13. Geophysical Computation Methods I

Module Name	:	Geophysical Computation Methods 1
Module Level	:	Bachelor
Code, if applicable	:	23H06120403
Subtitle, if applicable	:	
Courses, if applicable	:	Geophysics
Semester(s) in which the module is taught	:	3 (Third 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	:	Introduction of Programming, Mathematical Geophysics I
Module objectives/intended learning outcomes	:	After completion of this module, students will be able to: CLO 1. Able to apply basic programming concepts: flowcharts, Python language structure, and create simple programs; CLO 2. Able to solve basic geophysical formulas with simple programs using Python language; 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 14</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. Introduction to Geophysical Computing
2. Python Basics
3. Condition Selection
4. Loops
5. Arrays, Numpy Matplotlib
6. Functions
7. Matplotlib and Numpy Applications</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>Student performance is assessed entirely through a project-based approach. Students are required to apply fundamental programming concepts—such as flowcharting, Python syntax structures, and basic program creation—to solve problems involving fundamental geophysical formulas using simple Python</td></tr>
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		scripts. The project is assigned at the beginning of the designated period and developed over several weeks, with ongoing supervision, guidance, and formative feedback from the course instructor. Upon completion, students disseminate their results through an oral presentation and submit a comprehensive written report, demonstrating both technical accuracy and effective communication of their work.
Reading list		Main References: Fuhrer, C., Solem, J.E. and Verdier, O. 2021. Scientific Computing with Python 3: An example-rich, comprehensive guide for all of your Python computational needs. Packt Publishing Ltd Additional References: 1. Hill, C. 2020. Learning scientific programming with python 2nd edition. Cambridge University Press. 2. Pajankar, A. 2021. Data visualization with NumPy and Matplotlib. In Practical Python Data Visualization (pp.57-79). Apress, Berkeley, CA. 3. Penuntun Praktikum Metoda Komputasi Geofisika I
Last revision date		July 1st , 2025