SYE3018: CONTROL SYSTEMS

Effective Term
Semester A 2024/25

Part I Course Overview

Course Title
Control Systems

Subject Code
SYE - Systems Engineering
Course Number
3018

Academic Unit
Systems Engineering (SYE)

College/School
College of Engineering (EG)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
MA1200/MA1300

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract
This is an introductory undergraduate course in control systems for engineering students. In this course, the students will learn classical techniques for control system analysis and design for continuous time dynamical systems. They include

fundamentals of classical control theory combined with simulation based control experiments. This course will provide students with a solid foundation in dynamic systems, and assist students in discovering feedback control system theory and practice.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe and formulate mathematical representation of dynamic systems		x		
2	Analyze the performance of feedback dynamic systems			x	
3	Analyze the stability of the feedback control systems			x	
4	Analyze and design of control systems using root-locus method			x	
5	Analyze and design of control systems using frequency response methods			x	
6	Design and apply PID controller			x	

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	lecture	explain theory and tutorial exercise	1, 2, 3, 4, 5, 6	3 hours/week

Additional Information for LTAs

Lecture - Students will engage in formal lectures to gain knowledge about control systems;

Tutorial - Students will engage in simulation activities to better understand control knowledge and apply them in applications.

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	assignments	1, 2, 3, 4, 5, 6	20	2 - 3 assignments report to be submitted for assessment
2	test	1, 2, 3, 4	20	mid-term test

Continuous Assessment (%)

40

Examination (%)

60

Examination Duration (Hours)

2

Additional Information for ATs

For a student to pass the course, at least 30% of the maximum mark for the examination should be obtained.

Assessment Rubrics (AR)

Assessment Task

1. test

Criterion

basic understanding and use of classical control theory

Excellent (A+, A, A-)

Excellent capacity to analyse and synthesize; superior grasp of the classical control theory and methods.

Good (B+, B, B-)

Evidence of grasp of subject topics, and some evidence of critical capacity and analytic ability in control systems; reasonable understanding of essential control issues.

Fair (C+, C, C-)

Evidence of understanding of the main control topics; ability to develop solutions to simple problems in the classical control.

Marginal (D)

Marginal familiarity with the subject matter in the classical control to enable the student to progress without repeating the course.
course

Failure (F)

Little evidence of familiarity with the essential control methods; weakness in critical and analytic skills in using control methods.

Assessment Task

2. Assignment

Criterion

Basic understanding of control theory and apply it to solve problems.

Excellent (A+, A, A-)

Excellent capacity to analyse and synthesize; superior grasp of the classical control theory and methods.

Good (B+, B, B-)

Evidence of grasp of subject topics, and some evidence of critical capacity and analytic ability in control systems; reasonable understanding of essential control issues.

Fair (C+, C, C-)

Evidence of understanding of the main control topics; ability to develop solutions to simple problems in the classical control.

Marginal (D)

Marginal familiarity with the subject matter in the classical control to enable the student to progress without repeating the course.

Failure (F)

Little evidence of familiarity with the essential control methods; weakness in critical and analytic skills in using control methods.

Assessment Task

3. Examination

Criterion

Deep understanding and use of the classical control theory

Excellent (A+, A, A-)

Excellent capacity to analyse and synthesize; superior grasp of the classical control theory and methods.

Good (B+, B, B-)

Evidence of grasp of subject topics, and some evidence of critical capacity and analytic ability in control systems; reasonable understanding of essential control issues.

Fair (C+, C, C-)

Evidence of understanding of the main control topics; ability to develop solutions to simple problems in the classical control.

Marginal (D)

Marginal familiarity with the subject matter in the classical control to enable the student to progress without repeating the course.

Failure (F)

Little evidence of familiarity with the essential control methods; weakness in critical and analytic skills in using control methods.

Part III Other Information

Keyword Syllabus

time domain and frequency domain representation of control systems, control system characteristics, performance and stability of control systems, root-locus method, frequency response method, PID control,

Reading List

Compulsory Readings

	Title
1	Modern Control Systems, Richard C. Dorf, 13th Edition, Pearson Education

Additional Readings

	Title
1	Nil