ME2101 - Mathematical Physics for Meteorology

<table>
<tr><td colspan="5">COURSE LESSON PLAN
STUDY PROGRAM: METEOROLOGY
FACULTY/SCHOOL: FACULTY OF EARTH SCIENCES AND TECHNOLOGY
INSTITUT TEKNOLOGI BANDUNG</td></tr>
<tr><td colspan="2">Course Code:
ME2101</td><td>Credits: 3</td><td>Semester: 3</td><td>Course Type:
Compulsory course</td></tr>
<tr><td colspan="2" rowspan="2">Course Name</td><td colspan="3">Fisika Matematika Meteorologi</td></tr>
<tr><td colspan="3">Mathematical Physics for Meteorology</td></tr>
<tr><td colspan="2" rowspan="2">Related Course</td><td>MA1011</td><td>Mathematics</td><td>Pre-requisite</td></tr>
<tr><td>FI1011</td><td>Physics</td><td>Pre-requisite</td></tr>
<tr><td colspan="2" rowspan="10">Study Materials</td><td colspan="2">Complex Numbers: complex algebra, complex series, Euler’s formula, hyperbolic functions, complex roots and powers, and selected applications</td><td>Expose</td></tr>
<tr><td colspan="2">Linear Algebra: matrices, determinants, vectors, eigenvalues, and eigenvectors</td><td>Expose</td></tr>
<tr><td colspan="2">Partial Differentiation: power series, total differentials, chain rule, applications of partial differentiation, and Leibniz rule</td><td>Expose</td></tr>
<tr><td colspan="2">Multiple Integrals: double and triple integrals, applications of integration, change of variables in integrals, and surface integrals</td><td>Expose</td></tr>
<tr><td colspan="2">Vector Analysis: applications of vector products, triple products, vector differentiation, fields, gradients, line integrals, and Green’s theorem</td><td>Expose</td></tr>
<tr><td colspan="2">Divergence and the Divergence Theorem</td><td>Expose</td></tr>
<tr><td colspan="2">Curl and Stokes’ Theorem</td><td>Expose</td></tr>
<tr><td colspan="2">Fourier Series</td><td>Explore</td></tr>
<tr><td colspan="2">Fourier Transform</td><td>Explore</td></tr>
<tr><td colspan="5">Learning Outcomes</td></tr>
<tr><td colspan="2">Code</td><td colspan="3">LO</td></tr>
<tr><td colspan="2">PLO-1.1</td><td colspan="3">Able to use basic science and mathematics as a foundation for understanding the fundamentals of meteorology.</td></tr>
<tr><td colspan="2">PLO-2.2</td><td colspan="3">Able to demonstrate an understanding of basic meteorological knowledge to explain weather or climate phenomena.</td></tr>
<tr><td>Code</td><td>CO</td><td colspan="3">Elements of Course Learning Outcomes (CO)</td></tr>
<tr><td>1.1</td><td>1</td><td colspan="3">Students are able to demonstrate knowledge of various mathematical tools, their uses in physics, and their properties, including complex numbers, matrices, partial derivatives, multiple integrals, vector analysis, Fourier series, and Fourier transforms.</td></tr>
<tr><td>1.1</td><td>2</td><td colspan="3">Students are able to apply mathematical tools to solve basic and simple problems.</td></tr>
<tr><td>1.1</td><td>3</td><td colspan="3">Students are able to apply mathematical tools to solve problems involving multiple concepts, excluding complex problems and open-ended problems.</td></tr>
<tr><td>2.2</td><td>4</td><td colspan="3">Students are able to identify and/or formulate appropriate mathematical models for physical problems.</td></tr>
<tr><td>2.2</td><td>5</td><td colspan="3">Students are able to apply mathematical tools to solve various physical problems.</td></tr>
<tr><td colspan="2">Learning Methods</td><td colspan="3">Lectures
Group discussions
Cooperative learning
Problem-based learning</td></tr>
<tr><td colspan="2">Learning Modalities</td><td colspan="3">Synchronous offline learning
Blended/asynchronous online learning</td></tr>
<tr><td colspan="2">Assessment Method</td><td colspan="3">Exams, quizzes, and assignments</td></tr>
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