The University of Jordan
School of Engineering
Mechatronics Engineering Department
1st Semester – A.Y. 2020/2021

Course: **Actuators Lab – 0908324 (1 Cr. – RequiredCourse)**

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Course website: https://elearning.ju.edu.jo/course/view.php?id=15081

Catalog description: Single Phase Transformers; DC Motors (shunt, series, differentially compound, cumulatively compound); Three phase induction motors; Synchronous generators..

Prerequisites by course: **MX908323** Electrical Actuators (pre-requisite) (pre- or co-requisite)

Prerequisites by topic:
Students should have assumed to have sufficient knowledge in:
- Magnetic circuits and single-phase transformers.
- Three-phase transformers: construction, connections and groups.
- DC Generators and Motors.
- concept of 3-phase rotating field.
- 3-phase synchronous generators.

Textbook: **Experiment Sheets on the e-learning website https://elearning.ju.edu.jo/course/view.php?id=15079**

References:
1. Electric Machinery Fundamentals by S .J. Chapman, McGraw Hill , 4th Edition , 2005

Schedule: 16 Weeks, 6 Labs (3 hours each) plus exams.

Course goals: This is a practical course of Electrical Machines that is provided by the Department of Electrical Engineering for the Electrical Engineering students. It is designed to achieve the following objectives:
- Provide the student with the basic skills and proficiency of implementing the wiring diagrams required to conduct the testing procedures of transformers, AC and DC generators and motors.
- Provide the student with the basic skills of conducting different testing procedures of the different types of electrical machines.
- Allow the student to benefit from the testing results of the testing procedures to calculate the parameters of the tested machine equivalent circuit.
- Provide the student with the proficiency of constructing the experimental performance characteristics of the different types of machines and correlate practical and theoretical results.

Course learning outcomes (CLO) and relation to ABET student outcomes (SO):

Upon successful completion of this course, a student should:	[SO]
1. Proficiently deal with the measuring instruments usually involved in electrical machines testing procedures such as voltmeters, ammeters, ohmmeters, wattmeters, power factor meters, torque and speed meters	**[6]**
2. Improve report writing skills	**[3]**
3. Understand and construct the wiring diagram of the different testing procedures of power transformers and electric generators and motors	**[1, 6]**
4. Perform the different test procedures of the different types of electrical machines safely	**[5, 6]**
5. Use the testing data to calculate the equivalent circuit parameters of the tested machines.	**[6]**
6. Construct and understand the different performance characteristics of electrical machines.	**[1, 6]**
7. Correlate practical and theoretical results of the testing machines	**[1, 5, 6]**

Course topics:

	Hrs
1. **Single-Phase Transformers**: DC test, No-load test and Short-circuit test, Equivalent circuit parameters evaluation, Voltage regulation and efficiency curves.	**6**
2. **DC Motors:** Starting of DC Motors, Torque-Speed Characteristics of Separately-excited & Shunt DC Motors, Speed control of DC Motors by Armature Voltage Control	**9**
3. **Three-Phase Induction (Asynchronous) Motors:** Starting of 3-phase induction motors, DC test, No-load test & Blocked-rotor test, Equivalent circuit parameters evaluation, Torque-Speed characteristics of 3-phase induction motors, Speed control of 3-phase induction motors	**6**
4. **Synchronous Generators**: DC test, Open-circuit test & short-circuit tests, Equivalent circuit parameters evaluation, Load test and load characteristics, Voltage regulation of Synchronous Generators.	**3**

Ground rules:

Attendance is required and highly encouraged. To that end, attendance will be taken every lecture. All exams (including the final exam) should be considered cumulative.
Exams are closed book. No scratch paper is allowed. You will be held responsible for all reading material assigned, even if it is not explicitly covered in lecture notes.

Assessment & grading policy:

Assignments	0%	Quizzes	10%
First Exam	0%	Projects	0%
Midterm	30%	Reports	20%
Final Exam	40%	Presentation	0%
		Total	**100%**

Last Revised: November 2, 2019