UNIVERSITAS GADJAH MADA
Faculty of Mathematics and Natural Sciences
Department of Mathematics
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MODULE HANDBOOK

Module Name	*Topics in Topology*
Module level, if applicable	*Doctor*
Code, if applicable	*MMM-7108*
Subtitle, if applicable	-
Semester(s) in which the module is taught	*1st or 2nd semester*
Person responsible for the module	*Chair of the Lab. Of Analysis*
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 232 hours per semester, which consists of 50 minutes lectures per week, 120 minutes structured activities per week, 120 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 the set theory*
Module objectives/intended learning outcomes	*After completing this course, the students should have the ability to:* *CO 1. Prove some properties in topology topics* *CO 2. Combine some properties in topology to solve some problems in areas related to topology.* *CO 3. Use or combine the concepts in topology to solve problems related to the students' research topic*

<table>
<tr><td>Content</td><td>

General topology (definition of topological space, bases, sub-bases, subspace, sums, cartesian products, quotient spaces, continuous functions, open functions and closed functions, homeomorphism, , axioms of separation, convergence in topological spaces, covering axioms, compactness and connectedness.)
Topology related to posets/ the domain theory
Algebraic topology (topology related to algebra structute: homotopy, homology, cohomology)
Topological method in analysis (topology used to solve problems in real analysis such as the Polish space, Baire one functions defined on topological spaces)

</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>presentation</td><td>20-30%</td></tr>
</table>
To pass the course, the minimum grade is B.
</td></tr>
<tr><td>Media employed</td><td>Board, LCD Projector, Laptop/Computer</td></tr>
<tr><td>Reading list</td><td>

Dugundji J., 1996, Topology, Allyn and Bacon Inc. Boston.
Engelking R., 1989, General Topology, Heldermann Verlag, Berlin.
Bourbaki, N., 2013. General Topology: Chapters 1–4 (Vol. 18). Springer Science & Business Media.
Gierz, G., Hofmann, K.H., Keimel, K., Lawson, J.D., Mislove, M. and Scott, D.S., 2003. Continuous lattices and domains (Vol. 93). Cambridge university press.
Goubault-Larrecq, J., 2013. Non-Hausdorff topology and domain theory: Selected topics in point-set topology (Vol. 22). Cambridge University Press.
Hatcher, A., 2005. Algebraic topology. Cambridge University Press.

</td></tr>
</table>

CO-PLO Mapping

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

Last Modified Date : September 3, 2023.

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MODULE HANDBOOK

Module designation	*Topics in Topology*
Code, if applicable	*MMM-7108*
Subtitle, if applicable	*General Topology*
Semester(s) in which the module is taught	*1st or 2nd semester*
Person responsible for the module	*Chair of the Lab. Of Analysis*
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 232 hours per semester, which consists of 50 minutes lectures per week, 120 minutes structured activities per week, 120 minutes individual study per week, in total is 16 weeks per semester, including mid exam and final exam.*
Credit points in Credit Units	*3*
Required and recommended prerequisites for joining the module	*Students have strong knowledge on the set theory*
Module objectives/intended learning outcomes	*After completing this course, the students should have the ability to:* *CO 1. Prove some topological properties.* *CO 2. Solve some problems in mathematics that require general topology concepts.* *CO 3. Make conjecture or use some concept in the general topology to solve problems related to the students' research topic.*

Content	*Definition of topological space, bases, sub-bases, subspace, sums, cartesian products, quotient spaces, continuous functions, open functions and closed functions, homeomorphism, , axioms of separation, convergence in topological spaces, covering axioms, compactness and connectedness.*
Examination forms	*Oral presentation, essay.*
Study and examination requirements	*The final mark will be weighted as follows:* *No* — *Assessment methods (components, activites)* — *Weight (percentage)* *1* — *Final Examination: final project/presentation/oral exam/essay* — *30-40%* *2* — *Mid-Term Examination: presentation/oral exam/essay* — *30-40%* *3* — *presentation* — *20-30%* *To pass the course, the minimum grade is B.*
Reading list	1. Dugundji J., 1996, *Topology*, Allyn and Bacon Inc. Boston. 2. Engelking R., 1989, *General Topology*, Heldermann Verlag, Berlin. 3. Bourbaki, N., 2013. *General Topology: Chapters 1–4* (Vol. 18). Springer Science & Business Media. 4. J.L. Kelley, 1975, General Topology, Spinger-Verlag. 5. Willard, S., 2012, *General topology*. Courier Corporation

CO-PLO Mapping

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

Last Modified Date : 4 September 2023

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MODULE HANDBOOK

Module designation	*Topics in Topology*
Code, if applicable	*MMM-7108*
Subtitle, if applicable	*Topology Related to Posets*
Semester(s) in which the module is taught	*1st or 2nd semester*
Person responsible for the module	*Chair of the Lab. Of Analysis*
Language	*Bahasa Indonesia*
Relation to curriculum	*Elective course in the 1 st or 2 nd semester of doctor's degree*
Teaching methods	*Lecture, classroom discussion, flipped classroom.*
Workload (incl. contact hours, self-study hours)	*Total workload is 232 hours per semester, which consists of 50 minutes lectures per week, 120 minutes structured activities per week, 120 minutes individual study per week, in total is 16 weeks per semester, including mid exam and final exam.*
Credit points in Credit Units	*3*
Required and recommended prerequisites for joining the module	*Students have strong knowledge on the set theory*
Module objectives/intended learning outcomes	*After completing this course, the students should have the ability to:* *CO 1. Prove some properties in topology related to posets topics.* *CO 2. Combine some properties in topology to solve some problems in areas related to topology.* *CO 3. Use or combine the concepts in topology to solve problems related to the students' research topic.*

<table>
<tr><td>Content</td><td>1. General topological space: topology, base, subbase, compactness, separation axioms, net, and convergence.
2. Partially ordered sets and their classifications: dcpos, continuous posets, complete lattices.
3. Topologies on partially ordered sets and related properties.</td></tr>
<tr><td>Examination forms</td><td>e.g. report, manuscript, oral presentation, essay, etc.</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>presentation</td><td>20-30%</td></tr></table>To pass the course, the minimum grade is B.</td></tr>
<tr><td>Reading list</td><td>1. Goubault-Larrecq, J., 2013. Non-Hausdorff topology and domain theory: Selected topics in point-set topology (Vol. 22). Cambridge University Press.
2. Gierz, G., Hofmann, K.H., Keimel, K., Lawson, J.D., Mislove, M. and Scott, D.S., 2003. Continuous lattices and domains (Vol. 93). Cambridge university press.
3. Engelking R., 1989, General Topology, Heldermann Verlag, Berlin.
4. Bourbaki, N., 2013. General Topology: Chapters 1–4 (Vol. 18). Springer Science & Business Media.</td></tr>
</table>

CO-PLO Mapping

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

Last Modified Date : September 3, 2023

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MODULE HANDBOOK

Module designation	*Topics in Topology*
Code, if applicable	*MMM-7108*
Subtitle, if applicable	*Topological Algebra*
Semester(s) in which the module is taught	*1st or 2nd semester*
Person responsible for the module	*Chair of the Lab. Of Analysis*
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 232 hours per semester, which consists of 50 minutes lectures per week, 120 minutes structured activities per week, 120 minutes individual study per week, in total is 16 weeks per semester, including mid exam and final exam.*
Credit points in Credit Units	*3*
Required and recommended prerequisites for joining the module	*Students have strong knowledge on the set theory and algebraic structure*
Module objectives/intended learning outcomes	*After completing this course, the students should have the ability to:* *CO 1. Prove some algebraic structures using topological properties.* *CO 2. Combine some properties in the algebraic structure and general topology to solve some problems in algebra.* *CO 3.Make conjecture or use some concept in topology and algebraic structure to solve problems related to the students' research topic.*

Content	*Definition of topological space, bases, sub-bases, subspace, continuous functions, convergence in topological spaces, compactness, connectedness, topological groups/semigroup and linear spaces, topological rings/semiring, and Banach algebra.*
Examination forms	*Oral presentation, essay.*
Study and examination requirements	*The final mark will be weighted as follows:* *No* — *Assessment methods (components, activites)* — *Weight (percentage)* *1* — *Final Examination: final project/presentation/oral exam/essay* — *30-40%* *2* — *Mid-Term Examination: presentation/oral exam/essay* — *30-40%* *3* — *presentation* — *20-30%* *To pass the course, the minimum grade is B.*
Reading list	1. Dugundji J., 1996, *Topology*, Allyn and Bacon Inc. Boston. 2. Engelking R., 1989, *General Topology*, Heldermann Verlag, Berlin. 3. Balachandran, V. K. , 2000, *Topological algebras*, Amsterdam, North Holland. 4. Beckenstein, E.; Narici, L.; Suffel, C., 1977, *Topological Algebras*, Amsterdam, North Holland.

CO-PLO Mapping

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

Last Modified Date : 4 September 2023

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MODULE HANDBOOK

Module Name	*Topics in Topology*
Code, if applicable	*MMM-7108*
Subtitle, if applicable	*Topological method in analysis*
Semester(s) in which the module is taught	*1st or 2nd semester*
Person responsible for the module	*Chair of the Lab. Of Analysis*
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 232 hours per semester, which consists of 50 minutes lectures per week, 120 minutes structured activities per week, 120 minutes individual study per week, in total is 16 weeks per semester, including mid exam and final exam.*
Credit points in Credit Units	*3*
Required and recommended prerequisites for joining the module	*Students have strong knowledge on the set theory*
Module objectives/intended learning outcomes	*After completing this course, the students should have the ability to:* *CO 1. Use topological method to prove some properties in mathematical analysis.* *CO 2. Combine some properties in topology to solve some problems in areas related to mathematical analysis* *CO 3. Use or combine the concepts in topology to solve problems related to the students' research topic*

Content	*Topological method in analysis (topology used to solve problems in mathematical analysis such as the Polish space, Baire one functions and semicontinuous functions defined on topological spaces)*
Examination forms	*Oral presentation, essay.*
Study and examination requirements	*The final mark will be weighted as follows:* *No* — *Assessment methods (components, activities)* — *Weight (percentage)* *1* — *Final Examination: final project/presentation/oral exam/essay* — *30-40%* *2* — *Mid-Term Examination: presentation/oral exam/essay* — *30-40%* *3* — *presentation* — *20-30%* *To pass the course, the minimum grade is B.*
Media employed	*Board, LCD Projector, Laptop/Computer*
Reading list	1. Kharazishvili A., 2017, *Strange Functions in Real Analysis*, *Chapman and Hall/CRC, 3rd , Boca Raton.* 2. Dugundji J., 1996, *Topology*, Allyn and Bacon Inc. Boston. 3. Engelking R., 1989, *General Topology*, Heldermann Verlag, Berlin. 4. Bourbaki, N., 2013, *General Topology: Chapters 1–4* (Vol. 18), Springer Science & Business Media. 5. Kuratowski K., 1966, Topoloogy : Vol I, Academic Press, New York. 6. Kuratowski K., 1968, Topoloogy : Vol II, Academic Press, New York.

CO-PLO Mapping

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

Last Modified Date : 12 August 2022