



**The Hashemite University**  
**Faculty of Engineering**  
**Course Syllabus**  
**Department of Mechanical Engineering**

|                                                                          |                                      |                             |                      |
|--------------------------------------------------------------------------|--------------------------------------|-----------------------------|----------------------|
| <b>Course Title:</b>                                                     | <b>Electromech. Systems (3,0, 0)</b> | <b>Course Number:</b>       | 110402542            |
| <b>Designation:</b>                                                      | Compulsory                           | <b>Prerequisite(s):</b>     | 110402440, 110406229 |
| <b>Instructor:</b>                                                       | Dr. Rami Al-Jarrah                   | <b>Instructor's e-mail:</b> |                      |
| <b>LECTURE TIME AND LOCATION : ONLINE LECTURES USING MICROSOFT TEAMS</b> |                                      |                             |                      |

**Course Description (catalog):** This course is to discuss some of the concepts of Electro-Mechanical system as well as its real applications. In addition, this course will introduce an introduction of how both the computer hardware and electromechanical systems will control the external devices.

**Textbook(s) and/or Other Supplementary Materials:**

- Introduction to Mechatronics and Measurement Systems, David G. Alciatore and Michael B. Hstand, 4th Edition.

**References:**

- Electromechanical Systems and Devices, Sergey Edward Lyshevski, CRC Press, ISBN: 1420069721, 2008.

**Goals:** The main goals which the students shall achieve during this course are:

- 1- An ability to apply the knowledge, skills, and modern tools of the discipline to narrowly defined engineering technology activities.
- 2- An ability to apply knowledge of technology to engineering problems that require limited application of principles but extensive practical knowledge.
- 3- An ability to conduct standard tests and measurements, and to conduct, analyze, and interpret experiments.
- 4- An ability to identify, analyze, and solve narrowly defined engineering technology problems.

**Attendance:** Like all engineering courses attendance is very important in this course. Especially, the course is considered as a very basic science course in the mechanical engineering curriculum. Therefore, students must try to attend all lectures and those who are absent 6 lectures and more during the semester will not be admitted to the final exam, and will fail the course.

**Major Topics Covered:**

| Topic                                             | No. of Weeks | Contact hours* |
|---------------------------------------------------|--------------|----------------|
| Introduction to Electro-Mechanical Systems.       | 1            | 3              |
| Electric motors and DC motor drive circuits       | 2            | 6              |
| DC motor speed control and PWM                    | 2            | 6              |
| Analog and digital circuits and their application | 1            | 3              |
| Sensors and sensing devices                       | 2            | 6              |
| Introduction to Embedded system                   | 1            | 3              |
| Microcontroller and microprocessor                | 1            | 3              |
| Electromechanical real applications               | 2            | 6              |
| Project hour                                      | 1            | 3              |
| Project demonstration and presentation            | 2            | 6              |
| <b>Total</b>                                      | <b>15</b>    | <b>45</b>      |

\*Contact hours include lectures, quizzes and exams

**Specific Outcomes of Instruction (Course Learning Outcomes):**

After completing the course, the student will be able to:

1. Demonstrate knowledge, techniques, and skills in the design and development of an electromechanical system and modern technology in this area.(a,j)
2. Demonstrate knowledge in selecting mechanical, electrical, and computer software components and materials for develop an electromechanical system.(a,c)
3. Select the best computer software and hardware tools to integrate the components for developing an electromechanical system. (k)
4. Utilize mathematics and science in support of electromechanical system design. (a, e)
5. Function as a team member or and to communicate effectively in a project either orally or in writing. (i).

**Student Outcomes (SO) Addressed by the Course:**

| #                                           | Outcome Description                                                                                                                                                                                                           | Contribution |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>General Engineering Student Outcomes</b> |                                                                                                                                                                                                                               |              |
| (a)                                         | an ability to apply knowledge of mathematics, science, and engineering                                                                                                                                                        | H            |
| (b)                                         | an ability to design and conduct experiments, as well as to analyze and interpret data                                                                                                                                        |              |
| (c)                                         | an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability | M            |
| (d)                                         | an ability to function on multidisciplinary teams                                                                                                                                                                             |              |
| (e)                                         | an ability to identify, formulate, and solve engineering problems                                                                                                                                                             | H            |
| (f)                                         | an understanding of professional and ethical responsibility                                                                                                                                                                   |              |
| (g)                                         | an ability to communicate effectively                                                                                                                                                                                         |              |
| (h)                                         | the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context                                                                                    |              |
| (i)                                         | a recognition of the need for, and an ability to engage in life-long learning                                                                                                                                                 | L            |
| (j)                                         | a knowledge of contemporary issues                                                                                                                                                                                            | L            |
| (k)                                         | an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.                                                                                                                    |              |
| <b>H=High, M= Medium, L=Low</b>             |                                                                                                                                                                                                                               |              |

**Grading Plan:**

|          |              |
|----------|--------------|
| Mid Exam | 30 Points    |
| Others   | 20-30 Points |

|            |              |
|------------|--------------|
| Final exam | 40-50 Points |
|------------|--------------|

**Prepared by:** Dr. Rami Al-Jarrah

**Date:** 1<sup>st</sup> October 2020