



UNIVERSITAS GADJAH MADA

Faculty of Mathematics and Natural Sciences

Mathematics Department

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Doctoral Program in Mathematics

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MODULE HANDBOOK

Doctoral in Mathematics

Module name:	Fuzzy Logic															
Module level, if applicable:	Doctor Program															
Code, if applicable:	MMM 5214															
Semester(s) in which the module is taught:	First Year															
Person responsible for the module:	Chair of Algebra Research Group															
Lecturer(s):	Budi Surodjo															
Language:	Bahasa Indonesia															
Relation to curriculum:	Doctor Degree in Mathematics, Elective Courses															
Credit points:	3 Semester Credit Unit															
Type of teaching, contact hours:	3x50 minutes lectures, 3x50 minutes structured activities.															
Workload:	<ul style="list-style-type: none"> • 3x50 minutes lectures, • 3x50 minutes structured activities, • 3x50 minutes individual study, • In 16 weeks per semester (including mid-term and final examinations). • Total: 144x50 minutes per semester. 															
Requirements according to the examination regulations:	NONE															
Recommended prerequisites:	Before taking this course, students must have a good knowledge of conventional logic (binary logic), tautology (proposition), algebraic structures, basic theory in analysis, and probability theory.															
Module objectives/intended learning outcomes:	<p>After attending this lecture, students will have the knowledge and skills to:</p> <p>CO-1 : Demonstrate understanding and ability to work on various types of fuzzy system (fuzzy subset, fuzzy subsemigroup, subgroup, and fuzzy subring)</p> <p>CO 2 : Demonstrate their ability to explain the similarity and differences between the classical system and the fuzzy system.</p> <p>CO 3 : Demonstrate their ability to explain fuzzy inference and to apply it to the design of intelligence systems or humanic systems.</p> <p>CO 4. Demonstrate their ability to construct the fuzzy arithmetic systems and able to analyze it</p>															
Content:	Fuzzy subsets and related concepts (membership function, algebra operations). Fuzzy mapping and extension principal. Numbers and fuzzy relations. Fuzzy subemigroup and subgroup, fuzzy homomorphism, and fuzzy subring. Binary logic, fuzzy logic, and their relationships. Classical propositions and fuzzy propositions. Classical and fuzzy inferences. Fuzzy arithmetic system. Applications of fuzzy logic.															
Study and examination requirements and forms of examination:	<p>The final mark will be weighted as follows:</p> <table border="1"> <thead> <tr> <th>No</th> <th>Assessment methods (components, activities)</th> <th>Weight (percentage)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Final Examination</td> <td>35%</td> </tr> <tr> <td>2</td> <td>Mid-Term Examination</td> <td>30%</td> </tr> <tr> <td>3</td> <td>Projects/Presentation</td> <td>20%</td> </tr> <tr> <td>4</td> <td>Homework/Quiz</td> <td>15%</td> </tr> </tbody> </table> <p>Final grade will be determined as follows:</p>	No	Assessment methods (components, activities)	Weight (percentage)	1	Final Examination	35%	2	Mid-Term Examination	30%	3	Projects/Presentation	20%	4	Homework/Quiz	15%
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1	Final Examination	35%														
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	<p>Grade Criteria</p> <p>A : $95 \leq \text{final mark} \leq 100$</p> <p>A- : $90 \leq \text{final mark} < 95$</p> <p>A/B : $85 \leq \text{final mark} < 90$</p> <p>B+ : $80 \leq \text{final mark} < 85$</p> <p>B : $70 \leq \text{final mark} < 80$</p> <p>B- : $65 \leq \text{final mark} < 70$</p> <p>B/C : $60 \leq \text{final mark} < 65$</p> <p>C+ : $55 \leq \text{final mark} < 60$</p> <p>C : $50 \leq \text{final mark} < 55$</p> <p>D : $40 \leq \text{final mark} < 45$</p> <p>E : $0 \leq \text{final mark} < 40$</p>
Media employed:	White/Black Board, LCD Projector, Laptop/Computer
Reading List:	<p>Referensi:</p> <ol style="list-style-type: none"> Chen, G. and Trung Tat Pham, 2001, <i>Introduction to Fuzzy Sets, Fuzzy Logic, and Fuzzy Control Systems</i>, CRC Press LLC, http://sc.uaemex.mx/xose/html/clases/logica/articles/libro_fuzzy_logic.pdf. Buckley, J.J, and Eslami, E., 2002, <i>An Introduction to Fuzzy Logic and Fuzzy Sets</i>, Springer, https://link.springer.com/book/10.1007%2F978-3-7908-1799-7. Klir, G.J. and Bo Yuan, 1995, <i>Fuzzy Sets And Fuzzy Logic.</i>, Prentice Hall. Setiadji, 2009, <i>Himpunan dan Logika Samar dan Aplikasinya</i>, Graha Ilmu.

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	√		√			
CO 2	√	√	√			
CO 3	√	√	√		√	
CO 4		√	√		√	

Programme Learning Outcomes (PLO) Doctoral Programme in Mathematics

PLO-1	:	<p>Attitude:</p> <p>Devote to God Almighty, uphold the humanity values, internalize academic values and ethics, responsible in working in the area of expertise independently.</p>
PLO-2	:	<p>Knowledge:</p> <p>Mastering philosophy of mathematics and one of the fields in mathematics (algebra, analysis, applied mathematics, statistics, computational mathematics, computational statistics).</p>
PLO-3	:	<p>Knowledge:</p> <p>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.</p>
PLO-4	:	<p>Skill:</p> <p>Creating new concepts and / or new methods (original) in the field of mathematics that are recognized nationally and internationally.</p>
PLO-5	:	<p>Skill:</p> <p>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.</p>
PLO-6	:	<p>Life Long Learning:</p> <p>Having lifelong learning skills and adaptive to the development of science and technology, especially in fields related to Mathematics and its applications.</p>