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

Geophysical Geodynamics

MFG 4615/ 2 credits

Mentoring Team:

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	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 4615	*Geodinamics*	*T: 2*	*P: -*	*Odd*	*Choice*	*Mechanics of the Continuous Medium*

Course Brief Description	Geodynamics courses are related to the understanding, scope, methods and benefits of geodynamics; History of geodynamic developments and trends 5 to 10 years from now. Geodynamic phenomena in geology and geophysics: Earth evolution; geography and physiography of continents and oceans; the crust, mantle and core of the Earth; earthquake focuses; distribution of gravitational anomalies; phenomena from absolute and geothermal dating; continental drift and expansion of the ocean floor. Deformation mechanism: Stress, strain and rheology of rocks; plasticity and plastic material; viscosity and viscous fluid; Maxwell liquids and Kelvin solids; fracture physics; Earth rheology. Geodynamic effects: Earth precession, tides and phase lag; polar wandering and convection currents. Orogenesa: theory of plate movement and other theories of orogenesa. Geo-tectonics: Theories about faulting, folding, petrofabrics, earthquake sources, boundary effects. Local hues: boudinage, piercement structure, volcanic effects, impact hues, ejecta, gravitational crater, contemporary shift. Global tectonics: Earth's internal structure, ocean floor expansion and continental drift, ocean ridges, transform and transcurrent faults, suduction zones and mountain ranges. This course aims to introduce and instill the basics of earth science needed to understand conceptions and discuss problems related to the mechanisms and processes of surface features of the Earth. Also as a focus as well as a provision to understand deeper and further geophysical expertise lectures. Students who have taken this course seriously are expected to be able to solve simple geodynamic problems, and have adequate provisions to understand geophysical expertise courses in the following semesters.
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.
	CPL-4	**LSkill application and analysis:** ulusan able to carry out and manage a geophysical survey which includes scientific steps in acquisition, processing and

		interpretation of data for natural resource exploration for both energy (e.g. oil and gas, coal, for energy exploration (e.g. oil and gas, coal, geothermal), mining materials (e.g. iron, copper, gold, silver, tin) and groundwater and disaster mitigation
Course Learning Outcomes (CPMK)	**After completing the learning of this course, students are expected to be able to:**	
	CPMK-1	Introducing the realm of geodynamics supported by several geophysical methods [CPL-1, CPL-2]
	CPMK-2	Deepening of appropriate geophysical methods [CPL-2]
	CPMK3	Applications of geophysical methods especially seismology (triple junction), geomagnetic (polar wandering), rock dating, displacement [CPL-4]

CPL Mapping with CPMK

	CPMK1	CPMK2	CPMK3
CPL-1			
CPL-2			
CPL-4			

CPMK link with Learning Material and Form, as well as Time Allocation		**Learning Materials**	**Forms of Learning**	**Time Allocation**
	CPMK1	Contract tuition, Geological time, Mineral and Rock, The dynamic Earth, The Earth's Interior	TCL and SCL-Lectures and discussions	2 Hours
	CPMK1	Seasons, Earth radius, Heat transport, Tidal Force	TCL and SCL-Lectures and discussions	2 Hours
	CPMK1	Earthquakes, Seismograms, Hook's Law, Lithospheric Plate Growth on oceanic ridges, Subduction on ocean trenches, Formation of plate boundaries, Transform fault	TCL and SCL-Lectures and discussions	2 Hours
	CPMK3	Plate tectonic, Triple junction, Stability triple junction, Three types of plate boundaries: Ridge, Trench, Transform Fault, 10 types of triple junction, Kinematic triple junction	TCL and SCL-Lectures and discussions	2 Hours
	CPMK3	Three basic types of plate boundaries: divergent, convergent, strike slip, Stable configuration of a single boundary, Evolution of triple	TCL and SCL-Lectures and discussions	2 Hours
	CPMK3	RRR, TTT, RTF triple junction, Example: RRR,	TCL and SCL-Lectures and discussions	2 Hours

		TTT, RTF triple junction, RRR stability, TTT, Triple junction completion example		
	CPMK3	Magnetic strips, describing the Earth's magnetic field, spherical polar coordinates, magnetizing rocks, magnetic field induction, paleomagnetic latitude calculations, location of paleomagnetic polespolar wander paths, reversal timescale, reconstruction past plate motions.	TCL and SCL-Lectures and discussions	2 Hours
UTS/Project Task Results/Case Analysis				
	CPMK3	Dating rock and relative events, absolute dating, relative dating, Law of Superposition, Law of Cross – Cutting, Law of Included Fragments, radiometric method, Mass Spectroscopy, Exponential Decay, Exponential Decay, Decay Chains, Ideal Radiometric Dating, Potassium- Argon,Inherited Argon, A K-Ar Isochron, Rb-Sr, Isochron Diagram, What initial Sr-87/Sr-86 means, U-Th-Pb Dating, Concordia Plot, Discordia Plot, Samarium-Neodymium, The CHUR Model:Chondritic Uniform Reservoir (CHUR) line, Neodymium Model Ages, Nd-Sm Model Ages, Uranium-thorium dating method, Fission Track Dating, Optically Stimulated Luminescence Dating, Cosmogenic	TCL and SCL-Lectures and discussions	

		Dating, Beryllium-10 Dating, Chlorine-36 Dating		
	CPMK3	Decay Laws, Isotopes of Chemical Elements, Parent and Daughter Isotopes, Decay Chain – Radium Series, Usable Isotopes, Uranium-Lead- Dating, Uranium-Lead- Dating, Potassium-Argon-Dating, Potassium-Argon- Dating, Footprints in Laetoli, Tanzania, Argon-Argon-Dating, Different Methods in Comparison, A Brief History of Time, Oldest Rocks, Half-Lives and Range of Use, The Origin of Radioactive Carbon, Radiocarbon Dating, Radiocarbon Dating – "Ötzi", the Iceman, Dating Rock Layers, What is Age?, What are the ways to tell RELATIVE AGE, What is the Law of Superposition?, Age and Superposition, What is Extrusion?, What is an Intrusion?, What is a Fault?,	TCL and SCL-Lectures and discussions	
Learning Methods	Lectures and Discussions			
Student Learning Experience				
Access to Learning Media an/ LMS and Offline &; Online Percentage	LCD, paper, google classroom/ internet			

Assessment Methods and Alignment with CPMK	**Assessment Techniques**	**Percentage e Assessment**	**Criteria/ Indicators**	**CPMK 1**	**CPMK 2**	**CPMK 3**	
	Participatory Activities[*)]						
	***Project Results/*Case Study Results/PBL Results**[*)]						
	Cognitive						
	Assignment	**15**		√			
	Quiz	**-**					
	UTS	**35**		√	√		
	UAS	**50**				√	
	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. Scheidegger, A.E., 1982, Principles of Geodynamics, Springer-Verlag 2. Kearey, P. and F.J. Vine, 1990, Global Tectonics, Blackwell Sci. Publ. 3. Turcotte, 1982, Geodynamics. Appli. of Continuum Physics to Geological Problems, John Wiley &; Sons.						
Name of Lecturer (*Team Teaching*)	Ari Setiawan						

Authorization	**Drafting Date**	**Course Coordinator**	**Coordinator of Expertise (if any)**	**Head of Study Program**
	August 3 2022	 Dr.-Ing. Ari Setiawan, M.Si.		