UNIVERSITAS GADJAH MADA
Faculty of Mathematics and Natural Sciences
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Doctoral Program in Mathematics

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MODULE HANDBOOK
Doctoral in Mathematics

Module name:	Advanced Mathematical Modelling
Module level, if applicable:	Doctoral
Code, if applicable:	MMM 7303
Semester(s) in which the module is taught:	1st (first) year
Person responsible for the module:	Chair of Applied Mathematics Research Group
Lecturer(s):	Dr. Irwan Endrayanto Aluicius, S.Si., M.Sc.
Language:	Bahasa Indonesia
Relation to curriculum:	Doctoral Degree in Mathematics, Elective Course
Credit points:	3 Semester Credit Unit
Type of teaching, contact hours:	3x50 minutes lectures, 3x60 minutes structured activities. 3x60 minutes individual self-study per week.
Workload:	3 hours lectures, 3 hours structured activities, 3 hours individual study, 16 weeks per semester (including mid-term and final examinations), 144 hours per semester.
Recommended prerequisites:	Students have learned about basic mathematical modelling, basic stochastics processes and basic optimization theory.
Module objectives/intended learning outcomes:	After completing this course the students have ability to : CO 1. verify various types of mathematical optimization modelling. CO 2 compare various types of mathematical models and its algorithms CO 3. design advanced mathematical model for specific problems
Content:	1. Convex optimization modelling problems. 2. Mathematical Programming (advanced convex optimization modelling) 3. Applications of optimization modelling
Study and examination requirements and forms of examination:	The final mark will be weighted as follows: No — Assessment methods (components, activities) — Weight (percentage) 1 — Final Examination — 30 2 — Mid-Term Examination — 25 3 — Presentation — 25 4 — Assignments — 20 Final grade will be determined as follows: Grade — Criteria A — $95 \leq$ final mark ≤ 100 A- — $90 \leq$ final mark ≤ 94 A/B — $85 \leq$ final mark < 90 B+ — $80 \leq$ final mark ≤ 84 B — $75 \leq$ final mark < 80 B- — $70 \leq$ final mark ≤ 74 B/C — $65 \leq$ final mark < 70 C+ — $60 \leq$ final mark ≤ 64 C — $55 \leq$ final mark < 60

	C- $50 \leq$ final mark ≤ 54 C/D $45 \leq$ final mark < 50 D+ $40 \leq$ final mark < 45 D $35 \leq$ final mark < 40 E $0 \leq$ final mark < 35
Media employed:	White Board, LCD Projector, Laptop/Computer
Reading List:	1. Niculescu, C.P., and Persson, L-E., (2018), *Convex Functions and Their Applications*, Springer; 2nd ed. 2018 2. Schneider, J., and Kirkpatrick, S., (2006), Stochastic Optimization, Springer. 3. Zhigljavsky, A., and Žilinskas, A., (2008), Stochastic Global Optimization, Springer.

Mapping of The COs and PLOs

	PLO – 1 S3 Mat	**PLO – 2 S3 Mat**	**PLO – 3 S3 Mat**	**PLO – 4 S3 Mat**	**PLO – 5 S3 Mat**	**PLO –6 S3 Mat**
CO 1		v	v			
CO 2		v	v			
CO 3	v				v	

Programme Learning Outcomes (PLO) Doctoral Programme in Mathematics

PLO-1	:	**Attitude:** Devote to God Almighty, uphold the humanity values, internalize academic values and ethics, responsible in working in the area of expertise independently.
PLO-2	:	**Knowledge:** Mastering philosophy of mathematics and one of the fields in mathematics (algebra, analysis, applied mathematics, statistics, computational mathematics, computational statistics).
PLO-3	:	**Knowledge:** Able to think logically, analytically, inductively, deductively, and structured; having the ability to manage, lead, and develop research programs independently, and able to communicate the thoughts as well as his work to the scientific community and the general public.
PLO-4	:	**Skill:** Creating new concepts and / or new methods (original) in the field of mathematics that are recognized nationally and internationally.
PLO-5	:	**Skill:** Able to apply mathematics according to their field of expertise to solve problems including those that require a multidisciplinary, cross-disciplinary, or trans-disciplinary approach.
PLO-6	:	***Life Long Learning:*** Having lifelong learning skills and adaptive to the development of science and technology, especially in fields related to Mathematics and its applications.