Compulsory Core Program Competency Courses

1. Introduction to Geophysics

Module Name	:	Introduction to Geophysics
Module Level	:	Bachelor
Code, if applicable	:	23H06110102
Subtitle, if applicable	:	-
Courses, if applicable	:	Geophysics
Semester(s) in which the module is taught	:	I (First Semester)
Module coordinator(s)	:	Dr. Muhammad Alimuddin, Eng.
Lecturer(s)	:	Prof. Dr. Halmar Halide, M.Sc., Dr. Samsu Arif, M.Si., Dr. Muhammad Alimuddin, Eng., Syamsuddin, S.Si.,MT.
Language	:	Bahasa (Indonesian language)
Relation to curriculum	:	Compulsory course in the first 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 100 minutes lectures per week, plus 120 minutes per week for each of the following: structured assignments and independent study
Workload	:	Total workload is 90 hours per semester, consisting of 28 hours for lectures, and 31 hours each for structured assignments and independent study
Credit points	:	2 SKS (3.2 ECTS)
Requirements according to the examination regulations	:	Students are eligible to attend the final exam 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. Students are able to apply and apply geophysics as well as the basic principles of geophysical and BMI-based methods; CLO 2. Able to apply the basic principles of various natural disaster exploration and mitigation methods;

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CLO 3. Analyze structured studies on the dynamics and role of oceans as a physical system in human life and living creatures;

CLO 4. Analyze the potential threat of hydro-meteorological disasters related to the hydrological cycle of sea water which is triggered by local, regional and global climate conditions.

The following is the mapping of the ILO and the CLO of this course:
<table>
<tr><th></th><th>ILO 4</th><th>ILO 7</th><th>ILO 8</th><th>ILO 11</th></tr>
<tr><td>CLO 1</td><td>✓</td><td></td><td></td><td></td></tr>
<tr><td>CLO 2</td><td></td><td>✓</td><td></td><td></td></tr>
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<tr><td>CLO 4</td><td></td><td></td><td></td><td>✓</td></tr>
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<td>Content</td>
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1. Basic principles, scope, applications, and complexity of geophysics.
2. Observation, measurement, processing, and interpretation of geophysical data phenomena.
3. The role of basic science and other earth sciences, as well as teamwork in geophysical trends for the next 5-10 years.
4. Earth and the solar system, Earth's shape and composition, gravitational field, geoid, and tidal phenomena.
5. Subsurface surveys using geophysical methods
6. Coastal and ocean dynamics
7. Atmospheric dynamics
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<td>Study and examination requirements</td>
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<td>Participants are marked based on their performance in: Structured Assignments (25%), Quiz (10%), Case Study (55%), Written Exam (10%).

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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<td>Exams and assessment formats</td>
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<td>Student performance in this course is evaluated through various formative and summative assessments. Structured Assignments are used to assess the ability to analyze the fundamental principles and applications of different geophysical methods, fostering analytical thinking and conceptual understanding. Quizzes are administered periodically to measure mastery of geophysical concepts and methods, and to evaluate students' ability to apply marine disaster mitigation strategies effectively according to specific triggers and environmental-social contexts. A major portion of the assessment is the case study, which requires students to accurately analyze, explain, and draw conclusions on complex, real-world problems, integrating theoretical knowledge with practical problem-solving skills. The written examination (closed-book, written) evaluates students' understanding of fundamental concepts covered by CLO 1 - CLO 4.</td>
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<td>Reading list</td>
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<td>Main References:

1. Introduction to Geophysical Exploration, Philips, Keary.
2. Introduction to Theoretical Geophysics, Charles, B. Officer.
3. Ackerman, S. A., and J.A. Knox. (2011). Meteorology – Understanding the Atmosphere. Jones & Bartlett Learning.</td>
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		4. Ahrens, C. D. (2012). Essentials of Meteorology – An Invitation to the Atmosphere. Belmont: Brookes/Cole. 5. Moran, J. M. (2012). Weather Studies (5th ed.). American Meteorological Society, USA. 6. Bearman, G., 1993, Ocean Circulation, Terbuka University, UK. Additional References: 1. Introduction to Geophysical Techniques, Joko Santoso. 2. Geophysics in Engineering Investigations, MC, Dowell. 3. Behringer, W. (2010). A Cultural History of Climate. Cambridge: Polity Press. 4. Horikawa K. 1988. Nearshore Dynamics and Coastal Processes. Japan: University of Tokyo Press. 5. OSR Ongkosongo, Suyarso. 1989. Tides. Jakarta: Indonesian Institute of Sciences (LIPI), Center for Oceanographic Development. 6. Other sources on the internet.
Last revision date		July 1st, 2025