Birzeit University-Faculty of Engineering and Technology Electrical and Computer Engineering Department ENEE4302- Control systems I.
Dr. Hakam Shehadeh Course Outline 2021-2022

Textbook: Control System Engineering, Norman S. Nise, 7th edition, Wiley

Specific course information

Description: An introduction to linear systems control, analysis and design.
Prerequisites: ENEE2302: Signals and Systems & ENEE2305: Network Analysis 2

Course Objectives

The objectives of this course are:

To expose students to some important issues in the analysis and design of control systems.

To use Software packages in the analysis and design of control systems.

Specific goals for the course

Upon the successful completion of this course a student should understand:

- To understand the system modeling concepts and the classification of dynamical systems (Linear, Time Invariant, etc.)
- To understand the difference between open and closed loop control systems
- To understand the difference between the different control systems implementations
- To be able to analyze the system representation in time, frequency and Laplace domain
- To be able to manage block diagrams and signal flow graphs.
- To be able to analyze control systems stability using the root locus technique
- To be able to understand the technical specifications of control systems in transient and steady state phases for various types of test signals' responses
- To be able to analyze control systems based on frequency response Bode, Polar, and Nyquist plots
- To be able to design adequate controllers to meet desired specifications using root locus and frequency response.
- To be able to use Matlab to model, analyze, and simulate the behavior of SISO LTI dynamical systems
- To have the chance to work with others on Team Assignments

(ABET) Relationship of course to Computer Engineering Program Student Outcomes:

- (a) Ability to apply mathematics, science and engineering principles.
- (c) Ability to design a system, component, or process to meet desired needs.
- (k) Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice 2
- Brief list of topics to be covered
- Basic concepts and definitions in control theory
- Mathematical modeling of systems

- Feedback control systems characteristics
- Performance of linear feedback control systems
- Stability of linear feedback control systems
- The root locus method
- The frequency response method
- Stability in the frequency domain
- The design of feedback control systems

Exams and Grades

Midterm Exam	30%
Matlab Project	15%
Quizzes	10%
Final Exam	40%

Simulation Assignments

Simulation assignments are required in this course. This will be giving students the opportunity to learn how to use this program to analyze and design control systems.

Attendance

All the students are required to attend the online classes. Any student who exceeds the absence limit set by the university will not be allowed to continue in the course.

Office and email address

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References

[1] Katsuhiko Ogata, "Modern Control Engineering", Prentice –Hall International, Third Edition, 1997.

[2] R. C. Dorf and R. H. Bishop, "Modern Control Systems", Prentice Hall, Tenth Edition, 2005.

[3] C. L. Phillips and H. T. Nagle, "Digital Control System Analysis and Design", Third Edition, Prentice Hall International, 1995.