Module Description

Module name	Instrumentation Based Internet of Things
Module level, if applicable	Bachelor of Science
Code, if applicable	23H02132202
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 [Bahasa Indonesia]
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	Basic Physics 1 and Basic Physics 2
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 **ILO 4:** Students will have capability to operate the physical instrumentation in the laboratory and conduct experiments and interpret the result. [ILO 4] – Ab **Course Learning Objective (CLO):** 1. Mastering the basic principles of introduction, history, and fundamental concepts of the Internet of Things. 2. Mastering the introduction to the architecture of the Internet of Things system and the components forming the Internet of Things. 3. Explaining the Internet of Things communication protocols and the use of sensors in the Internet of Things system. 4. Explaining the applications of the Internet of Things in the fields of health, agriculture, environment, and industry. 5. Analyzing the usage of Basic Arduino Uno Programming and Designing Simple Internet of Things-Based Systems. **Sub CLO:** ILO 1 ⇒ CLO-1: Able to explain the basic concepts and history of Internet of Things development. ILO 2 ⇒ CLO-2: Able to recognize and explain the architecture of the Internet of Things system. ILO 2 ⇒ CLO-2: Able to recognize and explain the tools that make up the Internet of Things.

	ILO 3 ⇒ CLO-3: Able to explain the Internet of Things communication protocol. ILO 3 ⇒ CLO-3: Be able to explain the use of sensors in the Internet of Things system. ILO 3 ⇒ CLO-4: Able to explain Internet of Things Applications in the fields of health, agriculture, environment and industry. ILO 4 ⇒ CLO-5: Able to analyze the use of Arduino Uno Basic Programming. ILO 4 ⇒ CLO-5: Able to analyze simple Internet of Things Based systems.
Content	Students will learn about: 1. Introduction to the Internet of Things 2. Internet of Things System Architecture 3. Internet of Things Forming Devices 4. Internet of Things Communication Protocols 5. Use of Sensors in the Internet of Things System 6. Applications of the Internet of Things in the Healthcare Field 7. Applications of the Internet of Things in Agriculture 8. Applications of the Internet of Things in the Environment 9. Applications of the Internet of Things in the Industry 10. Basic Arduino Uno Programming 11. Designing Simple Internet of Things-Based Systems
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 = 30% CLO 1 ⇒ ILO 1: Mid examination number 1 (5%) (Mid examination: written text) CLO 2 ⇒ ILO 2: Mid examination number 2 (5%) (Mid examination: written text) CLO 3 ⇒ ILO 2: Mid examination number 3 (5%) (Mid examination: written text) CLO 3 ⇒ ILO 3: Question in Assignment 1 (20%); Mid examination number 4 (5%) (Assignment: written text and Mid examination: written text) CLO 3 ⇒ ILO 3: Mid examination number 5 (5%) (Mid examination: written text)

	CLO 4 ⇒ ILO 3: Mid examination number 6 (5%) Question in Assignment 2 (20%) Final examination number 1 (5%) Final examination number 2 (5%) (Assignment: written text; mid examination: written text; and final examination: written text) CLO 5 ⇒ ILO 4: Final examination number 3 (5%) Final examination number 4 (5%) (Final examination: written text) CLO 5 ⇒ ILO 4: Final examination number 5 (5%) 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. Dimitrios Serpanos dan Marilyn Wolf, Internet of Things (IoT) System, Springer 2018. 2. Perry Xiao, Designing Embedded System and the Internet of Things (IoT) with the ARM MBED, John Wiley 2018. **Support:** 1. Adeel Javed, Building Arduino Project for the Internet of Things, Apress 2016. 2. Bam Bahadur Sinha, R. Dhanalakshmi, Recent advancements and challenges of Internet of Things in smart agriculture: A survey, Future Generation Computer Systems: 126 (2022) 169–184, Elsevier, 2022.