



Philadelphia University
Faculty of Engineering
Department of Mechatronics Engineering

Second Semester, 2013/2014

Course Syllabus

Course Title: Special Topics in Mechatronics	Course code: 0640593
Course Level: 5 th Year	Course prerequisite(s): NA
Lecture Time: 13:00-14:15 Sun, Tue and Thu	Credit hours: 3
Office Hours: Variable	

Academic Staff Specifics

Name	Rank	Office No.	E-mail Address
Dr. Mohammad Bni Younis Dr. Tarek Tutunji Dr. Mohammad Al-Shabi	Assistant Prof. Associate Prof. Assistant Prof.	---	mbaniyounis@philadelphia.edu.jo ttutunji@philadelphia.edu.jo mshabi@philadelphia.edu.jo

Course module description:

The course includes the following:

- Kinetic and kinematic of Rigid Body.
- Mechanical Vibration: Free and Forced.
- Automatic control principles: Time and frequency response, and root locus analysis.
- Programming using Matlab.
- Process modeling and structure analysis.

Course module objectives:

At completing this module the student should be able to:

- Understand the basics of Dynamics, vibration, control, and process modeling.
- The ability of fully construct a control system and modeling it by matlab.
- The ability of using Matlab and Simulink.

Course/ module components:

- **Books (title , author (s), publisher, year of publication):**
 - “Mechatronics: An Integrated Approach” – Clarence W. De Silva, 1st edition, 2004.
 - “Engineering Mechanics: Dynamics” - Hibbeler, 13th Edition, 2012.
 - “Control Sustrms Engineering”, Norman Nise, 2010.
- **Support material (s) (vcs, acs, etc).**
- **Study guide (s) (if applicable)**
- **Homework and laboratory guide (s) if (applicable).**

Teaching methods:

Lectures, discussion groups, tutorials, problem solving, etc.

Learning outcomes:

- Knowledge and understanding: Understanding the principles of kinetic and kinematic of a rigid body performance. analysis of the deformation under various type of loads. Understanding the materials behavior due to its structures.
- Cognitive skills (thinking and analysis): Applying different control approaches to achieve a targeted performance.
- Communication skills (personal and academic).
- Practical and subject specific skills (Transferable Skills): Learning Matlab, Simulink and Toolboxes.

Assessment instruments

- **Project.** Using the Matlab Toolboxes and Simulink to simulate a system and different type of controllers.
- **Final examination:** 40 marks

Allocation of Marks	
Assessment Instruments	Mark
1 st examination	20%
2 nd examination	20%
Project	20%
Final Examination:	40%
Total	100%

Documentation and academic honesty

- Documentation style (with illustrative examples)
- Protection by copyright
- Avoiding plagiarism.
- **Ethics and Disability Act:**
 - Students may consult with one another on solutions, but copying another student's code is strictly prohibited.
 - Students should write their own code. Using code found on books or internet is prohibited.
 - The Instructor follows general university “Academic Dishonesty/Cheating Policy”.

Course/module academic calendar

week	Basic and support material to be covered	Homework
(1)	Introduction	
(2)	Rigid Body: Position and Velocity	
(3)	Rigid Body: Acceleration Vibration	
(4)	Work and Energy	Project Phase I
(5)	Time response Stability, PID control	
(6)	Root Locus	
(7)	Bode Plot	Project Phase II
(8)		
(9)	MatLab and Simulink with applications to control of mechatronics systems	
(10)		Project Phase III
(11)	Process models	
(12)	System specification (structured, behavior, data, and object oriented)	
(13)	Petri nets, Structured Analysis	
(14)	Unified modeling language (introduction)	Project submit
(15)	Case Study	

Expected workload:

On average students need to spend 2 hours of study and preparation for each 50-minute lecture/tutorial.

Attendance policy:

Absence from lectures and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

The student is responsible for all assignments on a weekly basis.

No make-up will be given for missed quizzes, tests or assignments, unless a case is made in advance with Instructor's approval.