



UNIVERSITAS GADJAH MADA

Faculty of Mathematics and Natural Sciences

Mathematics Department

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Undergraduate Programme in Mathematics

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MODULE HANDBOOK

Module name	Applied Linear Algebra I												
Module level, if applicable	Bachelor												
Code, if applicable	MMM-2210												
Subtitle, if applicable	-												
Courses, if applicable	Applied Linear Algebra I												
Semester(s) in which the module is taught	2 nd (second)												
Person responsible for the module	Chair of the Lab. of Algebra												
Lecturer(s)	Prof. Dr. Sri Wahyuni												
Language	Bahasa Indonesia												
Relation to curriculum	Elective courses												
Type of teaching, contact hours	100 minutes lecture, 120 minutes structured activities												
Workload	Total workload is 90.67 hours per semester, which consists of 100 minutes lectures per week for 14 weeks, 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	2												
Requirements according to the examination regulations	Students have taken Applied Linear Algebra I course (MMM-2210) and have an examination card where the course is stated on.												
Recommended prerequisites	Students have taken “Elementary Linear Algebra (MMM-1202)” course and have participated in the final examination of the course.												
Module objectives/intended learning outcomes	As a result of completing this course, the student will be able: CO-1: to apply concept of elementary linear Algebra on Real Problems and become familiar with a diverse set of linear models and use them to interpret theory and techniques throughout the course. CO-2: strengthen ability in communicating and translating of mathematical concepts especially properties of algebra matrices and vectors to real world settings:												
Content	Topics: Applications of properties algebra matrices and vectors on problems related to 1. Physics: Equilibrium Temperature Distributions 2. Economics: Leontief Economic Models 3. Biology: Genetics 4. Forestry and agriculture: Forest Management, Age-Specific Population Growth , Harvesting of Animal Populations 5. Statistics and health: Least Square Model for Human Hearing, 6. IT: Computer Graphics, Computed Tomography, Internet Search Engines.												
Study and examination requirements and forms of examination	The final mark will be weighted as follows: <table border="1" style="width: 100%; border-collapse: collapse;"> <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>40</td> </tr> <tr> <td>2</td> <td>Mid-Term Examination</td> <td>30</td> </tr> <tr> <td>3</td> <td>Class Activities (Quiz, Homework, etc.)</td> <td>30</td> </tr> </tbody> </table> The initial cut-off points for grades A, B, C, and D should not be less than 80%, 70%, 50%, and 40%, respectively.	No	Assessment methods(components, activities)	Weight(percentage)	1	Final Examination	40	2	Mid-Term Examination	30	3	Class Activities (Quiz, Homework, etc.)	30
No	Assessment methods(components, activities)	Weight(percentage)											
1	Final Examination	40											
2	Mid-Term Examination	30											
3	Class Activities (Quiz, Homework, etc.)	30											
Media employed	LCD Projector, Board, Laptop												

Reading List	<p>[1] Shores, T.S. 2018, <i>Applied Linear Algebra and Matrix Analysis</i>, Springer (Second Edition)</p> <p>[2] Peter J. Olver and Chehrzad Shakiban, <i>Applied Linear Algebra</i>, second edition by Undergraduate Texts in Mathematics, Springer, New York, 2018</p> <p>[3] Howard Anton, and Chris Rorres, 2000, <i>Elementary Linear Algebra: Application Version</i>, John Wiley and Sons, New York.</p> <p>[4] De Franza J., Gagliardi, D., 2009, <i>Introduction to Linear Algebra with Applications</i>, McGraw-Hill, Boston.</p> <p>[5] Keith Nicholson, 2001, <i>Elementary Linear Algebra</i>, McGraw-Hill Book Co., Singapore.</p> <p>[6] David C. Lay, 2012, <i>Linear Algebra and Its Applications</i>, 4th Edition Linear Algebra and Its Applications, Addison Wesley. http://web.stanford.edu/class/nbio228-01/handouts/Linear%20Algebra_David%20Lay.pdf</p> <p>[7] Carl D. Meyer, 2000, <i>Matrix Analysis and Applied Linear Algebra</i>, SIAM http://saba.kntu.ac.ir/eecd/sedghizadeh/Ebooks/Matrix_Analysis.pdf</p>
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PLO and CO Mapping

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9
CO 1		v			v		v		
CO 2		v			v		v		

Description of The PLOs:

CP Lulusan (PLO)-1	Bertakwa kepada Tuhan Yang Maha Esa, berjiwa Pancasila dan memiliki kesadaran akan kepentingan bangsa. (devote to God Almighty, Pancasila minded, and aware of the interest of the nation.)
CP Lulusan (PLO)-2	Mampu mengidentifikasi dan menyelesaikan permasalahan terkait matematika. (are able to recognize mathematics-related problems, assess their solvability and solve them within a specified time frame.)
CP Lulusan (PLO)-3	Mampu mengembangkan cara berpikir matematis dan logis dan mampu membuat dugaan-dugaan serta penyelidikan benar tidaknya beberapa dugaan (<i>conjecture</i>). (are able to develop their logic and mathematical thinking. They are in particular able to formulate mathematical hypotheses and have an understanding of how such hypotheses can be verified or falsified using mathematical methods.)
CP Lulusan (PLO)-4	Memiliki pengetahuan yang cukup dalam bidang teknologi informasi dan terampil menggunakannya untuk mendukung pembelajaran dan penelitian matematika. (have sufficient knowledge in information technology and have ability it to support the teaching-learning and research process.)
CP Lulusan (PLO)-5	Memiliki pengetahuan yang komprehensif di bidang pemodelan matematika serta mampu menyusun model matematika berbagai permasalahan, baik di matematika maupun di bidang lain seperti sains atau kehidupan sehari-hari serta mampu menentukan strategi pemecahannya. (have comprehensive knowledge in mathematical modelling and able to create mathematical models, both in mathematics, in other fields, and in real problems. They are in particular able to solve and determine the strategy how to solve the problems.)
CP Lulusan (PLO)-6	Mampu mengidentifikasi pola-pola dasar dan bentuk-bentuk analogi serta mampu melakukan generalisasi dan abstraksi. (have generalization and abstraction abilities and are able to recognize analogies and basic patterns.)
CP Lulusan (PLO)-7	Mampu mengkomunikasikan bahasa matematika baik secara lisan maupun tulisan dengan tepat, jelas dan terorganisasi. (are able to communicate in mathematical language, oral and writing, concisely, clearly, and well-organized.)
CP Lulusan (PLO)-8	Memiliki tanggung-jawab, kepercayaan diri, kematangan emosional, etika dan kesadaran menjadi pembelajar sepanjang hayat. (have responsibility, confidence, emotional mature, ethics, and lifelong learner principle.)
CP Lulusan (PLO)-9	Mampu mengaplikasikan pengetahuan matematis dalam karier yang terkait dengan bidang matematika atau untuk melanjutkan studi pada program pasca sarjana. (have ability to apply their mathematics ability in their carrier related to mathematics and to continue their programme in master and doctoral programme.)