Module Description

Module name	Formal Language and Automata Theory
Module level, if applicable	Bachelor of Informatics
Code, if applicable	21D12120602
Subtitle, if applicable	-
Course, if applicable	**-**
Semester(s) in which the module is taught	3th
Person responsible for the module	Dr. Eng. Ady Wahyudi Paundu
Lecturer	1. Prof. Dr. Ir. Andani, M.T. 2. Dr. Eng. Ady Wahyudi Paundu 3. Elly Warni, S.T., M.T.
Language	Indonesian Language [Bahasa Indonesia]
Relation to Curriculum	This course is a compulsory course and offered in the 3th semester.
Type of teaching, contact hours	Teaching methods: [simulation], [case study], [problem-based learning]. Teaching forms: [lecture], [tutorial], [practicum]. CH : 08.00 - 16.00
Workload	For this course, students are required to meet a minimum of 90.67hours in one semester, which consist of: - 26.67 hours for lecture, - 32 hours for structured assignments, - 32 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	Discrete Mathematics
Module objectives/intended learning outcomes	After completing the course, Students are able: **Intended Learning Outcomes (ILO):** **ILO 1 :** Have the knowledge of fundamental in Computing Science that includes basic theory and concepts of computer science, Mathematics and Statistics, Programming Algorithm, Software Engineering, Information Management and Digital Resilience, also the advance topics of either Artificial Intelligence, Data Science, Computer Network, Cloud Computing or Internet of Things. **ILO 3 :** Apply the knowledge of computing and other related disciplines to analyze and identify solutions for any computing-based problem. **Course Learning Objective (CLO):** Students understand the basic principles of Language and Automata concepts to model the communication with the computer systems, especially for Languages at level 3 and level 2 in Chomsky's Grammar Hierarchy and are able to use it to solve related computing-based problems . **Sub CLO :** ILO 3 => CLO 1 : Students understand the concepts of Language, Grammar and Automata in the third layer of Chomsky Hierarchy (Regular Language), as well as their applications in computing systems. ILO 3 => CLO 2 : Students understand the concepts of Language, Grammar and Automata in the second layer of Chomsky Hierarchy (Context Free Language), as well as their applications in computing systems. ILO 1 => CLO 3 : Students know the basics of some advanced topics of Formal Language and Automata Theory, such as the form of language

	and rules at levels 1 and 0 of the Chomsky Hierarchy, Turing Machines and the latest issues in the use of this theory.
Content	Students will learn about : 1. The Concepts of 'Language', 'Grammar' and 'Automata' 2. Fundamental concepts: Sets, Functions and Relations; Graph and Tree; Alphabet and Strings, Proving Techniques 3. Deterministic and Non-Deterministic Finite Automata 4. Epsilon Transition 5. JFLAP 6. The Regular Expressions 7. Regular Grammar 8. Pumping Lemma, The Pigeon-Hole Principle of Regular Languages and Closure Property: Reversal, Homomorphism and its inverse 9. Automata Equivalence and Minimization 10. Context-Free Grammar 11. Grammar transformation method; Chomsky and Greibach Normal Form; Membership Algorithm for CFG 12. Definition of Push Down Automata (Deterministic / Non-Deterministic) 13. PDO and CFG equivalence 14. Normal Form of CFG; Closure and Decision Property of CFG 15. Introduction to Context-Sensitive Grammar and Unrestricted Grammar 16. Turing Machine 17. Undecidability 18. Overview of Computational Complexity 19. Intractable Problems: Introduction to the P and NP classes
Forms of Assessment	Assessment techniques: [observation], [performance], [written test]. Assessment forms: [midterm exam], [assignment].

CLO 1		CLO 2		CLO 3
Assign 1	Exam 1	Assign 2	Exam 2	Exam 3
25	15	25	15	20

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 the final grade. **Form of examination:** Written exam
Media employed	Video conference, slide presentation, Learning Management System (LMS).
Reading list	**Main :** 1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman. 2007. Introduction To Automata Theory, Languages, and Computation, 3rd ed. Addison-Wesley. ISBN: 978-0321455369 2. Peter Linz. 2017. An Introduction To Formal Languages And Automata, 6th ed. Jones & Bartlett. ISBN: 978-1284077247 **Support :** 1. Susan H. Roger and Thomas W. Finley. 2005. FLAP – An Interactive Formal Languages and Automata Package.