Digital System

Module name	Digital System
Module level	Undergraduate
Code	IF221105
Courses (if applicable)	Digital System
Semester	2
Lecturer	Agung Mustika Rizki, S.Kom, M.Kom. (PIC) Andreas Nugroho S, S.Kom, M.Kom. Henni Endah Wahanani, S.T, M.Kom. M. Muharrom A.H, S.Kom., M.Kom
Language	Bahasa Indonesia and English
Relation to curriculum	Undergraduate degree program; compulsory; 2nd semester
Type of teaching, contact hours	Lectures, < 60 students,
Teaching Methods	simulation, case study, cooperative learning, problem-based learning
Workload	1. Lectures: 3 sks x 50 = 150 minutes (2 hours 30 minutes) per week. 2. Exercises and Assignments: 3 x 60 = 180 minutes (3 hours) per week. 3. Private study: 3 x 60 = 180 minutes (3 hours) per week
Credit points	3 credit points (sks)
Requirements according to the examination regulations	A student must have attended at least 80% of the lectures to sit in the exams.
Mandatory prerequisites	Computer Architecture
Courses description	In this course, students learn number systems, describes Boolean function of digital systems and its simplification using some methods, and explains the function and characteristic of digital system components. It also analyses and design digital systems, both combinational and sequential system.
Learning outcomes and their corresponding PLOs	After completing this module, a student is expected to:	
	CO1 Students understand the concept of number systems, methods for simplifying Boolean functions, and logic gates.	PLO3, PLO5
	CO2 Students are able to design both combinational and sequential circuits for solving problems.	PLO3, PLO5
	CO3 Students understand the implementation of both combinational and sequential circuits, including register, counter, and memory	PLO3, PLO5
Content	● Number System: Explanation between analog and digital system. Number systems: binary, octal, decimal, hexadecimal, conversion between number system. Coding: 8-4-2-1, BCD, Excess-3, Gray, dan others. ● Boolean Algebra and simplification of Boolean function: Logic Gate: OR, AND, NOT, XOR, NAND. Truth table, logic function and its implementation using gates. SOP and POS form. Simplification using Boolean algebra & De Morgan theory. Simplification using K-map and Tabulation method.

	- Combinational Circuit: Adder, Subtractor, Decoder, Encoder, Multiplexer, Demultiplexer. Design combinational circuit. - Synchronous Sequential Logic: Basic concept of synchronous sequential circuit, SR Latch. SR, JK, D, and T Flip-Flops, State Diagram, Sequential circuit analysis, design using flip-flops. - Register, Counter and Memory: Register, Register with Parallel Load, Shift Register, Counter, Binary Up-Down Counter, Memory Decoding, memory design, Error Correction, ROM. - Algorithmic Satate Machine (ASM): ASM Chart, ASM Block, Timing Sequence, Circuit design using ASM Chart. - Asynchronous Sequential Logic (ASL): Basic concept of ASL, Transition Table, Flow Table, Race Condition. Example of ASL circuit design, simplification of State and Flow Table..
Media employed	LCD, whiteboard, websites, books (as references), online meeting, etc.
Assessments and Evaluation	One written Midterm assessment (60 minutes) and one final oral exam (30 minutes), two short computer-based quizzes, takehome written assignments
Study and examination requirements and forms of examination	The final grade in the module is composed of: • Two short computer-based quizzes: 15% x 2 = 30% • Take-home written assignments: 15% • Written Midterm assessment: 25% • Final oral exam: 30% Students must have a final grade of 55.6% or higher to pass.
Reading List	S. Mulyati, BUKU AJAR SISTEM DIGITAL UNTUK TEKNIK INFORMATIKA. CV WIDINA MEDIA UTAMA, 2021. Z. Fu, A. Barbara, and P. Scupelli, Digital Futures in Human-Computer Interaction: Design Thinking for Digital Transformation. CRC Press, 2025. A. Elahi, Computer Systems - Digital Design, Fundamentals of Computer Architecture and ARM Assembly Language, 2nd edition. Springer, 2022. V. Taraate, Digital Design Techniques and Exercises: A Practice Book for Digital Logic Design 1st ed. Springer, 2022. F. S. Masoodi, Z. S. Masoodi, K. B. Dar, Digital and technological solutions exploring the foundations of digitization. BPB Publications, 2024. ISBN: 9789355519153. [Online]. Available: https://portal.igpublish.com/iglibrary/obj/BPB0000607?searchid=1754987877387FLTRNGCyjzQT~w2iG8e4V