Module Description of Computations Mathematics

Module Name	:	Computations Mathematics
Module Level	:	Bachelor
Code, if applicable	:	23H01130703
Subtitle, if applicable	:	-
Courses, if applicable	:	Computations Mathematics
Semester(s) in which the module is taught	:	5 (Fifth Semester)
Module coordinator(s)	:	Agustinus Ribal, S.Si.,M.Sc., Ph. D
Lecturer(s)	:	Agustinus Ribal, S.Si.,M.Sc., Ph. D Dr.Khaeruddin, M.Sc.
Language	:	Bahasa (Indonesian language)
Relation to curriculum	:	Elective course in third year for Bachelor degree in Mathematics
Type of teaching/teaching method	:	Lecturing, Small Group Discussion, Cooperative Learning, Self-Directed Learning
Contact hours	:	150 minutes lectures per week, 180 minutes structured activities per week, and 180 minutes independent study per week
Workload	:	Total workload is 135 hours per semester which consists of 40 hours per semester for Learning and Teaching, 47.5 hours per semester for Self-Study, and 47.5 hours per semester for Structured Works
Credit points	:	3 (4.8 ECTS)
Requirements according to the examination regulations	:	Students are required to attend at least 80% of the total meetings which is recorded via the attendance menu at https://sikola-v2.unhas.ac.id/, complete all mandatory assignments, and obtain permission from the lecturer to participate in the writtenexamination.
Recommended prerequisites	:	Students have completed and taken the exams for Advanced Mathematics, Numerical Methods, Differential Equations
Module objectives/intended learning outcomes	:	After the completion of this module, the student will be able to: CLO 1. understanding several mathematical methods and concepts and applying these methods in other related fields such as industry, economics, and agriculture; CLO 2. analyzing and implementing several numerical methods into other fields of study; CLO 3. create several mathematical models, explain procedures, and solve problems numerically using appropriate techniques and interpret the results obtained in other related fields; CLO 4. communicating ideas, developing personal skills based on local wisdom, and easily adapting to communities with different backgrounds.

<table>
<tr><td></td><td></td><td>The following is the mapping of the ILO and the CLO of this course:
<table>
<tr><th></th><th>ILO 3</th><th>ILO 4</th><th>ILO 6</th><th>ILO 7</th></tr>
<tr><td>CLO 1</td><td>X</td><td>X</td><td></td><td></td></tr>
<tr><td>CLO 2</td><td></td><td>X</td><td></td><td></td></tr>
<tr><td>CLO 3</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td>CLO 4</td><td></td><td></td><td></td><td>X</td></tr>
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<tr><td>Content</td><td>:</td><td>Computational Mathematics is an elective course in the mathematics program that equips students with the ability to solve real-world problems numerically using computers, as well as analyze errors and convergence of numerical methods. The course covers numerical methods for initial value problems, such as Euler's method, Runge-Kutta methods, multi-step methods, and corrector-predictor methods, as well as their application to systems of ordinary differential equations of first and higher orders. Additionally, the course discusses two-point limits, vector and matrix norms, spectral radii, matrix series and their convergence, as well as iterative methods for large-scale linear systems and nonlinear systems.</td></tr>
<tr><td>Study and examination requirements</td><td>:</td><td>Study and examination requirements:
Students must attend 15 minutes before the class starts.
Students must switch off all electronic devices.
Students must inform the lecturer if they will not attend the class due to sickness, etc.
Students must submit all class assignments before the deadline.
Students must attend the exam to get final grade.</td></tr>
<tr><td>Exams and assessment formats</td><td>:</td><td>Participants are marked based on their performance in theory: Written Exam (40%), and Report (60%).

Reports measure analytical and writing skills. The Written Exam assesses comprehension and synthesis of all materials discussed during the semester. Altogether, these components account for 100% of the final grade.

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>
</table></td></tr>
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			40 - < 50	D	1.00	
			< 40	E	0.00	
Reading list	:	1. Burden R.L. and Faires J.D., Numerical Analysis (9th edition) Brooks/Cole, Australia, UK, USA, 2011. 2. Smith G.D., Numerical Solution of Partial Differential Equations - Finite Difference Methods, Clarendon Press, Oxford, 1978.				
Last revision date	:	July 28th, 2025				