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

Physical Geophysics
Mathematical Physics I

MFG 1020/ 3 credits

Mentoring Team:

Prof.Dr. Agung B S Utomo, Dr. Eko Sulistya M.Si., Dr. Budi Eka Nurcahya M.Si., Ikhsan Setiawan M.Si

GADJAH MADA UNIVERSITY
FACULTY OF MATHEMATICS
AND NATURAL SCIENCES
2021

SEMESTER LEARNING PROGRAM AND ACTIVITY PLAN (RPKPS)

Course Code	Course Name	Weight (credit)		Semester	Course Status	Prerequisite Courses
MFG 1020	Mathematics FIsika I	T : 3	P:	Odd	Mandatory	-

Course Brief Description	Mathematics Physics I is a compulsory subject of the S1 Physics study program at Gadjah Mada University. This course can be taken by students in the even semester of the first year of study with the approval of their supervisor. Before taking this course, students are strongly encouraged to take Calculus courses. This is because in the Mathematics Physics I (and Mathematics II and III) courses, Calculus is used as a foundation in order to better understand Mathematics (for) Physics so that it will be easier to understand Physics and Further Physics. With Physics Mathematics I (II and III) lectures as instruments, students are expected to better understand the theoretical foundations of various Physics and Advanced Physics phenomena.

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 general 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

Course Learning Outcomes (CPMK)	**After completing the learning of this course, students are expected to be able to:**	
	CPMK-1	Can explain the concepts of Complex Algebra and the functions of complex variables.
	CPMK-2	Can describe Partial Derivative, Total derivative and high derivation/extremurum value.
	CPMK-3	Can explain analytical geometry of two dimensions (parabola, ellipse and hyperbola) and three dimensions (paraboloida, ellipsoid and hyperboloida) and series functions
	CPMK-4	Can explain vector algebra, vector calculus and direction vector derivative operations.
	CPMK-5	Can describe the integration of lines, planes and volumes.
	CPMK-6	Can explain the integration of gradients, divergences and rotations as well as Stokes' theorem and Gauss's theorem.

CPL Mapping with CPMK			CPMK1	CPMK2	CPMK3	CPMK4	CPMK5	CPMK6
		CPL-1						
		CPL-2						

CPMK link with		**Learning Materials**		Forms of Learning	Time Allocation
	CPMK-1	1. Introduction		TCL - SCL mixed	2 Hours

Learning Materials and Forms, as well as Time Allocation		2. Numbers complex (concept Numbers complex algebra Numbers complex, complex conjugate, polar representative,		
	CPMK-1	de Moivre's theorem, complex roots, polynomial equations logarithms and powers of complex numbers	TCL - SCL mixed	2 Hours
	CPMK-1	Hyperbolic functions: definition, hyperbolic trigonometric functions hyperbolic identities, hyperbolic equations, inverse of hyperbolic functions, calculus of hyperbolic functions),	TCL - SCL mixed	2 Hours
	CPMK-2	Partial derivative I (multi-variable function, definition of partial derivative, total derivative and total differential, exact and inexact differential)	TCL - SCL mixed	2 Hours
	CPMK-2	Partial Derivative II (important theorem theorem, rule chain change modifiers, values extreme)	TCL - SCL mixed	2 Hours
	CPMK-3	Analytic Geometry (curves and surfaces, parametric equations, implicit equations, and explicit equations	TCL - SCL mixed	2 Hours
	CPMK-3	conical slices (parabola, hyperbola, ellipse), wake-up three dimension (parabolaide, hyperbolaides, ellipsoids, spheroids)	TCL - SCL mixed	2 Hours
UTS/Project Task Results/Case Analysis Results				
	CPMK-3	Series I (power series, Taylor series)	TCL - SCL mixed	2 Hours
	CPMK-3	Series II (MacAurain series, harmonic series as well as complex)	TCL - SCL mixed	2 Hours
	CPMK-4	Vector Algebra, line equation, field equation, line to plane distance, point distance with lines.	TCL - SCL mixed	2 Hours
	CPMK-4	Vector calculus: The vector derivative of a parameters, scalar gradient, Divergence, Rotation, Laplacian	TCL - SCL mixed	2 Hours
	CPMK-5	Cylindrical coordinates and spherical coordinates, system curved coordinates,		
	CPMK-5	line and surface integrals, the connectedness of a region, Green's theorem on a plane, conserved and potential fields, volume integrals	TCL - SCL mixed	2 Hours
	CPMK-6	Integral forms of gradiency, divergence, and rotation, Theorem of Stokes and Gauss	TCL - SCL mixed	2 Hours
UAS/ Project Task Results/ Case Analysis Results				
Learning Methods	TCL - SCL mixed			

Learning Experience Student	Listen to lecturers' explanations and discussions							
Access to Learning Media an/ LMS and Offline &; Online Percentage	Slides and reference books							
Method Valuation and Harmony with CPMK	**Assessment Technique**	**Assessment Percentage**	**Criteria / Indicator**	**CPMK-1**	**CPMK-2**	**CPMK-3**	**CPMK-4**	**CPMK-5**
	Activity Participatory^{*)}							
	Result *Project*/Result of Studies Case/ PBL Result^{*)}							
	Cognitive							
	Assignment	**20**						
	Quiz							
	UTS	**40**						
	UAS	**40**						
	Total	**100**						
	^{*)} can also be obtained from UTS or UAS which is the result of participatory activities or results *project*/case study. In accordance with IKU 7, **the percentage of** participatory activities and project/study results PBL cases/results are at least 50%.							
Reference List	Main: 1. F. Riley, M. P. Hobson and S. J. Bence, 2006, Mathematical methods for physics and engineering, third edition, Cambridge Press. 2. Tom M. Apostol, Calculus, vol. I, issue II, John Wiley & Sons, 1967 3. Tom M. Apostol, Calculus, vol. II, issue II, John Wiley & Sons, 1967. Suggestion 1. Boas, M.L., 1983, Mathematical Methods in the Physical Sciences, 2nd ed., John Willey & Sons, NY. 2. Thomas G.B. dan Finney R.L., 1995, Calculus and Analytic Geometry, Addison Wesley.							
Lecturer Name (*Team Teaching*)	Prof. Dr. Agung B S Utomo, Dr. Eko Sulistya M.Si., Dr. Budi Eka Nurcahya M.Si., Ikhsan Setiawan M.Si							
Authorization	**Drafting Date**	**Course Coordinator**				**Coordinator of Expertise (if applicable)**	**Head of Study Program**	

| | *2022* | | | Dr.. Sudarmaji,MSi |