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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:	Theory of Integral
Module level, if applicable:	Doctoral Program
Code, if applicable:	MMM 6101
Semester(s) in which the module is taught:	1st (first) year
Person responsible for the module:	Chair of Applied Mathematics Research Group
Lecturer(s):	Ch. Rini Indrati / Assigned Lecturer(s)
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.
Workload:	• 3x50 minutes lectures, • 3x60 minutes structured activities, • 3x60 minutes individual study, • In 16 weeks per semester (including assignments and examinations)
Recommended prerequisites:	Student has learned the Riemann integral. It will be better if the student has learned the Lebesgue integral.
Module objectives/intended learning outcomes:	On successful completion of this course, students should be able to: CO 1. prove and develop some properties of the (non-absolute) integral. CO 2. analyze and develop some convergence theorems of the integral.
Content:	1. Absolute and non-absolute integrals. 2. Gauge functions, Generalized absolutely continuous functions, generalized bounded variation functions. 3. Definition and some characteristics of non-absolute integrable functions. 4. Some convergence theorems of the associated integrals.
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 — 30% 3 — Class Activities: Presentation and Quiz — 25% 4. — Homework — 15% The initial cut-off points for grades A, B, C, and D should not be less than 80%, 65%, 50%, and 40%, respectively.
Media employed:	Board, LCD Projector, Laptop/Computer
Reading List:	1. Lee Peng Yee, 1989, *Lanzhou Lectures on Henstock integration*, World Scientific, Singapore 2. Pfeffer, W.F., 1993, *The Riemann Approach to Integration*, Cambridge University Press, New-York, USA.

	3. Lee P.Y. and Výborný, R., 2000, Integral: *An Easy Approach after Kurzweil and Henstock*, Cambridge University Press. 4. Indrati, Ch. R., 2003, Convergence Theorems for the Henstock Integral Involving Small Riemann Sums, *Real Analysis Exchange* 29 (1), (2003/2004), 481 – 488. 5. Indrati, Ch. R., and Aryati, L., 2016, The Countably Lipschitz Integral, *Global Journal of Pure and Applied Mathematics*, Volume 12, Number 5 (2016), pp. 3991-3999.

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			v
CO 2		v	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.