Module Description

Module name	Microcontroller
Module level, if applicable	Bachelor of Science
Code, if applicable	23H02132602
Subtitle, if applicable	-
Course, if applicable	-
Semester(s) in which the module is taught	6th
Person responsible for the module	Prof. Dr. Arifin, M.T.
Lecturer	1. Prof. Dr. Arifin, M.T. 2. Prof. Dr. Bualkar Abdullah, M.Eng.Sc.
Language	Indonesian Language
Relation to Curriculum	Undergraduate degree program, elective, 6th semester
Type of teaching, contact hours	Teaching methods: [Focus group discussion], [~~simulation~~], [~~case study~~], [collaborative learning], [~~project-based learning~~], [~~problem-based learning~~]. Teaching forms: [lecture], [~~tutorial~~], [seminar], [~~practicum~~], [~~research~~], [~~internship~~], [~~community service~~] CH: 08.00 - 16.00
Workload	For this course, students are required to meet a minimum of 90.67 hours in one semester, which consist of: - 26.67 hours for lecture, - 32.00 hours for structured assignments, - 32.00 hours for private study.
Credit points	2 credit points (equivalent with 3.4 ECTS)

Requirements according to the examination regulations	Students have participated in at least 80% of the learning activities (Academic Regulations, Chapter VII)
Recommended prerequisites	Physical Electronics 2 and Microprosessor
Module objectives/intended learning outcomes	After completing the course, Students are able: **Intended Learning Outcomes (ILO):** **ILO 1:** Students will have relatively deep understood in classical and basic quantum physics. [ILO 1] – Kn **ILO 2:** Students will be able to use the fundamental principles of physics in modeling and computation to solve the complex physical problem. [ILO 2] – Kn **ILO 3:** Students will be able to use the basic principles of physics in technology application. [ILO 3] – Kn **Course Learning Objective (CLO):** 1. Capable of explaining the concepts and principles of microcontrollers. 2. Capable of understanding the architecture of microcontroller systems and their applications. 3. Capable of creating problem-based programs using microcontrollers. **Sub CLO:** ILO 1 ⇒ CLO-1: Explains the concept of microcontroller and the history of its development from generation to generation. ILO 2 ⇒ CLO-2: Describe the microcontroller architecture. ILO 2 ⇒ CLO-2: Explain the working principle of several types of microcontrollers. ILO 2 ⇒ CLO-2: Explain the features used in the microcontroller. ILO 2 ⇒ CLO-2: Describe the instruction set used in microcontroller systems. ILO 3 ⇒ CLO-2: Explain the program design using a microcontroller. ILO 2 ⇒ CLO-2: Explain the working principle of the arduino platform and the concept of the microcontroller interface with external device (2). ILO 3 ⇒ CLO-3: Able to explain and operate arduino basic programing. ILO 2 ⇒ CLO-2: Able to explain the working principle of seven segmen.

	ILO 2 ⇒ CLO-2: Able to explain the working principle of Liquid Crystal Display and keypad.
Content	Students will learn about: 1. Microcontrollers and their development history 2. Microprocessor, Microcontroller, and Microcomputer 3. Microcontroller Architecture and pins on the microcontroller 4. Registers, ALU, Memory, EEPROM, and I/O Ports 5. AVR Microcontroller and Arduino Platform 6. Arduino and Interfaces 7. Applications of AVR Microcontrollers
Forms of Assessment	Assessment techniques: [~~observation~~], [~~participation~~], [~~performance~~], [written test], [~~oral test~~] Assessment forms: [~~quiz~~], [mid examination], [final examination], [assignment], [~~report~~], [~~presentation~~] Assignment = 40% Mid examination = 30% Final examination = 35% CLO 1 ⇒ ILO 1: Question in Assignment 1 (10%) Mid examination number 1 (5%) Mid examination number 2 (5%) (Assignment: written text and mid examination: written text) CLO 2 ⇒ ILO 2: Question in Assignment 1 (10%) Mid examination number 3 (5%) (Assignment: written text and mid examination: written text) CLO 2 ⇒ ILO 2: Mid examination number 4 (5%) (mid examination: written text) CLO 2 ⇒ ILO 2: Mid examination number 5 (5%) (mid examination: written text) CLO 2 ⇒ ILO 2: Mid examination number 6 (5%) Final examination number 1 (5%) (mid examination: written text and final examination: written text) CLO 2 ⇒ ILO 3: Final examination number 2 (5%) (final examination: written text) CLO 2 ⇒ ILO 2: Question in Assignment 3 (10%) Final examination number 3 (5%) (Assignment: written text and final examination: written text) CLO 3 ⇒ ILO 3: Question in Assignment 4 (10%) Final examination number 4 (5%) (Assignment: written text and final examination: written text) CLO 2 ⇒ ILO 2: Final examination number 5 (5%) (Final examination: written text)

	CLO 2 ⇒ ILO 2: CO-10: Final examination number 6 (5%) (Final examination: written text)
Study and examination requirements and forms of examination	**Study and examination requirements:** - Students must attend 15 minutes before the class starts. - Students must switch off all electronic devices. - Students must inform the lecturer if they will not attend the class due to sickness, etc. - Students must submit all class assignments before the deadline. - Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Media employed	LED, Whiteboard, Learning Management System (SIKOLA)
Reading list	**Main:** 1. John Crisp, Introduction Microprocessors and Microcontrollers (2nd Edition), an imprint of Elsevier, ISBN: 0-7506-5989-0. 2. John Boxall, (2013), Arduino Workshop, Publisher: William Pollock, ISBN-13: 978-1-59327-448-1. **Support:** 1. Michael Margolis, (2011), Arduino Cookbook, Published by O'Reilly Media, Inc., ISBN: 978-0-596-80247-9. 2. Jack Purdum, (2011), Beginning C for Arduino, ISBN-13 (electronic): 978-1-4302- 4777-7.