Course number: 04084151 (04024161)
Course name: Automatic Control Systems (Control Systems)
Prerequisites by course: Systems and Signals (04024161)
Prerequisites by topic: Students are assumed to have had sufficient background of the following topics: Calculus and Ordinary Differential Equations (ODEs)
Credit hours: 3 hours
Contact hours: 3 hours
Textbook: [*Modern Control Systems*], [R.C. Dorf and R.H. Bishop], [2017]

1. References: Joseph J. and Allen R., *Feedback and Control Systems*, 2nd edition, Prentice-Hall, 2002.
2. N.S. Nise, *Control Systems Engineering*, 8th edition, Wiley, 2003.
3. K. Ogata, *Modern Control Engineering*, 4th edition, Prentice-Hall, 2002.

Course website: -----
Schedule and duration: 16 weeks, 48 lectures, 50 minutes each (including exams).
Minimum student material: Textbook, class handouts, some instructor keynotes, calculator and access to a personal computer and internet.
Minimum college facilities: Classroom with whiteboard and projection display facilities, library, and computational facilities.
Course objectives: The objectives of this course are:

1.	Understand the behavior of open and closed loop systems.
2.	Learn to apply the fundamental laws for linear system analysis.
3.	Learn to model and simplify linear systems.
4.	Introduce the analysis of complete system responses in first-order, second order and higher order linear systems.
5.	To study system stability by applying RH, RL, and frequency-domain methods.

Course outcomes and relation to ABET student outcomes: (matrix)
Upon successful completion of the course, a student should be able to:

Course Outcomes	Student Outcomes						
	SO 1	SO 2	SO 3	SO 4	SO 5	SO 6	SO 7
Apply appropriate physical laws to obtain lumped-parameter models of physical systems.	*						
Represent a linear time invariant dynamic system using ordinary differential equations, transfer functions, frequency response, and state-space methods.	*						
Test stability of feedback control systems using R-H, Root Locus, and frequency response methods.	*	*					
Analyze and design feedback control systems using R-H, Root Locus, and frequency response methods.	*						

Course topics:

1. Basic Concepts in Automatic Control Systems
2. Mathematical Reviews: ODEs and Transforms

3. Modeling of Linear Electrical and Mechanical Dynamic Systems
4. Block Diagram and Flow Graph Reduction Rules
5. Time and Laplace Domains System Response
6. Ruth-Hurwitz for Stability Analysis and Design
7. PID Control Design
8. Frequency Domain Control Analysis and Design

Computer usage:
Attendance: Class attendance will be taken every class and the university's policies will be enforced in this regard.
Assessments: Exams
Grading policy:

Participation	5%
Quizzes	15%
Midterm Exam	30%
Final Exam	50%

Instructors: Dr. Osama Fares email: osama.fares@iu.edu.jo
Class time and location: Sunday, Tuesday, and Thursday: 12:00 – 12:50 pm
Student Outcomes (SOs)

1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3	An ability to communicate effectively with a range of audiences
4	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies