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

Geophysics of

Seismic Methods

MFG 2117 / 3 credits

Mentoring Team:

Seismic Method Course Supervisory Team

GADJAH MADA UNIVERSITY
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 2117	*Seismic Method II*	*T: 3*	*P: -*	*4*	*Mandatory*	*MFG-2106, MFF-1405*

Course Brief Description	After attending lectures and practicum on seismic methods, students are expected to be able to explain the basic concepts of reflected seismic waves for exploration, calculate seismic wave parameters, design data acquisition, process data processing standards, and interpret simple seismic data, both qualitatively and quantitatively.	
Graduate Learning Outcomes (CPL) Charged to MK	***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.
	CPL-3	**Operational and comprehensive skills**: Graduates are able to apply all geophysical methods (seismic, gravitational, magnetic, electrical, electromagnetic, and thermic methods) for energy exploration (e.g. oil and gas, coal, geothermal), mining materials (eg: iron, copper, gold, silver, tin) as well as groundwater and disaster mitigation.
	CPL-4	**Application and analysis skills**: Graduates are able to carry out and manage a geophysical survey which includes scientific steps in the acquisition, processing and interpretation of data for the exploration of natural resources both for energy (e.g. oil and gas, coal, for energy exploration (e.g. oil and gas, coal, geothermal), mining materials (eg: iron, copper, gold, silver, tin) as well as groundwater and disaster mitigation
	CPL-5	**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	Have scientific competence in the field of Geophysics, especially exploration methods using conceptual reflected seismic waves. [CPL-2]
	CPMK-2	Utilizing the propagation of reflected seismic waves in the earth for the purposes of exploration / study of the existence of natural resources, especially oil and gas. [CPL-3]
	CPMK-3	Process 2D reflected and biased seismic data and know the basic correction steps of seismic data. [CPL 4]
	CPMK-4	Interpret both 2D and 3D reflected seismic data, and know the basic interpretation steps of seismic data. [CPL 5]

CPL mapping with CPMK

	CPMK1	CPMK2	CPMK3	CPMK4
CPL-2				
CPL-3				
CPL-4				
CPL-5				

The Relationship of CPMK with Learning Materials and Forms, as well as Time Allocation

	Learning Materials	Forms of Learning	Time Allocation
CPMK-1	Theory of elasticity, Seismic survey tools, positioning, energy sources, detectors, recording. Data acquisition parameters.	TCL - SCL mixed	2 Hours
CPMK-1	Geophone group, designing geophone array, calculating run response. Attenuation, quality factor, wave disposition due to the nature of the medium. Wavelet.	TCL - SCL mixed	2 Hours
CPMK-1	Identify waves, flat reflectors, oblique reflectors, flat refractors and oblique refusers. Vertical separation, horizontal separation, snapshot in time and space.	TCL - SCL mixed	2 Hours
CPMK-2	Seismic shallow refractive waves, geophone spans, interpretation of delay time method, HagiwaraMasuda method, General Reciprocal Method (GRM).	TCL - SCL mixed	2 Hours
CPMK-2	Routine processing of seismic data, demultiplex, labeling, gathering, gain recovery, static correction (elevation, weathered layer), dynamic correction (NMO, residual). Speed: Speed analysis, speed estimation, checkshot.	TCL - SCL mixed	2 Hours
CPMK-2	Fourier transforms, convolutions, correlations. Synthetic seismogram Frequency filter, inversion filter, F-K filter. Wiener filter, spike deconvolution and	TCL - SCL mixed	2 Hours
CPMK-2	F-K method migration (Stolt). Introduction to modeling with	TCL - SCL mixed	2 Hours

		ray trace method, wave theory, and finite surgery..		
	UTS/Project Task Results/Case Analysis			
	CPMK-3	Vertical Seismic Profiling (VSP)	TCL - SCL mixed	2 Hours
	CPMK-3	AVO (Amplitude Versus Offset)	TCL - SCL mixed	2 Hours
	CPMK-3	Seismic Tomography	TCL - SCL mixed	2 Hours
	CPMK-4	Seismic Interpretation of 3D Data	TCL - SCL mixed	2 Hours
	CPMK-4	It is expected that students can be skilled in using Hampson Russell software to perform Attribute analysis.	TCL - SCL mixed	2 Hours
	CPMK-4	It is expected that students can understand drilling and logging work.	TCL - SCL mixed	2 Hours
	CPMK-4	It is expected that students can classify oil and gas reservoirs	TCL - SCL mixed	2 Hours
	UAS/ Project Task Results/ Case Analysis			
Learning Methods	TCL - SCL mixed, discussions, assignments and lectures			
Student Learning Experience	Listening / listening to lecturers' explanations, discussions and presentations			
Access Learning Media / LMS and Offline &; Online Percentage	Reference book, Internet-technology, Classroom, Whiteboard, LCD, Powerpoint			

Assessment Methods and Alignment with CPMK	**Assessment Techniques**	**Assessment Percentage**	**Criteria/ Indicator**	**CPMK-1**	**CPMK-2**	**CPMK-3**	**CPMK-4**
	Participatory Activities*)	**10**	**Attend and**	√			
	***Project Results/*Case Study Results/PBL Results*)**						
	Cognitive Assignment	**10**	**Paper / file**	√	√		

	Quiz						
	UTS	**40**	**value**	√	√	√	√
	UAS	**40**	**value**	√	√	√	√
	Total	**100**					
	*) 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%.						
Reference List	1. Sismanto, Seismic Data Interpretation., Geophysical Lab, FMIPA-UGM, 1999. 2. Sheriff, Robert E, and Lloyd P. Geldart, Exploration Seismology., 2nd edition, Cambridge University 3. Press, USA, 1995. 4. Humpson-Russell HRS Manual, 2015. Perel Manual, 2013						
Name of Lecturer (*Team Teaching*)	1. Prof. Dr. Sismanto, MSi 2. Dr. Budi Eka Nurcahya, MSi						

Authorization	**Drafting Date**	**Course Coordinator**	**Coordinator of Expertise (if any)**	**Head of Study Program**
	August 3 2022	*(Signature) Prof. Dr. Sismanto, MSi*		Dr. Sudarmadji, MSi