7. Mathematical Geophysics I

Module Name	:	Mathematical Geophysics I
Module Level	:	Bachelor
Code, if applicable	:	23H06110503
Subtitle, if applicable	:	
Courses, if applicable	:	Geophysics
Semester(s) in which the module is taught	:	2 (Second Semester)
Module coordinator(s)	:	Dr. Muhammad Alimuddin, Eng.
Lecturer(s)	:	Dr. Muhammad Alimuddin, Eng. Dr. Muhammad Taufiq Rafie
Language	:	Bahasa (Indonesian language)
Relation to curriculum	:	Compulsory course in the second year for Bachelor Degree in Geophysics
Type of teaching, contact hours	:	This course is delivered through Lectures (i.e., Project/Case-based learning), complemented by structured assignments (paper review, project/case evaluation) and independent study. Contact hours consist of 150 minutes lectures per week, plus 180 minutes per week for each of the following: structured assignments and independent study
Workload	:	Total workload is 135 hours per semester, consisting of 38 hours for lectures, and 48.5 hours each for structured assignments and independent study
Credit points	:	3 SKS (4.8 ECTS)
Requirements according to the examination regulations	:	Students are eligible to attend the examination if their absences are less than 20% of the lectures
Recommended prerequisites	:	-
Module objectives/intended learning outcomes	:	After completion of this module, students will be able to: CLO 1. Able to model complex number analysis and vector calculus in graphical, contour, or geometric form; CLO 2. Able to apply complex analysis and vector calculus methods to geophysical problems; The following is the mapping of the ILO and the CLO of this course:

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<tr><td></td><td>ILO 5</td><td>ILO 11</td></tr>
<tr><td>CLO 1</td><td>✓</td><td></td></tr>
<tr><td>CLO 2</td><td></td><td>✓</td></tr>
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<tr><td>Content</td><td>:</td><td>1. Complex analysis
2. Series and residues
3. Vectors and matrices
4. Systems of linear equations
5. Vector calculus</td></tr>
<tr><td>Study and examination requirements</td><td></td><td>Participants are marked based on their performance in theory: Project/Case Study (100%).

Students are marked based on their percentage of points obtained and based on the following grade scale:
<table>
<tr><th>Percentage of Achievement</th><th>Grade</th><th>Conversion Value</th></tr>
<tr><td>85 – 100</td><td>A</td><td>4.00</td></tr>
<tr><td>80 - <85</td><td>A-</td><td>3.75</td></tr>
<tr><td>75 - < 80</td><td>B+</td><td>3.5</td></tr>
<tr><td>70 - < 75</td><td>B</td><td>3.0</td></tr>
<tr><td>65 - < 70</td><td>B-</td><td>2.75</td></tr>
<tr><td>60 - < 65</td><td>C+</td><td>2.5</td></tr>
<tr><td>50 - < 60</td><td>C</td><td>2.00</td></tr>
<tr><td>40 - < 50</td><td>D</td><td>1.00</td></tr>
<tr><td>< 40</td><td>E</td><td>0.00</td></tr>
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<tr><td>Exams and assessment formats</td><td></td><td>Assessment in this course is primarily project-based. The project-based component requires students to model complex number analysis and vector calculus in graphical, contour, or geometric form, as well as to apply these methods to real geophysical problems. This work is developed over several weeks under instructor guidance, culminating in a written report and an oral presentation of results</td></tr>
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Reading list		Main References: Yang, W.Y., Choi, Y.K., Kim, J., Kim, M.C., Kim, H.J., dan Im, T. 2018. Engineering Mathematics with Matlab. Chapman and Hall/CRC. Additional References: 1. Kreyszig, E., Stroud, K., dan Stephenson, G. 2008. Advanced engineering mathematics. Integration, 9(4). 2. Strang, G. 2016. Introduction to linear algebra Fifth Edition. Wellesley, MA: Wellesley-Cambridge Press.
Last revision date		July 1st, 2025