



UNIVERSITAS GADJAH MADA

Faculty of Mathematics and Natural Sciences

Department of Mathematics

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Master Program in Mathematics

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MODULE HANDBOOK

Module Name	Real Functions
Module level, if applicable	Master Program
Code, if applicable	MMM-5107
Subtitle, if applicable	
Courses, if applicable	Real Functions
Semester(s) in which the module is taught	2 nd (second)
Person responsible for the module	Chair of Analysis Research Group
Lecturer(s)	Atok Zulijanto, S.Si.,M.Si.,Ph.D.
Language	Bahasa Indonesia
Relation to curriculum	Elective course in the first year (2 nd semester) master's degree
Teaching methods	Lecture, classroom discussion, and presentation.
Workload (incl. contact hours, self-study hours)	The total workload is 136 hours per semester, which consists of 150 minutes of lectures per week for 14 weeks, 180 minutes of structured activities per week, and 180 minutes of 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	Students have taken the module of Analysis I (MMM-5101) and have participated in the final exam of the module. Before taking this course, students must have a good understanding about the completeness property of \mathbb{R} and the concepts in metric spaces

Module objectives/intended learning outcomes	<p>After completing this course, the students should have:</p> <p>CO 1. Ability to prove properties and solve problems related to limit superior and limit inferior of a function.</p> <p>CO 2. Ability to prove properties and solve problems related to semi-continuous functions.</p> <p>CO 3. Ability to analyze, prove, and solve problems related to properties and characterization of Baire-1 functions.</p> <p>CO 4. Ability to solve problem related to Darboux functions and use the properties of Darboux functions to solve problems in mathematical analysis.</p>												
Content	<ol style="list-style-type: none"> 1. Limit superior and limit inferior of real functions. 2. Semi-continuous functions : the definition, properties, and characterization of upper and lower semi-continuous functions. 3. Baire class on functions : the classical definition and basic properties of Baire-1 functions, uniform limit of sequences of Baire-1 functions, and some characterization of Baire-1 functions. 4. Darboux functions : some properties of Darboux functions, characterization of Darboux functions, and some Darboux functions which are continuous. 												
Examination forms	Essay												
Study and examination requirements	<p>The final mark will be weighted as follows:</p> <table border="0" data-bbox="607 1045 1404 1310"> <thead> <tr> <th data-bbox="607 1045 662 1075">No</th> <th data-bbox="672 1045 1133 1115">Assessment methods (components, activities)</th> <th data-bbox="1154 1045 1404 1075">Weight (percentage)</th> </tr> </thead> <tbody> <tr> <td data-bbox="607 1129 630 1159">1</td> <td data-bbox="672 1129 889 1159">Final Examination</td> <td data-bbox="1230 1129 1341 1159">35 - 45%</td> </tr> <tr> <td data-bbox="607 1173 630 1203">2</td> <td data-bbox="672 1173 951 1203">Mid-Term Examination</td> <td data-bbox="1230 1173 1341 1203">30 - 40%</td> </tr> <tr> <td data-bbox="607 1218 630 1247">3</td> <td data-bbox="672 1218 1068 1287">Class Activities: Quiz, Homework, presentation etc.</td> <td data-bbox="1230 1266 1341 1295">25 - 30%</td> </tr> </tbody> </table>	No	Assessment methods (components, activities)	Weight (percentage)	1	Final Examination	35 - 45%	2	Mid-Term Examination	30 - 40%	3	Class Activities: Quiz, Homework, presentation etc.	25 - 30%
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1	Final Examination	35 - 45%											
2	Mid-Term Examination	30 - 40%											
3	Class Activities: Quiz, Homework, presentation etc.	25 - 30%											
Media employed	Board, LCD Projector, Laptop/Computer												

Reading list	<ol style="list-style-type: none"> 1. Mc Shane E.J., 1961, <i>Integration</i>, Princeton University Press. 2. Gordon R.A., 1994, <i>The integrals of Lebesgue, Denjoy, Perron and Henstock</i>, American Mathematical Society. 3. Kharazishvili A., 2018, <i>Strange Functions in Real Analysis</i>, third edition, Chapman & Hall Book, Boca Raton. 4. Lee P.Y., Tang W.-K., and Zhao D., 2001, An equivalent definition of functions of the first Baire class, <i>Proc. Amer. Math. Soc.</i>, 129, 2273-2275. 5. Bruckner A.M., Bruckner J.B., and Thomson B.S., 2008, <i>Real Analysis</i>, second edition, Prentice-Hall Inc, New Jersey. 6. Natanson I.P., 1964, <i>Theory of Functions of a Real Variable</i>, Vol 1 and 2, Frederick Ungar Publishing Co, New York. 7. Goffman C., 1953, <i>Real Functions</i>, Holt, Rinehart and Winston, New York.
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CO-PLO Mapping

	PLO – 1	PLO – 2	PLO – 3	PLO – 4	PLO – 5	PLO – 6
	S2 Mat	S2 Mat	S2 Mat	S2 Mat	S2 Mat	S2 Mat
CO 1	V	V	V			
CO 2	V	V	V		V	
CO 3	V	V	V		V	
CO 4	V		V			

Compilation Date :

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