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



Geophysics Artificial Intelligence for Geosciences MFG-4649/ 2 credits

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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:** 

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	S	SEMESTER LEARNING PROGRAM AND ACTIVITY PLAN (RPKPS)										
Course Code		Course Name	Weight (credit)		Semester	Course Status		Prerequisite Courses				
MFG-46	549	Artificial Intelligence for Geosciences	<i>T: 2</i>	<i>P:</i> -	Odd	Choice		MFG-1102				
Course Bri Description	ief n	This Artificial Inte data science, espec mastery of technol particular, this cour In this course, stud exercises using the data science projec understand the bas <i>analytics</i> to answe	lligence vially i logy is rse intri- lents w Pytho ts to an sic m r their	e for on in the s one roduce vill be on prog nswer tethodorespec	Geosciences field of earth of the oblig s the use of <i>a</i> given matering gramming lan problems in g blogy of <i>dat</i>	(MFG-4649) course com in science. In the digital ations that must be ow <i>lata science</i> in earth scient al on the basic methodo inguage. Then students a geoscience. In the end, st a science, and design is that are still related to o	contains material on introduction to gital era like today, proficiency and owned by university graduates. In sciences for S1 Geophysics students. nodology of <i>data science</i> along with its are also invited to work on small id, students are expected to be able to gn the right methodology and <i>task</i> it to earth science.					
Graduate Learning Outcomes (CPL)CPL-2Mastery of general knowledge: Graduates are ab physics, chemistry, biology, geology), and geophy with other sciences such as geology, geodesy, geo information technology						<b>ledge:</b> Graduates are able t y, geology), and geophysic geology, geodesy, geoche	o apply basi s in general mistry, geog	ic science (mathematics, and their relationship graphy, computing and				
Charged to MK	D	CPL-4	<b>Application and analysis skills</b> : 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 form of solving advanced and reverse problems (inverse problems) in an integrated manner that have ambiguous characters, carry out interpretation by making models ar or solving simple forward and reverse problems and are skilled in the use of compute both for the purposes of solving geophysical problems and for communication and internet access							t geophysical data in the s) in an integrated by making models and / a the use of computers mmunication and				
Course Lea	arning	After completing	the lea	rning	of this cours	e, students are expecte	d to be abl	le to:				
Outcomes (CPMK)		СРМК-1	Able to mention the definition and history <i>of data science</i> and artificial intelligence [CPL-2]									
		СРМК-2	Able to identify, compare, and design data review processes [CPL-2] [CPL-4]									
		<b>CPMK-3</b> Able to formulate, demonstrate, and design data correction, data cleaning, and feature engineering processes [CPL-2] [CPL-4] [CPL-5]										
	CPMK-4         Able to explain classification, regression, and clustering methods [CPL-2] [CPL-4]           [CPL-5]         [CPL-5]							[CPL-2] [CPL-4]				
CPMK-5Able to demonstrate Artific[CPL-4] [CPL-5] methods						ficial Neural Network (ANN) and Deep Learning [CPL-2]						
		СРМК-6	Able	to desig	gn data scienc	e model evaluation [CPL-4	4] [CPL-5]					

CPL mapping with CPMK       CPMK1       CPMK2       CPMK3       CPMK4       CPMK5       CPMK4         CPL-2       CPL-4       CPL-2       CPL-4       CPL-2       CPL-4       CPL-2       CPL-4       CPL-2       CPL-4       CPL-2       CPL-3       CPL-3       Able to identify compare, and design data correction processes       CPL-3       Able to formulate, demonstrate, and design data correction processes, data cleaning, and feature engineering       CPL-3       CPMK-4       Able to explain chast estestowe cl	cation										
CPL2       Decision       Decision <thdecision< th="">       Deci</thdecision<>	cation										
CPL-4       CPL-4       CPL-5       CPL-5         The Relationship of CPMK with Learning Materials and Forms, as well as Time Allocation       CPMK-1       Able to mention the definition and history of data science and artificial intelligence       TCL - SCL mixed       4         CPMK-3       Able to identify, compare, and design data review processes       TCL - SCL mixed       6         CPMK-3       Able to formulate, demonstrate, and design data correction processes, data cleaning, and feature engineering       TCL - SCL mixed       4         CPMK-4       Able to explain clustering methods       TCL - SCL mixed       6         CPMK-5       Able to show Artificial Neural Network (ANN) and Deep Learning methods       TCL - SCL mixed       6         CPMK-5       Able to explain Clustering methods       TCL - SCL mixed       6       6         CPMK-6       Able to explain Clustering methods       TCL - SCL mixed       4       4         Artificial Neural Network (ANN) and Deep Learning methods       TCL - SCL mixed       4       4         CPMK-6       Able to design model evaluation Deep Learning methods       TCL - SCL mixed       4         CPMK-6       Able to design model evaluation Deep Learning methods       TCL - SCL mixed       4         CPMK-6       Able to design model evaluation Deep Learning methods       TCL - SCL mixed       4	cation										
CPL-5       Learning Materials       Forms of Learning       Time Allo         Relationship of CPMK with Learning Materials and Forms, as well as Time Allocation       CPMK-1       Able to mention the definition and history of data science and artificial intelligence       TCL - SCL mixed       4         CPMK-2       Able to identify, compare, and design data review processes       TCL - SCL mixed       6         CPMK-3       Able to formulate, demonstrate, and design data correction processes, data cleaning, and feature engineering       TCL - SCL mixed       4         CPMK-4       Able to explain Clustering methods       TCL - SCL mixed       6         CPMK-5       Able to explain clustering methods       TCL - SCL mixed       6         CPMK-6       Able to esplain clustering methods       TCL - SCL mixed       4         CPMK-6       Able to design model evaluation Deep Learning methods       TCL - SCL mixed       4         CPMK-6       Able to design model evaluation Data Science       TCL - SCL mixed       4         Hour state       CPMK-6       Able to design model evaluation Data Science       TCL - SCL mixed       4         Hour state       CPMK-6       Able to design model evaluation Data Science       TCL - SCL mixed       4         Hour state       CPMK-6       Able to design model evaluation Data Science       TCL - SCL mixed       4 <th>cation</th>	cation										
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CPMK-5       Able to show       TCL - SCL mixed       4         Artificial Neural Network (ANN) and       Hour         Deep Learning methods       s         CPMK-6       Able to design model evaluation       TCL - SCL mixed       4         Data Science       Hour       Hour         UAS/ Project Task Results/ Case Analysis       Hour         Student       Student centered Learning       Image: Student centered Learning	Hour										
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Deep Learning methods     s       CPMK-6     Able to design model evaluation Data Science     TCL - SCL mixed     4       Hour       Learning Methods     Student centered Learning       Student											
CPMK-6     Able to design model evaluation     TCL - SCL mixed     4       Data Science     Hour       UAS/ Project Task Results/ Case Analysis       Learning Methods     Student centered Learning       Student	<u> </u>										
Learning Methods     Student centered Learning       Student	4										
Learning Methods     Student centered Learning       Student	UAS/ Project Task Results/ Case Analysis										
Methods Student	Student centered Learning										
Student											
Learning ExperienceClass discussions, problem solving, machine learning cases in geosciences	Class discussions, problem solving, machine learning cases in geosciences										
Access       Paper, whiteboard, laptop, ELok, zoom meeting and google meet         Learning       Media / LMS         and Offline &;       Online Percentage											
Assessment Techniques Assessment Criteria/ CPMK1 CPMK2 CPMK3 CPMK4 CPMK5	СРМК										
Methods and Alignment with CDDWW     Participatory Activities <sup>*</sup> )     10     Liveliness											
Project     50     Presentation	1										
Results/Case and Final Benort	1										
Study											
Results/PBL       D       L											
Cognitive											
UIS 20 rest scores UIAS 20 Test scores											

	Total	100										
	<sup>*)</sup> can also be obtained from UTS or UAS which is the result of participatory activities or <i>project</i> / case study											
	studies/PBL results is at least 50%.											
Reference List	1. Aggarwal, C. C. (2021). An Introduction to Artificial Intelligence. In Artificial											
	2. Bishop, C. M. (2006). Pattern recognition. Machine learning, 128(9).											
	3. Duda, R. O., & Hart, P. E. (2006). Pattern classification. John Wiley & Sons.											
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	6. Zheng, A., & Casari, A. (2018). Feature engineering for machine learning: principles											
	and techniques for data scientists. "O'Reilly Media, Inc.".											
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Lecturer												
(Team Teaching)												
Authorization	Drafting Date	Course Co	oordinator	Coordi	nator of E	xpertise (i	if any) H	lead of Study	Program			
	Aug 16, 2022	Eluda	maf.	Dr. rer	nat Ade A	ngoraini N	IT .	Eludarma	ki-			
1	Dr. Sudarmaji, MSi. Dr. Ternat. Aue Anggrann, M.T. Dr. Sudarmaji, MSi.											