b>
	-----
	<b>100 %</b>

**References:**

1. An Introduction to Electric Machines and Transformers, George McPherson, Robert D. Laramore
2. Electric Motors and Drives, fundamentals, types and applications, Austin Hughes
3. Dynamic Simulation of Electric Machinery using MATLAB/ SIMULINK, Chee-Mun Ong
4. Electric Drives and Their Controls, Richard M. Crowder