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Master in Mathematics

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MODULE HANDBOOK

Module Name	**Teori Optimisasi (*Optimization Theory*)**
Module level, if applicable	**Master Program**
Code, if applicable	MMM 5301
Subtitle, if applicable	
Courses, if applicable	**Optimization Theory**
Semester(s) in which the module is taught	2nd(second) semester
Person responsible for the module	Chair of The Lab. of Applied Mathematics
Lecturer(s)	Prof. Dr. Salmah, M.Si.
Language	Bahasa Indonesia
Relation to curriculum	Compulsory in Applied Mathematic interest
Teaching methods	150 minutes lectures and 180 minutes structured activities per week.
Workload (incl. contact hours, self-study hours)	Total workload is 136 hours per semester, which consists of 150 minutes lectures per week for 14 weeks, 180 minutes structured activities per week, 180 minutes individual study per week, in total is 16 weeks per semester, including mid exam and final exam.
Credit points	3
Required and recommended prerequisites for joining the module	-

<table>
<tr><td>Module objectives/intended learning outcomes</td><td>After completing these course the students will be able:

CO1. to recognize basic concept in non linear optimization problems such as convex set, convex function and theorems related to optimization problems with convex functions.

CO2. to solve optimization problems analitically such as optimization problem without constraints, optimization problem with equation constraints, and optimization problems with inequalitu constraints.

CO3. to solve optimization problem numerically.

CO4. To relate between the theory and applications of optimization problem, and to interpret the solutions.

CO5. To recognize about introduction to advance theories in optimization.</td></tr>
<tr><td>Content</td><td>Topics include Euclidean space, convex sets, convex functions, quadratic forms, real functions, gradient, directional derivative, local and global extrema, unconstrained extrema, constrained extrema with equation by Lagrange multiplier, constrained extrema with inequality by Kuhn-Tucker theory, numerical methods: direct search, gradient method, Newton-Raphson method, numerical method for n-dimensional problem, numerical method for constrained extrema problem, application of optimization theories to simple real problems, introduction to advance theories of optimization such as: convex functions with nonconvex domains, quasiconvex functions, optimization for nondifferentiable functions, multi objective optimization, more numerical methods for optimizations problems, application of optimization theories on linear quadratic optimal control problems.</td></tr>
<tr><td>Examination forms</td><td>Essay, oral presentation</td></tr>
<tr><td>Study and examination requirements</td><td>The minimum requirement (final grade) to pass the course is D. The final mark will be weighted as follows:

No. | Assessment methods (components, activities) | Weight (percentage)
1. | Final Examination | 30%-40%
2. | Mid-term Examination | 30%-40%
3. | Class Activities: Quiz, Homework, etc. | 20%-30%</td></tr>
<tr><td>Media employed</td><td>Board, LCD Projector, Laptop/Computer/Tablet, eLok/Simaster</td></tr>
</table>

Reading list	• Boyd, S., Vandenberghe, L., 2004, *Convex Optimization,* Cambridge University Press. • Edwin K.P. Chong, dan Stanislaw H. Zak, 1996, *An Introduction to Optimization*, John Wiley & Sons. • Mokhtar S Bazaraa, Hanif D. Sherali, C.M.Shetty, 2006, *Nonlinear Programming. Theory andAlgorithms* 3rd Edition, John Wiley and Sons. • Mital, K.V., 1993, *Optimization Methods in Operations Research and Analysis*, Wiley Eastern Ltd. • Aragon, F.J., Goberna, M.A., Lopez, M.A., Rodriguez, M.M.L, 2019, Nonlinear Optimization, Springer Undergraduate Texts in Mathematics and Technology, 1st ed.

CO-PLO Mapping

	PLO 1	**PLO 2**	**PLO 3**	**PLO 4**	**PLO 5**	**PLO 6**
CO 1		√	√			
CO 2		√	√			
CO 3		√	√			
CO 4			√			
CO 5	√				√	√

Compilation Date :

Modified Date :