Zewail City of Science and Technology

Course Title:	System Modeling and Linear Systems
Course Code:	SPC 318
Department offering the course:	Space and Communication
Program Coordinator	Prof. Mohamed TAWFIK

1) Basic Information:

❖ Course Coordinator name: Prof. Mohamed TAWFIK

❖ Course Coordinator Email: mtawfik@zewailcity.edu.eg

❖ Instructors of the course :

Name of prof.	Email	Mobile number
~~Dr. Haitham ELSHIMY~~	helshimy@zewailcity.edu.eg	~~+201000-398-222~~

Name of instructor or TA	Email	Mobile number
Eng. Ahmed ELSADEK	aelsadek@zewailcity.edu.eg	+201117-143-870

❖ **Course meeting time & Location:**

		Number / week	Day	Time	Location
Contact hours	**lectures**	**2h**	Thursday	08:20-10:30	ZC2 154
	tutorial	2h	Sunday	15:20-17:30	ZC2 144
	Labs				
Office hours /clinic		**2h**	Thursday	After class	Adjunct Professors Room

❖ **Materials Used:**

Materials	Name of the book	ISBN
Text Books	* Modern Control Engineering, 5/E Katsuhiko Ogata * Modern Control Systems, 12/E Richard C. Dorf and Robert H. Bishop	* ISBN 10: 0-13-615673-8 ISBN 13: 978-0-13-615673-4 * ISBN-13: 978-0136024583 ISBN-10: 0136024580

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2) Syllabus:

- ### Course Description:

System modeling and Control are integral parts of all aerospace applications, from aircraft and spacecraft to robots and process control systems. Learning how to linearize and construct mathematical models for dynamical systems will help you qualitatively and quantitatively evaluate the behavior of the proposed system, and optimize system performance.

- ### Course goals:

The course aimed to:

1- Introduce the design of feedback control systems.

2- Introduce fundamentals of feedback systems, time-domain and frequency-domain performance measures, stability and degree of stability, the Root locus method, Nyquist criterion, frequency domain design and analysis.

3- Develop know how knowledge in designing control systems.

4- Using MATLAB in designing control systems.

- ### Course Objectives:

By the end of this course students will be able to :

1- Construct mathematical models for linear time-invariant (LTI) dynamical systems in dual domains: in the time domain using ordinary differential equations and in the Frequency domain (Laplace or s-domain).

2- Simplify mathematical models of LTI systems though linearization techniques and block diagram reduction and manipulation.

3- Evaluate the behavior of LTI systems qualitatively and quantitatively, both in the transient and steady-state regimes.

4- Use root-locus and frequency response techniques to improve system performance.

- ### Sequence of Learning Activities:

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Week	Syllabi topic	No. of hours	Activities*
1	Introduction to Control Engineering. System Modeling		
2	Modeling of Mechanical and Electrical Systems		Homework 1
3	Modeling of Fluid Systems and Thermal Systems.		Homework 2
4	Time Domain Analysis.		
5	Midterm 01		
6	Transient & Steady State Response.		Homework 3
7	Closed Loop Control Systems Block Diagram Reduction & Manipulation		
8-9	Classical Control Sys. Design in S-domain Stability Analysis		Homework 4
10	Midterm 02		
11-12	Root Locus Analysis And Design		Homework 5
13-14	Classical Control Sys. Design in Frequency Domain		

*Activities includes labs, projects, workshops, ..etc.

- **Assignments**

Assignment	Submission deadline
Homework 1 due	Week 3
Homework 2 due	Week 4
Homework 3 due	Week 7
Homework 4 due	Week 9
Homework 5 due	Week 12
Project	To Be Announced

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- **Exam Dates:**

Exam	Date	Number of students
First midterm	**Week 05**	
Second midterm	**Week 10**	
Final	**To Be Announce**	

- **Weighting of assessments**

Assessment Type	Percentage
Attendance & Participation	5%
Assignments	12%
Midterms	30% (2 X 15%)
Papers	
Project	23%(Incl. 2x4% follow up reports)
Final Exam	30%
Other types of Assessment	
Total	100%

3) Absence Policy

- Attendance in all academic activities is mandatory
- Students who are absent more than 25% of the time in any course should not be permitted to attend the final examination and should receive a W grade.
- Students are permitted to miss up to three lectures or tutorials without a valid excuse.
- Students who miss more than 3 lectures or tutorials must have points deducted from their attendance grade (5% of the course grade).
- Students are allowed to make up one lab absence with an approved petition.
- No makeup exams should be offered for missed exams.
- Late work policy due to absence are left to the course coordinator who may refuse to accept late work, accept it with a deduction or accept it at full grade with a valid excuse.

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4) Academic Integrity Policy:

Students are required to refrain from any and all forms of dishonorable or unethical conduct related to their academic work including:

- **Plagiarism**

Submitting material that is in part or whole is not entirely one's own work without properly citing sources. Plagiarism includes, but is not limited to:

1) Submitting a copied piece of writing as original work
2) The quotation or other use of another person's words, ideas, opinions, thoughts, or theories (even if paraphrased into one's own words) without acknowledgment of the source
3) The quotation or other use of facts, statistics, or other data or materials (including images) that are not clearly common knowledge without acknowledgment of the source

- **Fabrication**

Falsifying or inventing any information, data, or citation; presenting data that were not gathered in accordance with standard guidelines defining the appropriate methods for collecting or generating data and failing to include an accurate account of the method by which the data were gathered or collected including the incorrect documentation of a source;

1) The citation, in a bibliography or other list of references, of sources that were not used to prepare the academic work;
2) The inclusion in an academic work of falsified, invented, or fictitious data or information, or the deliberate and knowing concealment or distortion of the true nature, origin, or function of such data or information
3) The unauthorized submission of an academic work prepared totally or in part by another

- **Cheating**

Cheating is defined as fraud, deceit, or dishonesty in an academic assignment, or using or attempting to use materials, or assisting others in using materials that are prohibited or inappropriate in the context of the academic assignment in question,