Module Description

Module name	Parallel Programming
Module level, if applicable	Bachelor of Informatics
Code, if applicable	21D12131804
Subtitle, if applicable	-
Course, if applicable	-
Semester(s) in which the module is taught	6th
Person responsible for the module	Adnan., ST., MT., PhD
Lecturer	1. Adnan., ST., MT., PhD 2. Dr. Eng. Ady Wahyudi Paundu., ST., MT
Language	Indonesian Language [Bahasa Indonesia]
Relation to Curriculum	This course is a compulsory course for the Internet of Things research group and is offered in the 6th semester.
Type of teaching, contact hours	Teaching methods: [group discussion], [simulation], [case study], [collaborative learning], [project-based learning], [problem-based learning]. Teaching forms: [lecture], [tutorial], [practicum], [research]. CH : 08.00 - 16.00
Workload	For this course, students are required to meet a minimum of 181.33 hours in one semester, which consist of: - 53.33 hours for lecture, - 64 hours for structured assignments, - 64 hours for private study
Credit points	4 credit points (equivalent with 6.8 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 Computer Programming, Algorithm and Data Structure, Computer Architecture, and Operating System
Module objectives/intended learning outcomes	After completing the course, Students are able: **Intended Learning Outcomes (ILO):** **ILO 2 :** Have the knowledge of basic entrepreneurship, full technology stack and web development. **ILO 4 :** Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements by applying computer science theory and software development fundamentals. **ILO 7:** Perform a logical systematic procedure to solve problems, then communicate their ideas in a convincing and effective manner, either in written or orally, to propose solutions. **Course Learning Objective (CLO):** After following Parallel Programming Course for one semester, students are expected to be able to develop software that is efficient in utilizing the available computing resources on parallel computer systems, both shared memory multiprocessor and heterogeneous computers. **Sub CLO :** ILO 1 => CLO 1 : Understand various parallel computer systems such as shared memory multiprocessor & multicore, heterogeneous computers, distributed memory parallel computers. ILO 2 => CLO 2 : Able to create parallel shared-memory programs on computer systems with a number of CPUs (Multicore processors) using low level applications such as Pthreads (multithreading) and OpenMP. ILO 2 => CLO 3 : Able to create parallel programs on heterogeneous computer systems (with GPU) using high level languages such as CUDA.

	ILO 2 => CLO 4 : Able to analyze performance problems such as parallel overhead, critical overhead, load imbalance, scalability. ILO 7 => CLO 5 : Knowing the latest developments of parallel programming
Content	Students will learn about : 1. Various parallel computer systems 2. Basic concepts of parallel programming software 3. the advantages of parallel programming software 4. The latest developments of parallel programming
Forms of Assessment	Assessment is carried out based on written examinations, assessment / evaluation of the learning process and performance with the following components: CLO 1 → ILO 2 : 35% Mid Exam CLO 2 → ILO 4 : 5% observation + 2% Assignment CLO 3 → ILO 4 : 5% Observation + 1% Assignment CLO 4 → ILO 4 : 40% Final Exam + 5% Observation+ 2% assignment CLO 5 → ILO 7 : 5% assignment
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. **Form of examination:** Written exam: Essay
Media employed	Video conference, slide presentation, Learning Management System (LMS)
Reading list	**Main :** 1. Peter S. Pacecho. An Introduction to Parallel Programming 2. Parallel Programming. for Multicore and Cluster Systems. Thomas Rauber and Gudula Runger. Springer. 3. David Kirk et. All. Programming Massively Parallel Processors : A Hands on approach 4. Structured Parallel Programming. Pattern for efficient computation. Michael Mac Cool. Morgan Kaufman **Support :**

	1. Michael Klemm and Jim Cownie : High Performance Parallel Runtime : Design and Implementation.