Module designation	CE439 Interfacing & Instrumentation
Semester(s) in which the module is taught	4
Person responsible for the module	Dareen Kusuma Halim
Language	English & Indonesian
Relation to curriculum	Compulsory
Teaching methods	Lecture
Workload (incl. contact hours, self-study hours)	Total workload: 136.08 hours - 35.01 hours of synchronous lecture. - 84.06 hours of self-study and assignments in the form of essays. - 17.01 hours related to exam and self study
Credit points	3 SKS (5.04 ECTS)
Required and recommended prerequisites for joining the module	Required: - CE332 Computer Architecture & Organization

	Course Learning outcome	Related ELOs	
		ELO	**Performance Indicator**
Module objectives/intended learning outcomes	Students are able to describe instrumentation systems and its components	G	Understand the concept of electronics, analog systems, and digital systems in designing embedded systems.
	Students are able to describe the working principle of various external devices as inputs and outputs of an instrumentation system		
	Students are able to describe the phenomenon of problems in instrumentation systems		
	Students are able to describe the principle of inter-element communication in an embedded system		
	Students are able to describe the basics of control system		
	Students are able to apply the concept of instrumentation systems and/or control systems for a simple application		

Content	This course teaches principles of instrumentation and interfacing, from the system overall design, signal conversion, sensors, user inputs, control methods, to the system outputs. Inter-devices communication protocols are also discussed. Specifically, this course contain these topics: 1. Introduction to instrumentation systems and interfacing 2. Basics and types of sensors 3. Analog-digital signal conversion 4. Signal conditioning 5. Noise and how to handle it 6. User input and output devices 7. Interfacing of digital devices communication 8. Types and characteristics of actuator devices 9. Basics of control systems 10. Control methods 11. Design of instrumentation systems and/or control systems
Examination forms	Written test
Study and examination requirements	Total score ≥ 55 must be satisfied. The total score is the weighted average of the assignments (30%), the midterm exam (30%), and the final exam (40%).
Reading list	1. Instrumentation and Control System, Third Edition, William Bolton, Elsevier, 2021