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MODULE HANDBOOK

Module Name	*Topics in Functional Analysis*
Module level, if applicable	*Doctor*
Code, if applicable	*MMM-7107*
Subtitle, if applicable	-
Courses, if applicable	*Topics in Functional Analysis*
Semester(s) in which the module is taught	*1st or 2nd semester*
Person responsible for the module	*Chair of the Lab. Of Analysis*
Lecturer(s)	*Prof. Dr. Ch. Rini Indrati, M.Si.; Prof. Dr. Supama, M.Si.; Atok Zulijanto, M.Sc., Ph.D.; Hadrian Andradi, M.Sc., Ph.D.*
Language	*Bahasa Indonesia*
Relation to curriculum	*Elective course in the 1st or 2nd semester of doctor's degree*
Teaching methods	*Lecture, classroom discussion, flipped classroom.*
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	*Students have strong knowledge on abstract analysis and on theory in algebra, especially vector space, linear independence set, and orthonormal basis.*

<table>
<tr><td>Module objectives/intended learning outcomes</td><td>After completing this course, the students should have the ability to:

CO 1 integrate one or more theories in functional analysis for the development in developing and solving problems with functional analysis approach

CO 2 justify properties which are important in mathematical analysis research</td></tr>
<tr><td>Content</td><td>1. General functional analysis: Hilbert spaces, normed spaces, Riesz representation theorem, bilinear and sesquilinear mappings, adjoint, and spectral theorem.
2. Fuzzy functional analysis: fuzzy number and its characteristics, inequality, fuzzy Banach space or fuzzy metric space, continuous t-norms, open mapping theorem.
3. Operator theory: Preview on Hilbert spaces. Linear operator and adjoints: basic notion, bounded linear operators/functionals, isometry and isomorphism, adjoint operators, Banach-Steinhaus' Theorem, Strong and Weak convergent, projections. Closed linear operators: closed and closable operators, Closed Graph Theorem. Theory of Spectral, symmetry and self-adjoint operators, normal operators.</td></tr>
<tr><td>Examination forms</td><td>Oral presentation, essay.</td></tr>
<tr><td>Study and examination requirements</td><td>The final mark will be weighted as follows:
<table><tr><th>No</th><th>Assessment methods (components, activites)</th><th>Weight (percentage)</th></tr><tr><td>1</td><td>Final Examination : final project/presentation/oral exam/essay</td><td>30-40%</td></tr><tr><td>2</td><td>Mid-Term Examination : presentation/oral exam/essay</td><td>30-40%</td></tr><tr><td>3</td><td>Class Activities: presentation, quiz, homework, etc.</td><td>20-30%</td></tr></table>
To pass the course, students are expected to get a minimum grade of B.</td></tr>
<tr><td>Media employed</td><td>Board, LCD Projector, Laptop/Computer</td></tr>
</table>

Reading list	1. *Berberian, S.K., 1999, Introduction to Hilbert space Vol. 287. American Mathematical Soc.* 2. *Kreyszig, E., 1991. Introductory Functional Analysis with Applications (Vol. 17). John Wiley & Sons.* 3. *Bachman, G. and Narici, L., 1998, Functional Analysis 2nd Edition, Dover Publications.* 4. *R. Saadati and S. M. Vaezpour, 2005, Some Results on Fuzzy Banach Spaces, J. Appl. Math. & Computing Vol. 17(2005), No. 1 - 2, pp. 475 - 484* 5. *Weidmann, J., 1980, Linear Operators in Hilbert Spaces, Springer-Verlag, New York.* 6. *Conway, J.B., 2019, A Course in Functional Analysis 3rd Ediiton, Springer Verlag, New York.* 7. *Taylor, A.E., 1980, Introduction to Functional Analysis, John Wiley and Sons, New York.*

CO-PLO Mapping

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

Last Modified Date : 08 August 2022