Course Title and Number
Mechatronics System Design, 0908531

Lecturer
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Course Website
http://eacademic.ju.edu.jo/l.sharif/Material/Forms/AllItems.aspx
The course website will contain the following:
- Any important announcements (e.g., exam dates…)
- Handout materials
- Exercises and problems (and solutions where possible)
- Home-works (and solutions where possible)
- Quizes and exams (where possible)
- Extra reading material.
- Assignments submitted by students

Attendance
Absence of more than 7 hours (seven one hour lectures or five one and half hour lectures) will result in the expulsion of the student from the course. This will be applied very strictly.

Course Outline
The course provides the student with general overview of mechatronic systems, their main components and the approach to the design process. An important aim of the course is to allow the student to integrate his/her knowledge of measurement systems, control, electronics, programming and mechanics into designing comprehensive mechatronic systems.

The practical assignments and the project work prepare the student for the final year graduation project, by enhancing planning and team work skills as well as practical project work and the building of prototypes.

Course Objectives
By the end of the course, the student will achieve the following objectives:

1. You know how to identify whether system dynamics is important in a Mechatronics system and to use Simulink to understand them (c, k)
2. You can list the types of user requirements specifications (URS) in mechatronic systems (c, h)
3. You can explain the principle of operation of the stepper-motor and the servo-motor (j)
4. You have improved your presentation skills, report writing skills, teamwork skills and problem solving skills due to the work on the project in this course (g, d, e)
5. You know how to design a mechatronic system (c)
6. You know how to select suitable types of physical controllers, control algorithms and actuators for mechatronic systems (a)
7. You can explain the principles of operation of incremental and absolute shaft encoders and their areas of application (j)

Course contents
1. Introduction to Mechatronic Systems.
2. User requirements specification (URS).
3. The four questions that a Mechatronics system design must consider.
4. Accuracy, precision and resolution.
5. System Dynamics.
6. Types of motors (servomotor; stepper motor; squirrel cage induction motor; permanent magnet synchronous motor; DC motor).
7. Motor sizing and selection: Geared hoisting systems; AC motor selection example from lifts; stepper motor sizing selection example from a production line.
8. Speed and position feedback: Grey code absolute shaft encoders; rotary and linear.

Practicals and Project
There will be a number of practical experiments (between 5 to 10) which the students are asked to carry out during the lab. This will be followed by a main project that ends with a report and a presentation. The project team have to present a working model in the case of practical projects.

Main textbook
Videos on my You Tube playlist (Mechatronics System Design). Notes and slides on the my JU webspace.

Supporting textbooks

Course Marking
Midterm Exam: 30% (covers the theory)
Lab course work, (project, reports, quizzes...): 20%
Final Exam: theory 35%; lab final presentation 15%, total: 50%