Philadelphia University
Faculty of Engineering
Mechanical Engineering Department
First Semester, 2010/2011

Course Syllabus

Course Title Automatic control	**Course code: (620452)**
Course Level: 4	**Credit hours:3**

Course module description:

Analysis and synthesis of automatic control systems. Transfer functions. Root locus, Nyquist and Bode techniques. Introduction to state space formulation.

Course module objectives:

The objective of this course is to apply knowledge of mathematics and engineering to analyze and design a control system to meet desired specifications. Students should learn to analytically determine a control system's functionality and select appropriate tests to demonstrate system's performance and finally design a control system to meet a set of requirements. Develop an understanding of the elements of classical control theory as applied to the control of aircraft and spacecraft. In particular understand: the concept of feedback and its properties; the concept of stability and stability margins; and the different tools that can be used to analyze the previous properties. Finally gain a working knowledge of the basic linear design techniques.

Course/ module components

- **Books (title , author (s), publisher, year of publication)**
- **Control System Engineering, Norman S. Nice, Fifth Edition ,John Wiley &Sons**

Support material (s) (vcs, acs, etc).

- Modern Control Engineering by Katsuhiko Ogata, 4th Edition, Prentice Hall, 2002.
- **Study guide :**
- **Homework and laboratory guide (s) if (applicable).**

Teaching methods:
Lectures, tutorials, and problem solving,

Learning outcomes:

- Knowledge and understanding
  - An ability to apply knowledge of mathematics, science and engineering.
  - An ability to perform laboratory work and report on its outcome.

    - An ability to use the analysis and design tools of classical linear control in simplified homework problems, and in more realistic laboratory problems.
    - An ability to use modern computer tools such as MatLab and web-based tutoring tools.
- Communication skills (personal and academic).
  To help the student develop critical thinking and Problem-solving.
- Practical and subject specific skills (Transferable Skills).

Assessment instruments

- Quizzes.
- Home works
- Final examination: 50 marks

Allocation of Marks	
Assessment Instruments	**Mark**
Firist examination	**20**
Second examination	**20**
Final examination: 50 marks	**50**
Reports, research projects, Quizzes, Home works, Projects	**10**
Total	**1000**

Documentation and academic honesty

- Documentation style (with illustrative examples)
  Use the following style of references
  Caps R, Heinemann U, Ehrmanntraut M, Fricke J. Evacuated insulation panels filled with pyrogenic silica powders: properties and applications. High Temp-High Press 2001; 33:151–6.

- Protection by copyright

- Avoiding plagiarism.

Course/module academic calendar

week	Basic and support material to be covered	Homework/reports and their due dates
(1)	Basic control system concepts	
(2)	Transfer functions of physical systems	
(3)	Transfer functions of physical systems	
(4)	Transient response	
(5)	Transient response	
(6) **First examination**	Equivalent systems	
(7)	Equivalent systems	
(8)	Transient response stability	
(9)	Forced response errors	
(10)	Forced response errors	
(11)	Root locus method	
12 **Second examination**	Root locus method	
(13)	Design using the root locus method	
(14)	Frequency response	
(15)	Design using the frequency response	
(16) **Final Examination**		

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.

Module references

Books

- Feedback Control of Dynamic Systems by Gene F. Franklin, J. David Powell and Abbas Emami-Naeini, 4th Edition, Prentice Hall, 2002.
- Modern Control Engineering by Katsuhiko Ogata, 4th Edition, Prentice Hall, 2002.

Journals

Websites