PROGRAM PLAN AND SEMESTER LEARNING ACTIVITIES (RPKPS) SCHOOL YEAR 2021/2022

Physical Geophysics

Numerical Completion

MFG 4611/ 2 credits

Mentoring Team:

Sudarmaji

UNIVERSITAS GADJAH MADA FACULTY OF MATHEMATICS AND NATURAL SCIENCES

2021

	Gadjah Mada University Faculty of Mathematics and Natural Sciences Department of Physics / S1 Geophysics Study Program Academic Year 2021/2022	**Document Code:** .....

SEMESTER LEARNING PROGRAM AND ACTIVITY PLAN (RPKPS)

Course Code	Course Name	Weight (credit)		Semester	Course Status	Prerequisite Courses
MFG 4611	*Numerical Resolver*	*T: 2*	*P: -*	*Odd*	*Choice*	*MFF 2023*

Course Brief Description	Numeris solutions study various methods of solving numeris for geophysical, physical, mathematical and applied problems. This course aims to enable students to master 1. Solving linear and nonlinear equations 2. Completion of Interpolation and curva fittings 3. Completion of differentiation and integration 4. Solving diffential equations	
Graduate Learning Outcomes (CPL) Charged to MK	***CPL-1***	**Good Attitude**: Graduates are honest, disciplined, curious, critical, confident, independent, emotionally mature, cooperative, and trustworthy. Uphold norms, values, morals, religion, general ethics and professional ethics, and actively play a role in the global movement of sustainable development and behave professionally
	CPL-2	**Mastery of knowledge:** Graduates are able to apply basic science (mathematics, physics, chemistry, biology, geology), and geophysics in general and their relationship with other sciences such as geology, geodesy, geochemistry, geography, computing and information technology
	CPL5	**Synthesis and Evaluation Skills** : Graduates are able to interpret geophysical data in the form of solving advanced and reverse problems (inverse problems) in an integrated manner that have ambiguous characters, carry out interpretation by making models and / or solving simple forward and reverse problems and are skilled in the use of computers both for the purposes of solving geophysical problems and for communication and internet access
Course Learning Outcomes (CPMK)	**After completing the learning of this course, students are expected to be able to:**	
	CPMK-1	Cultivate a good and professional attitude [CPL-1]
	CPMK-2	Solving Linear, nonlinear and interpolated equations [CPL-2, CPL-5]
	CPMK-3	Solving differentiation, integration and differential equations [CPL-2, CPL-5]

CPMK link with Learning Material and Form, as well as Time Allocation		**Learning Materials**	**Forms of Learning**	**Time Allocation**
	CPMK-2	Introduction to Numerical	TCL - SCL mixed	2 Hour
	CPMK-2	Linear Equations, Methods of Elimination	TCL - SCL mixed	2 Hour

		Gaussian and Gauss-Jordan Method of		
	CPMK-2	LU decomposition , Cholesky , Jacobi Iteration and Gauss-	TCL - SCL mixed	2 Hour
	CPMK-2	Solving non-linear equations	TCL - SCL mixed	2 Hour
	CPMK-2	Least Square and curve fittings	TCL - SCL mixed	2 Hour
	CPMK-2	Completion of Numerical Interpolation	TCL - SCL mixed	2 Hour
	CPMK-2	Differentiation Completion	TCL - SCL mixed	2 Hour
UTS/Project Task Results/Case Analysis				
	CPMK-3	Numeris Integration Trapezoidal Rule , Simpson 1/3 Rule and Simpson's 3/8 Rule	TCL - SCL mixed	2 Hour
	CPMK-3	Numerical integration of the Romberg Rule and the Gauss-Quadrature	TCL - SCL mixed	2 Hour
	CPMK-3	Ordinary differential equations Euler Method and Runge-Kutta Method of 2nd	TCL - SCL mixed	2 Hour
	CPMK-3	Ordinary differential equations Runge- Method Kutta order-4 and Finite Difference Method	TCL - SCL mixed	2 Hour
	CPMK-3	Press Introduction. Partial differential	TCL - SCL mixed	2 Hour
	CPMK-3	Press settlement. elliptic partial differential	TCL - SCL mixed	2 Hour
	CPMK-3	Press settlement. Parabolic partial differential	TCL - SCL mixed	2 Hour
UAS/ Project Task Results/ Case Analysis				
Learning Methods	TCL - SCL mixed			

<table>
<tr><td>Student Learning Experience</td><td colspan="6"></td></tr>
<tr><td>Access to Learning Media an/ LMS and Offline &; Online Percentage</td><td colspan="6">LCD, paper, google classroom/ internet</td></tr>
<tr><td rowspan="9">Assessment Methods and Alignment with CPMK</td><td>Assessment Techniques</td><td>Assessment Percentage</td><td>Criteria/ Indicators</td><td>CPMK-1</td><td>CPMK-2</td><td>CPMK-3</td></tr>
<tr><td>Participatory Activities *)</td><td>10</td><td>Liveliness</td><td>√</td><td></td><td></td></tr>
<tr><td>Project Results/Hasil Case Study/ PBL Results*)</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="6">Cognitive</td></tr>
<tr><td>Assignment</td><td>20</td><td>Task Grad</td><td></td><td>√</td><td>√</td></tr>
<tr><td>Quiz</td><td>-</td><td></td><td></td><td></td><td></td></tr>
<tr><td>UTS</td><td>35</td><td>Test Score</td><td></td><td>√</td><td></td></tr>
<tr><td>UAS</td><td>35</td><td>Test Score</td><td></td><td></td><td>√</td></tr>
<tr><td>Total</td><td>100</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="6">*) can also be obtained from UTS or UAS which is the result of participatory activities or project / case study results. In accordance with IKU 7, the percentage of participatory activities and project results/case studies/PBL results is at least 50%.</td></tr>
<tr><td>Reference List</td><td colspan="6">1. Kiusalaas, 2013,' Numerical Methods in Engineering with Python 3', cambridgeuniversitypress, New York, USA
2. Chapra, C.S. and Canale, R.P, 2015, 'Numerical Methods for Engineers', 7th Edition, Mc Graw Hill Education, New York, USA
3. Madhumangal Pal, 2007, 'Numerical Analysis for Scientists and Engineers: Theory and C Programs, Alpha Science Intl Ltd.
4. William H.P., 2007,'Numerical recipes The art of scienti□c Computing", Cambridge University Press.</td></tr>
<tr><td>Name of Lecturer (Team Teaching)</td><td colspan="6">Dr. Sudarmaji and Dr. Afif Rahman, MT</td></tr>
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Authorization	Drafting Date	Course Coordinator	Coordinator of Expertise (if applicable)	Head of Study Program
	September 7 2022	 Dr. Sudarmaji, MSi		 Dr. Sudarmaji, MSi