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MODULE HANDBOOK

Module name	**High Performance Architecture and Infrastructure**
Module level, if applicable	Undergraduate
Code, if applicable	MII-
Courses, if applicable	**High Performance Architecture and Infrastructure**
Semester(s) in which the module is taught	Summer (Even)
Person responsible for the module	Dr, Mardhani Riasetiawan
Lecturer(s)	Dr. Mardhani Riasetiawan Muhammad Alfian Amrizal, Ph.D
Language	Bahasa Indonesia
Relation to curriculum	1. Undergraduate degree program, compulsory, 4th semester. 2. International undergraduate program, compulsory, 4th semester.
Teaching methods	1. Undergraduate degree program: lectures, < 60 students, 2. International undergraduate program: lectures, < 30 students.
Workload (incl. contact hours, self-study hours)	1. Lectures: 3 x 50 = 100 minutes (1 hours 40 menit) per week. 2. Exercises and Assignments: 3 x 60 = 120 minutes (2 hours) per week. 3. Private study: 3 x 60 = 120 minutes (2 hours) per week.
Credit points	3 credit points (sks).
Requirements according to the examination regulations	A student must have attended at least 75% of the lectures to sit in the exams.
Required and recommended prerequisites for joining the module	-
Learning outcomes and their corresponding PLOs	After completing this module, a student is expected to: CO1. Able to explain the concept and architecture of high performance computing CO2. Able to explain high performance computing and environment CO3. Able to explain cluster, distributed and Grid CO4. Able to explain multicore, GPGPU, and Quantum Computing CO5. Able to explain use cases of high performance computing

PLO		CO1	CO2	CO3	CO4	CO5
	PLO1	√				

<table>
<tr><td></td><td>
<table>
<tr><td rowspan="4">Program Learning Outcome (PLO)</td><td>PLO2</td><td></td><td>√</td><td></td><td></td><td></td></tr>
<tr><td>PLO3</td><td></td><td></td><td>√</td><td></td><td></td></tr>
<tr><td>PLO4</td><td></td><td></td><td></td><td>√</td><td></td></tr>
<tr><td>PLO5</td><td></td><td></td><td></td><td></td><td>√</td></tr>
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<tr><td>Content</td><td>1. Concept and architecture High performance architecture
2. High speed network management and configuration
3. High performance computation and environment
4. Development of cluster, distributed and Grid
5. High performance computing: resource allocation management, load balancing management
6. Processing technology: core, multicore and threads
7. GPU based computing
8. Quantum computing
9. Use cases: molecular computation, data science, artificial intelligence</td></tr>
<tr><td>Study and examination requirements and examination forms</td><td>The evaluation is done in 3 forms, namely:
1. Trial, either midterm or semester test,
2. Tasks, including individual or group assignments to be completed within a certain timeframe, and
3. Quizzes, held on face-to-face, once before midterm exam and once after midterm exam, with a short answer form.

Assessment is done using benchmark assessment, with the aim of measuring the level of student understanding related to the target and class rank.</td></tr>
<tr><td>Media employed</td><td>LCD, blackboard, and websites.</td></tr>
<tr><td>Assessments and evaluation</td><td>
<table>
<tr><th>Type</th><th>Percentage</th><th>CO1</th><th>CO2</th><th>C03</th><th>C04</th><th>CO5</th></tr>
<tr><td>Quiz</td><td>10</td><td>√</td><td>√</td><td></td><td>√</td><td></td></tr>
<tr><td>Individual Task</td><td>15</td><td></td><td>√</td><td>√</td><td></td><td></td></tr>
<tr><td>Group Task</td><td>30</td><td>√</td><td>√</td><td>√</td><td></td><td></td></tr>
<tr><td>Midterm Exam</td><td>15</td><td></td><td></td><td></td><td>√</td><td>√</td></tr>
<tr><td>Final Exam</td><td>30</td><td></td><td></td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>Total</td><td>100%</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Reading list</td><td>1. High Performance Datacenter Networks: Architectures, Algorithms, & Opportunities (Synthesis Lectures on Computer Architecture), Dennis Abts and John Kim, March 2011, Morgan & Claypool Publishers
2. Multi-Core Cache Hierarchies, Rajeev Balasubramonian, Norman P. Jouppi, and Naveen Muralimanohar, 2011
3. Performance Analysis and Tuning for General Purpose Graphics Processing Units (GPGPU), Hyesoon Kim, Richard Vuduc, Sara Baghsorkhi, Jee Choi, and Wen-mei Hwu, 2012
4. Quantum Computing for Computer Architects, Second Edition, Tzvetan S. Metodi, Arvin I. Faruque, and Frederic T. Chong, 2011
5. Pacheco, P., An Introduction to Parallel, Morgan Kaufmann, 2011.
6. Wilkinson, B. and Allen, M., Parallel Programming Techniques and Applications using Networked Workstations and Parallel Computers, 2nd Edition, Pearson Prentice Hall, 2005.</td></tr>
</table>

	7. Alamat Web: http://top500.org (tentang peringkat superkomputer) dan Wikipedia serta video dari Youtube

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