Module Description of Optimization

Module Name	:	Optimization
Module Level	:	Bachelor
Code, if applicable	:	23H01131003
Subtitle, if applicable	:	-
Courses, if applicable	:	Optimization
Semester(s) in which the module is taught	:	5 (Fifth Semester)
Module coordinator(s)	:	Prof. Agustinus Ribal, S.Si.,M.Sc., Ph. D
Lecturer(s)	:	Prof. Dr. Aidawayati Rangkuti, MS., Prof. Agustinus Ribal, S.Si.,M.Sc., Ph.D
Language	:	Bahasa (Indonesian language)
Relation to curriculum	:	Elective course in third year for Bachelor degree in Mathematics and Set Theory
Type of teaching/teaching method	:	Lecturing, Small Group Discussion, Cooperative Learning, Self-Directed Learning
Contact hours	:	150 minutes lectures per week, 180 minutes structured activities per week, and 180 minutes independent study per week
Workload	:	Total workload is 135 hours per semester which consists of 40 hours per semester for Learning and Teaching, 47.5 hours per semester for Self-Study, and 47.5 hours per semester for Structured Works
Credit points	:	3 (4.8 ECTS)
Requirements according to the examination regulations	:	Students are required to attend at least 80% of the total meetings which is recorded via the attendance menu at https://sikola-v2.unhas.ac.id/, complete all mandatory assignments, and obtain permission from the lecturer to participate in the written examination.
Recommended prerequisites	:	Students have completed and taken the exams for Operations Research
Module objectives/intended learning outcomes	:	After the completion of this module, the student will be able to: CLO 1. understand several mathematical methods and their underlying concepts, and apply these methods in other related fields such as industry, economics, and agriculture; CLO 2. analyze and implement several optimization methods in other areas of study; CLO 3. construct mathematical models, explain the procedures, and solve optimization problems using appropriate methods, as well as interpret the obtained results in relevant fields;

<table>
<tr><td></td><td></td><td>CLO 4. communicate ideas effectively, develop self-capabilities based on local wisdom, and adapt easily within communities of diverse backgrounds.

The following is the mapping of the ILO and the CLO of this course:
<table>
<tr><th></th><th>ILO 2</th><th>ILO 4</th><th>ILO 7</th></tr>
<tr><td>CLO 1</td><td>X</td><td></td><td></td></tr>
<tr><td>CLO 2</td><td>X</td><td></td><td></td></tr>
<tr><td>CLO 3</td><td></td><td>X</td><td></td></tr>
<tr><td>CLO 4</td><td></td><td></td><td>X</td></tr>
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<tr><td>Content</td><td>:</td><td>The Optimization course is an elective in the mathematics study program that equips students with the ability to apply several mathematical methods in optimization. The first part of this course focuses on dynamic programming and game theory. Dynamic programming includes both deterministic and probabilistic approaches, while game theory covers zero-sum games as well as pure and mixed strategies. The second part of the course discusses queuing theory and network analysis. Queuing theory covers both single-server and multi-server models, while network analysis introduces the concepts and applications of the max flow–min cut theorem and the maximum flow algorithm.</td></tr>
<tr><td>Study and examination requirements</td><td>:</td><td>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.</td></tr>
<tr><td>Exams and assessment formats</td><td>:</td><td>Participants are marked based on their performance in theory: Report (55%), Written Exam (45%)

Reports measure analytical and writing skills. The Written Exam assesses comprehension and synthesis of all materials discussed during the semester. Altogether, these components account for 100% of the final grade.

Students are marked based on their percentage of points obtained and based on the following grade scale:
<table>
<tr><th>Percentage of Achievement</th><th>Grade</th><th>Conversion Value</th></tr>
<tr><td>85 – 100</td><td>A</td><td>4.00</td></tr>
<tr><td>80 - <85</td><td>A-</td><td>3.75</td></tr>
<tr><td>75 - < 80</td><td>B+</td><td>3.5</td></tr>
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			70 - < 75	B	3.0	
			65 - < 70	B-	2.75	
			60 - < 65	C+	2.5	
			50 - < 60	C	2.00	
			40 - < 50	D	1.00	
			< 40	E	0.00	
Reading list	:	1. Hiller, Liebermen, 2005. Introduction to Operation Research. Eighth edition, Mc Graw- Hill, Companies, one book, New York. 2. Caccetta, L., 2005. Network Optimisation Lecture Notes. Perth: Curtin Publication. 3. Frederick, S. H, Gerald, 2001." Introduction to Operation Research". seven edition, Mc Graw- Hill, New York. 4. Gass, Saul L, 1984. "Linear Programming : Method and Application". Fifth edition, Mc Graw- Hill, New York. 5. Ronal. E. Miller, 2000. "Optimization" Foundation and Application. Prentice Hall, Inc USA 6. Taha, Hamdy, 2007. "Operation Research". Eighth edition Mc Graw- Hill, New York 7. Hinding, Nurdin, Determination of the Grid-Shaped Transportation Network's Optimization Value via Graph Labelling (August 20, 2024). Available at SSRN: https://ssrn.com/abstract=5266765 or http://dx.doi.org/10.2139/ssrn.5266765			
Last revision date	:	July 28th, 2025				