Syrian Arab Republic

Higher Institute for Applied Sciences and Technology

Course Specification Document

Title	Analog Control

Credits	3.5 ECTS

Aims	This course aims to provide the student with knowledge and skills related to modeling linear continuous-time single-input single-output systems. This includes studying their behavior and control, with the aim of making the system follow a reference input with a desired behavior.

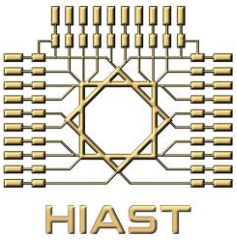
Intended learning outcomes

On successful completion of this course, the student will be able to:

- Understand the modeling of linear systems by a transfer function and link it to time response characteristics.
- Recognize the temporal and frequency approaches in modeling linear systems.
- Understand the closed-loop control strategy and its characteristics.
- Know the types of controllers and their design methods.
- Apply theoretical concepts in the field of specialization to industrial practices.
- Implement mathematical models using computers.
- Design and implement controllers to obtain a specific response.
- Use mathematical and physical methods in analyzing and modeling linear systems.

Syllabus

- **General introduction:** Open loop systems, closed loop systems, types of automatic control systems.
- **Linear system modeling**: A reminder of Laplace transform, transfer function, block diagrams, signal graphs.
- **Closed-loop control system characteristics:** Parameter sensitivity, disturbance rejection, noise attenuation, steady state error, transient response, performance indicators, simplification of higher-order systems.
- **Time response:** Standard test signals, time response of first-order system, time response of second-order system.
- **Stability:** The principle of stability, the Routh-Hurwitz criterion, the effect of pole placement in the complex plane on the system's performance.



- **Methods of designing correctors in the time domain:** PID controllers, Ziegler-Nichols, loop shaping, pole placement.
- **Frequency response characteristics:** Frequency analysis of linear systems using Nyquist and Bode diagrams.
- **Methods of designing correctors in the frequency domain:** Lead/Lag phase controller, loop shaping**.**