SEMESTER COURSE PLAN

ARTIFICIAL INTELLIGENCE IN GEOPHYSICS COURSES
(23H06130402)

TEACHING TEAM

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STUDI PROGRAM OF GEOPHYSICS - S1
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
HASANUDDIN UNIVERSITY
MAKASSAR
2025

STUDY PROGRAM OF GEOFISIKA - S1
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
HASANUDDIN UNIVERSITY

Vision

Become a program Reliable studies in the field of geophysics to produce superior graduates and mastering science, technology, arts and culture based on BMI in 2030.

Vision Strategy

Misson

Based on the Vision above, the Geophysics Study Program has a mission:

1. Improving the quality of education to produce graduates who are competitive, able to work independently and in groups in implementing and developing BMI science and technology;

2. Carrying out research to produce reliable and competitive scientific work oriented towards the scientific development of solid geophysics, marine geophysics, geoinformatics and hydro-meteorology;

3. Disseminate the results of applied research, action studies and appropriate technology packages in synergistic and accelerated productive activities to improve the quality of life of the community.

Graduate Profiles

Educators in the Field of Geophysics; meteorologist; geomaths; oceanographer; exploration geophysicist; seismologist ; geophysical entrepreneur.

PLO charged to courses

CPL-5 (P2) - Mastering Geophysical concepts and principles in applying applied mathematics in the field of Geophysics

CPL-14 (KK4) - Able to investigate potential natural resources and utilize appropriate information and computing technology-based instruments to carry out natural resource exploration and natural disaster mitigation activities

Course Learning Outcomes (CLO)

CPMK-1: Able to apply machine learning concepts to supervised and unsupervised problems on geophysical data (CPL5)

CPMK-2: Able to apply TensorFlow to geophysical data problems (CPL14)

Sub-CLO

Sub CPMK-1: Able to solve geophysical data problems using data training techniques in machine learning (CPMK-1)

Sub CPMK-2: Able to apply supervised methods: Neighborhood-Based methods on geophysical data (CPMK-1)

Sub CPMK-3: Able to apply supervised methods: Tree-Based methods on geophysical data (CPMK-1)

Sub CPMK-4: Applying supervised methods: Support Vector Machines to geophysical data (CPMK-1)

Sub CPMK-5: Applying the unsupervised method: Principal Component Analysis (PCA) to geophysical data (CPMK-1)

Sub CPMK-6: Applying the unsupervised method: Singular Value Decomposition (SVD) to geophysical data (CPMK-1)

Sub CPMK-7: Applying unsupervised methods: Hierarchical Clustering to geophysical data (CPMK-1)

Sub CPMK-8: Applying unsupervised methods: Clustering k-means and DBSCAN on geophysical data (CPMK-1)

Sub CPMK-9: Demonstrating machine learning through supervised and unsupervised approaches to geophysical data processing projects (CPMK-1)

Sub CPMK-10: Applying single layer and multi-layer Neural Network concepts to geophysical data (CPMK-1)

Sub CPMK-11: Solving geophysical data problems using deep learning techniques on geophysical data (CPMK-1)

Sub CPMK-12: Applying Convolutional Neural Networks to geophysical models (CPMK-1)

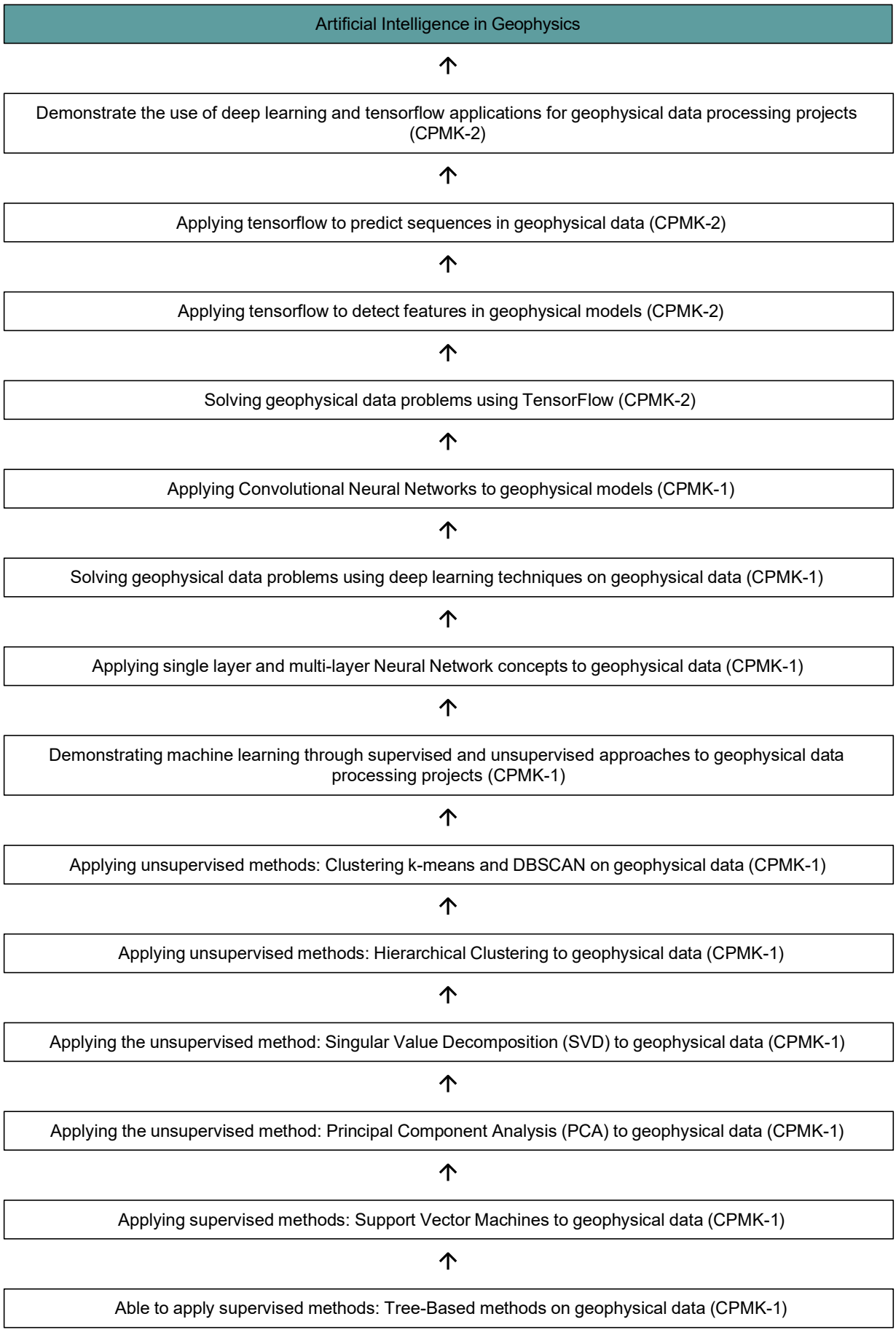
Sub CPMK-13: Solving geophysical data problems using TensorFlow (CPMK-2)

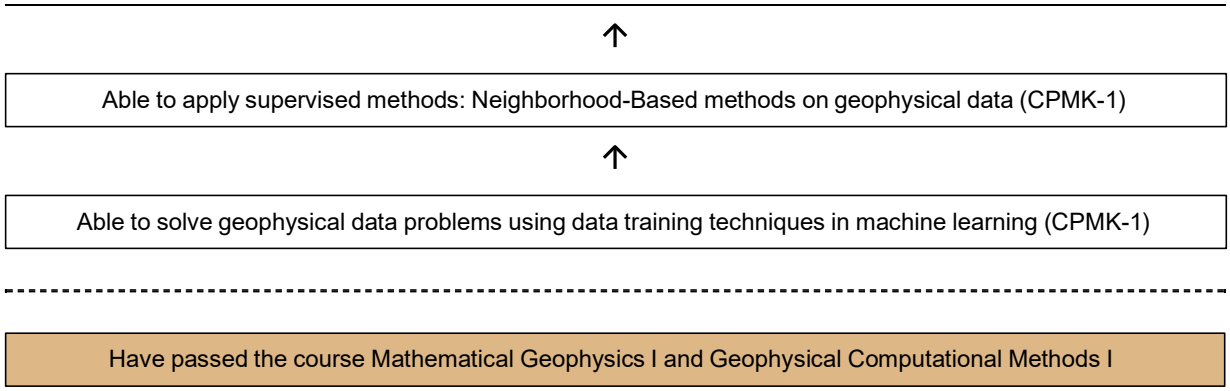
Sub CPMK-14: Applying tensorflow to detect features in geophysical models (CPMK-2)

Sub CPMK-15: Applying tensorflow to predict sequences in geophysical data (CPMK-2)

Sub CPMK-16: Demonstrate the use of deep learning and tensorflow applications for geophysical data processing projects (CPMK-2)

Learning Analytics




Able to apply supervised methods: Neighborhood-Based methods on geophysical data (CPMK-1)
Able to solve geophysical data problems using data training techniques in machine learning (CPMK-1)
Have passed the course Mathematical Geophysics I and Geophysical Computational Methods I

HASANUDDIN UNIVERSITY
FAKULTY OF MATHEMATICS AND NATURAL SCIENCES
STUDY PROGRAM OF GEOPHYSICS - S1
SEMESTER LEARNING PLAN

Course	Code	Cource Group	Credits	SEMESTER	Compilation Date
Artificial Intelligence in Geophysics	23H06130402		2	5	1 Juli 2025

AUTHORITY	SLP Developer Lecturer	Coordinator	Head of Study Program
	Dr. Muhammad Alimuddin, Eng., Dr. Muhammad Taufiq Rafi	Dr. Muhammad Alimuddin, Eng.	Dr. Muhammad Alimuddin, Eng.

Learning Outcomes Course	**SLOs that are imposed on the course**	
	SLO-5:	Menguasai konsep Geofisika dan prinsip dalam mengaplikasikan matematika terapan dalam bidang Geofisika
	SLO-14:	Mampu menyelidiki potensial sumberdaya alam dan memanfaatkan instrumen yang berbasis teknologi informasi dan komputasi yang sesuai untuk melakukan aktivitas eksplorasi SDA dan Mitigasi Bencana Alam
	SLO ⇒ Course Learning Outcomes	
	After completing this course, it is expected:	
	SLO-5	**CLO-1:** Able to apply machine learning concepts to supervised and unsupervised problems on geophysical data
	SLO-14	**CLO-2:** Able to apply TensorFlow to geophysical data problems
	CLO ⇒ Sub-CLO	
	CLO-1	**Sub-CLO-1:**Able to solve geophysical data problems using data training techniques in machine learning
		Sub-CLO-2: Able to apply supervised methods: Neighborhood-Based methods on geophysical data
		Sub-CLO-3: Able to apply supervised methods: Tree-Based methods on geophysical data
		Sub-CLO-4: Applying supervised methods: Support Vector Machines to geophysical data
		Sub-CLO-5: Applying the unsupervised method: Principal Component Analysis (PCA) to geophysical data
		Sub-CLO-6: Applying the unsupervised method: Singular Value Decomposition (SVD) to geophysical data
		Sub-CLO-7: Applying unsupervised methods: Hierarchical Clustering to geophysical data
		Sub-CLO-8: Applying unsupervised methods: Clustering k-means and DBSCAN on geophysical data
		Sub-CLO-9: Demonstrating machine learning through supervised and unsupervised approaches to geophysical data processing projects

		Sub-CLO-10: Applying single layer and multi-layer Neural Network concepts to geophysical data
		Sub-CLO-11: Solving geophysical data problems using deep learning techniques on geophysical data
		Sub-CLO-12: Applying Convolutional Neural Networks to geophysical models
	CLO-2	**Sub-CLO-13:**Solving geophysical data problems using TensorFlow
		Sub-CLO-14: Applying tensorflow to detect features in geophysical models
		Sub-CLO-15: Applying tensorflow to predict sequences in geophysical data
		Sub-CLO-16: Demonstrate the use of deep learning and tensorflow applications for geophysical data processing projects
	Correlation between SLOs/CLOs to Sub-CLOs	

SLOs that are charged on the Course	**CPMK**	**SUB CPMK**	**Form of Assessment***					**Weight**	**Value**	**Student Score**
			Formative	**Sumative**						
				Participatory Activities	**Project/Case Study**	**Formative Test**	**Quiz**			
SLO-5	CLO-1	SUB-CLO-1	Participation	2	0	0	0	2		
SLO-5	CLO-1	SUB-CLO-2	Participation	0	2	0	0	2		
SLO-5	CLO-1	SUB-CLO-3	Participation	0	2	0	0	2		
SLO-5	CLO-1	SUB-CLO-4	Participation	0	2	0	0	2		
SLO-5	CLO-1	SUB-CLO-5	Participation	0	2	0	0	2		
SLO-5	CLO-1	SUB-CLO-6	Participation	0	2	10	0	12		
SLO-5	CLO-1	SUB-CLO-7	Participation	0	2	0	0	2		
SLO-5	CLO-1	SUB-CLO-8	Participation and Quizzes	0	2	0	6	8		
SLO-5	CLO-1	SUB-CLO-9	Presentations and Reports	0	28	0	0	28		
SLO-5	CLO-1	SUB-CLO-10	Participation	2	0	0	0	2		
SLO-5	CLO-1	SUB-CLO-11	Participation	0	2	0	0	2		
SLO-5	CLO-1	SUB-CLO-12	Participation	2	0	0	0	2		
SLO-14	CLO-2	SUB-CLO-13	Participation	0	2	0	0	2		
SLO-14	CLO-2	SUB-CLO-14	Participation	0	2	0	0	2		
SLO-14	CLO-2	SUB-CLO-15	Participation	0	2	0	0	2		

SLOs that are charged on the Course	CPMK	SUB CPMK	Form of Assessment*					Weight	Value	Student Score
			Formative	Sumative						
				Participatory Activities	Project/Case Study	Formative Test	Quiz			
SLO-14	CLO-2	SUB-CLO-16	Presentations and Reports	0	28	0	0	28		
				6	78	10	6	100		

Course Description	This Artificial Intelligence in Geophysics course discusses regarding machine learning and deep learning applications using TensorFlow on geophysical data and model problems with a load of 2 credits. this course implements the concept of artificial intelligence in analyzing various Geophysical phenomena include: regression, classification and clustering represented in a mathematical geophysical model. Presented to students fifth semester in the Geophysics Undergraduate Study Program. The person responsible for the course is the manager Artificial Intelligence in Geophysics course. The learning method is Small Group Discussion and Project-Based Study
Learning Materials/Subjects	1. Supervised Machine Learning 2. Unsupervised Machine Learning 3. Single layer and multi-layer Neural Network (NN) 4. Deep Learning 5. Convolutional Neural Networks (CNN) 6. Tensorflow and its applications
Reference	**Main References**
	Pattel, A.A. 2019. Hands-on unsupervised learning using Python: how to build applied machine learning solutions from unlabeled data. O'Reilly Media
	Additional References
	Moroney, L. 2020. AI and Machine Learning for coders. O'Reilly Media Kim, P. 2017. Matlab deep learning. With machine learning, neural networks and artificial intelligence, 130(21). Brunton, S.L and Kutz, J.N. 2022. Data-driven science and engineering: Machine learning, dynamical systems, and control. Cambridge University Press
Teaching Team	Dr. Muhammad Alimuddin, Eng., Dr. Muhammad Taufiq Rafi
Course requirement	Mathematical Geophysics I, Geophysical Computational Methods I

Week	Sub CPMK (End-of-stage learning ability)	Penilaian (*Assesment*)		Learning Forms and Methods [time estimate]		Content	Weight of Assessment (%)
		Indicator	Techniques & Criteria	Offline	Online		
1	2	3	4	5	6	7	8

1	Able to solve geophysical data problems using data training techniques in machine learning (CPMK-1)	**Formative:** Skilled in geophysical data training process algorithms on machine learning **Sumative:** -	**Formative Criteria:** Participation dinilai dengan rubrik 1 **Sumative Criteria:** Participatory Activities (2) dinilai dengan rubrik 1 **Assessment Technique:** Non Test	**Studying:** Project-Based Learning (Project-based Learning) 1 x 2 x 50" **Other Forms:** Self-Directed Learning Reading Machine Learning Materials in Sikola on Flow Week 1 Learning 1 x 2 x 60"		• Contract Lectures • Material course study • Machine Learning	2

2	Able to apply supervised methods: Neighborhood-Based methods on geophysical data (CPMK-1)	**Formative:** Skilled in the k-nearest neighbors algorithm for predict values on geophysical data **Sumative:** -	**Formative Criteria:** Participation dinilai dengan rubrik 1 **Sumative Criteria:** Project/Case Study (2) dinilai dengan rubrik 1 **Assessment Technique:** Non Test	**Studying:** Project-Based Learning (Project-based Learning) 1 x 2 x 50" **Other Forms:** Self-Directed Learning Reading Neighborhood-Based Methods material at Sikola on Week 2 Learning Flow 1 x 2 x 60" **Other Forms:** Project-Based Learning (Project-based Learning) Working in groups on a given project related to Neighborhood-Based Methods 1 x 2 x 60"		Neighborhood-Based Methods	2

3	Able to apply supervised methods: Tree-Based methods on geophysical data (CPMK-1)	**Formative:** Skilled in single decision tree and random algorithms forests **Sumative:** -	**Formative Criteria:** Participation dinilai dengan rubrik 1 **Sumative Criteria:** Project/Case Study (2) dinilai dengan rubrik 1 **Assessment Technique:** Non Test	**Studying:** Project-Based Learning (Project-based Learning) 1 x 2 x 50" **Other Forms:** Self-Directed Learning Reading Tree-Based Methods material in Sikola on Flow Week 3 Learning 1 x 2 x 60"		• Single decision tress • Random forests	2
4	Applying supervised methods: Support Vector Machines to geophysical data (CPMK-1)	**Formative:** Skilled in Support Vector Machines algorithms on data geophysics **Sumative:** -	**Formative Criteria:** Participation dinilai dengan rubrik 1 **Sumative Criteria:** Project/Case Study (2) dinilai dengan rubrik 1 **Assessment Technique:** Non Test	**Studying:** Project-Based Learning (Project-based Learning) 1 x 2 x 50" **Other Forms:** Self-Directed Learning Reading Support Vector Machines material in Sikola in Alur Week 4 Learning 1 x 2 x 60"		Support Vector Machines	2

5	Applying the unsupervised method: Principal Component Analysis (PCA) to geophysical data (CPMK-1)	**Formative:** Skilled in PCA algorithm on geophysical data **Sumative:** -	**Formative Criteria:** Participation dinilai dengan rubrik 1 **Sumative Criteria:** Project/Case Study (2) dinilai dengan rubrik 1 **Assessment Technique:** Non Test	**Studying:** Project-Based Learning (Project-based Learning) 1 x 2 x 50" **Other Forms:** Self-Directed Learning Reading Principal Component Analysis material at Sikola on Week 5 Learning Flow 1 x 2 x 60" **Other Forms:** Project-Based Learning (Project-based Learning) Working in groups on a given project related to Principal Component Analysis 1 x 2 x 60"		Principal Component Analysis	2

6	Applying the unsupervised method: Singular Value Decomposition (SVD) to geophysical data (CPMK-1)	**Formative:** Skilled in SVD algorithm on geophysical data **Sumative:** -	**Formative Criteria:** Participation dinilai dengan rubrik 1 **Sumative Criteria:** Project/Case Study (2) dinilai dengan rubrik 1 Formative Test (10) dinilai dengan rubrik 1 **Assessment Technique:** Non Test	**Studying:** Project-Based Learning (Project-based Learning) 1 x 2 x 50" **Other Forms:** Self-Directed Learning Reading Material Singular Value Decomposition at Sikola in Week 6 Learning Flow 1 x 2 x 60" **Other Forms:** Project-Based Learning (Project-based Learning) Working in groups on a given project related to Singular Value Decomposition 1 x 2 x 60"		Singular Value Decomposition	12

7	Applying unsupervised methods: Hierarchical Clustering to geophysical data (CPMK-1)	**Formative:** Skilled in Hierarchical algorithm on geophysical data **Sumative:** -	**Formative Criteria:** Participation dinilai dengan rubrik 1 **Sumative Criteria:** Project/Case Study (2) dinilai dengan rubrik 1 **Assessment Technique:** Non Test	**Studying:** Project-Based Learning (Project-based Learning) 1 x 2 x 50" **Other Forms:** Self-Directed Learning Reading Material Hierarchical Clustering at Sikola in Week 7 Learning Flow 1 x 2 x 60"		Hierarchical	2

8	Applying unsupervised methods: Clustering k-means and DBSCAN on geophysical data (CPMK-1)	**Formative:** Skilled in k-means and DBSCAN algorithms on geophysical data **Sumative:** -	**Formative Criteria:** Participation dinilai dengan rubrik 1 Quiz dinilai dengan rubrik 1 **Sumative Criteria:** Project/Case Study (2) dinilai dengan rubrik 1 Quiz (6) dinilai dengan rubrik 1 **Assessment Technique:** Non Test	**Studying:** Project-Based Learning (Project-based Learning) 1 x 2 x 50" **Other Forms:** Self-Directed Learning Reading k-means and DBSCAN material in Sikola on Alur Week 8 Learning 1 x 2 x 60" **Other Forms:** Project-Based Learning (Project-based Learning) Working in groups on a given project related to k-means and DBSCAN 1 x 2 x 60"		• K-means • DBSCAN	8

9	Demonstrating machine learning through supervised and unsupervised approaches to geophysical data processing projects (CPMK-1)	**Formative:** Skilled in the training process using geophysical data supervised and unsupervised machine learning methods **Sumative:** -	**Formative Criteria:** Presentation dinilai dengan rubrik 3 Report dinilai dengan rubrik 2 **Sumative Criteria:** Project/Case Study (18) dinilai dengan rubrik 2 Project/Case Study (10) dinilai dengan rubrik 3 **Assessment Technique:** Non Test	**Seminar:** Group discussion (Small Group Discussion) 1 x 2 x 100" **Other Forms:** Self-Directed Learning Correct Return input to presentations and reports 1 x 2 x 60"		• Machine Learning • Neighborhood-Based Methods • Single decision tress • Random forests • Support Vector Machines • Principal Component Analysis • Singular Value Decomposition • Hierarchical • K-means • DBSCAN	28
10	Applying single layer and multi-layer Neural Network concepts to geophysical data (CPMK-1)	**Formative:** Skilled in single layer and multi-layer Neural algorithms Network on geophysical data **Sumative:** -	**Formative Criteria:** Participation dinilai dengan rubrik 1 **Sumative Criteria:** Participatory Activities (2) dinilai dengan rubrik 1 **Assessment Technique:** Non Test	**Studying:** Project-Based Learning (Project-based Learning) 1 x 2 x 50" **Other Forms:** Self-Directed Learning Reading material on single layer and multi-layer neural networks at Sikola in the 10th Week Learning Flow 1 x 2 x 60"		Neural Networks	2

11	Solving geophysical data problems using deep learning techniques on geophysical data (CPMK-1)	**Formative:** Skilled in geophysical data training process algorithms using ReLU and Dropout functions **Sumative:** -	**Formative Criteria:** Participation dinilai dengan rubrik 1 **Sumative Criteria:** Project/Case Study (2) dinilai dengan rubrik 1 **Assessment Technique:** Non Test	**Studying:** Project-Based Learning (Project-based Learning) 1 x 2 x 50" **Other Forms:** Self-Directed Learning Reading deep learning material on Sikola in Alur Week 11 Learning 1 x 2 x 60"		Deep Learning	2
12	Applying Convolutional Neural Networks to geophysical models (CPMK-1)	**Formative:** Skilled at Convolutional neural network algorithm on geophysical data **Sumative:** -	**Formative Criteria:** Participation dinilai dengan rubrik 1 **Sumative Criteria:** Participatory Activities (2) dinilai dengan rubrik 1 **Assessment Technique:** Non Test	**Studying:** Project-Based Learning (Project-based Learning) 1 x 2 x 50" **Other Forms:** Self-Directed Learning Reading material on convolutional neural networks at Sikola on Week 12 Learning Flow 1 x 2 x 60"		Convolutional Neural Network	2

13	Solving geophysical data problems using TensorFlow (CPMK-2)	**Formative:** Skilled in using the tensorflow module on data examples geophysics **Sumative:** -	**Formative Criteria:** Participation dinilai dengan rubrik 1 **Sumative Criteria:** Project/Case Study (2) dinilai dengan rubrik 1 **Assessment Technique:** Non Test	**Studying:** Project-Based Learning (Project-based Learning) 1 x 2 x 50" **Other Forms:** Self-Directed Learning Reading tensorflow material in Sikola in the Learning Flow Week 13 1 x 2 x 60" **Other Forms:** Project-Based Learning (Project-based Learning) Working in groups on a given project tensorflow related 1 x 2 x 60"		Tensorflow	2

14	Applying tensorflow to detect features in geophysical models (CPMK-2)	**Formative:** Skilled at tensorflow algorithm for prediction features in geophysical models **Sumative:** -	**Formative Criteria:** Participation dinilai dengan rubrik 1 **Sumative Criteria:** Project/Case Study (2) dinilai dengan rubrik 1 **Assessment Technique:** Non Test	**Studying:** Project-Based Learning (Project-based Learning) 1 x 2 x 50" **Other Forms:** Self-Directed Learning Reading tensorflow material in Sikola in the Learning Flow Week 14 1 x 2 x 60" **Other Forms:** Project-Based Learning (Project-based Learning) Working in groups on a given project tensorflow related 1 x 2 x 60"		Tensorflow	2

15	Applying tensorflow to predict sequences in geophysical data (CPMK-2)	**Formative:** Skilled at tensorflow algorithm for predicting values in time series sequence models geophysics **Sumative:** -	**Formative Criteria:** Participation dinilai dengan rubrik 1 **Sumative Criteria:** Project/Case Study (2) dinilai dengan rubrik 1 **Assessment Technique:** Non Test	**Studying:** Project-Based Learning (Project-based Learning) 1 x 2 x 50" **Other Forms:** Self-Directed Learning Reading tensorflow material in Sikola in the Learning Flow Week 15 1 x 2 x 60" **Other Forms:** Project-Based Learning (Project-based Learning) Working in groups on a given project tensorflow related 1 x 2 x 60"		Tensorflow	2

16	Demonstrate the use of deep learning and tensorflow applications for geophysical data processing projects (CPMK-2)	**Formative:** Skilled in completing geophysical data processing projects using the tensorflow module **Sumative:** -	**Formative Criteria:** Presentation dinilai dengan rubrik 3 Report dinilai dengan rubrik 2 **Sumative Criteria:** Project/Case Study (10) dinilai dengan rubrik 3 Project/Case Study (18) dinilai dengan rubrik 2 **Assessment Technique:** Non Test	**Seminar:** Group discussion (Small Group Discussion) 1 x 2 x 100" **Other Forms:** Self-Directed Learning Correct Return input to presentations and reports 1 x 2 x 60"		• Neural network • Deep learning • Convolutional neural networks • Tensorflow	28
							100

Matrix of SLO, CLO, and Assessment Method

SLO / CLO	CLO-1	CLO-2
CPL-5 (P2)	Participatory Activities (Weight 2%) Project/Case Study (Weight 2%) Project/Case Study (Weight 2%) Project/Case Study (Weight 2%) Project/Case Study (Weight 2%) Project/Case Study (Weight 2%) Formative Test (Weight 10%) Project/Case Study (Weight 2%) Project/Case Study (Weight 2%) Quiz (Weight 6%) Project/Case Study (Weight 28%) Participatory Activities (Weight 2%) Project/Case Study (Weight 2%) Participatory Activities (Weight 2%)	
CPL-14 (KK4)		Project/Case Study (Weight 2%) Project/Case Study (Weight 2%) Project/Case Study (Weight 2%) Project/Case Study (Weight 28%)

Evaluation Type and Assessment Weight

Type	Assessment Weight
Participatory Activities	6
Project/Case Study	78
Formative Test	10
Quiz	6
Total	100

Assessment and Evaluation of Student Achievement of CLOs

SLOs that are charged on the Course	CLO	SUB CLO	Form of Assessment*					Weight	Value	Student Score
			Formative	Sumative						
				Participatory Activities	Project/Case Study	Formative Test	Quiz			
SLO-5	CLO-1	SUB-CLO-1	Participation	2	0	0	0	2		
SLO-5	CLO-1	SUB-CLO-2	Participation	0	2	0	0	2		
SLO-5	CLO-1	SUB-CLO-3	Participation	0	2	0	0	2		
SLO-5	CLO-1	SUB-CLO-4	Participation	0	2	0	0	2		
SLO-5	CLO-1	SUB-CLO-5	Participation	0	2	0	0	2		
SLO-5	CLO-1	SUB-CLO-6	Participation	0	2	10	0	12		
SLO-5	CLO-1	SUB-CLO-7	Participation	0	2	0	0	2		
SLO-5	CLO-1	SUB-CLO-8	Participation and Quizzes	0	2	0	6	8		
SLO-5	CLO-1	SUB-CLO-9	Presentations and Reports	0	28	0	0	28		
SLO-5	CLO-1	SUB-CLO-10	Participation	2	0	0	0	2		
SLO-5	CLO-1	SUB-CLO-11	Participation	0	2	0	0	2		
SLO-5	CLO-1	SUB-CLO-12	Participation	2	0	0	0	2		

SLOs that are charged on the Course	CLO	SUB CLO	Form of Assessment*					Weight	Value	Student Score
			Formative	Sumative						
				Participatory Activities	Project/Case Study	Formative Test	Quiz			
SLO-14	CLO-2	SUB-CLO-13	Participation	0	2	0	0	2		
SLO-14	CLO-2	SUB-CLO-14	Participation	0	2	0	0	2		
SLO-14	CLO-2	SUB-CLO-15	Participation	0	2	0	0	2		
SLO-14	CLO-2	SUB-CLO-16	Presentations and Reports	0	28	0	0	28		
				6	78	10	6	100		

Lampiran Rubrik 1 | Rubrik Holistik

Tabel 6. 1 Rubrik Holistik

Grade Capaian	Skor	Uraian
Sangat Baik	≥ 85	Memperlihatkan pemahaman yang lengkap tentang permasalahan. Semua metode dan persyaratan tentang tugas terdapat dalam jawaban
Baik	71 - 84	Memperlihatkan cukup pemahaman tentang permasalahan. Semua persyaratan tentang tugas terdapat dalam jawaban
Cukup Baik	61 - 70	Memperlihatkan hanya sebagian pemahaman tentang permasalahan. Kebanyakan persyaratan tentang tugas terdapat dalam jawaban
Kurang	51 - 60	Memperlihatkan sedikit pemahaman tentang permasalahan. Banyak persyaratan tugas yang tidak ada
Sangat kurang	< 51	Memperlihatkan tidak ada pemahaman tentang permasalahan

Lampiran Rubrik 2 | Rubrik analitik makalah (kelompok atau individu)

Kriteria/Dimensi	**Penilaian mahasiswa**					**Nilai masing masing kriteria**
	Sangat baik	**Baik**	**Cukup**	**Kurang**	**Sangat kurang**	
	Skor≥ 85	**Skor 71 - 84**	**Skor 61 - 70**	**Skor 51 – 60**	**Skor 41 - 50**	
Sistematika Laporan – SL	laporan dibuat sesuai sistematika penulisan yang dijelaskan di detail tugas	laporan dibuat dengan benar tetapi kurang jelas	laporan dibuat cukup benar dan kurang jelas	laporan dibuat kurang benar dan kurang jelas	laporan dibuat dengan sistematika yang tidak sesuai yang diminta	10 %
Kelengkapan Laporan - KL	laporan dibuat secara lengkap sesuai petunjuk pembuatan laporan	laporan dibuat tanpa referensi dalam laporan	laporan dibuat tanpa referensi dalam laporan dan kesimpulan	laporan dibuat tanpa referensi dalam laporan, kesimpulan dan daftar pustaka	laporan dibuat tanpa referensi dalam laporan, kesimpulan, daftar pustaka dan lampiran yang diperlukan	20 $
Kejelasan dan keruntutan penulisan –JR	laporan jelas, dapat dipahami, ditulis secara runtut	laporan jelas, tetapi penulisan kurang runtut	laporan cukup jelas, cukup sesuai dengan keruntutan penulisan, tapi ada beberapa ketidak teraturan	laporan kurang jelas, kurang sesuai dengan keruntutan penulisan	laporan tidak jelas, tidak sesuai dengan keruntutan penulisan	20 %
Validitas Referensi – VR	Mencantumkan referensi yang valid di setiap paragraf, rumus, tabel dan gambar	Mencantumkan referensi yang valid tapi di beberapa paragraf, rumus, tabel dan gambar	Ada beberapa referensi yang kurang valid, walau lengkap tercantum di semua paragraf, rumus, tabel dan gambar	Lebih banyak referensi yang kurang valid, kurang tercantum di paragraf, rumus, tabel dan gambar	Tidak menggunakan referensi yang valid dan dominan tidak dicantumkan di setiap paragraf tabel, rumus dan gambar	20%
Kebenaran konsep ide yang dipaparkan – KI	konsep/ide yang dipaparkan tepat, benar, dan sesuai dengan teori	konsep/ide yang dipaparkan sesuai dengan teori tetapi kurang jelas	konsep/ide yang dipaparkan cukup	konsep/ide yang dipaparkan kurang tepat	konsep/ide yang dipaparkan tidak tepat	30 %

Lampiran Rubrik 3 | Rubrik Presentasi

Kriteria/ Dimensi	**Penilaian mahasiswa**					**Nilai masing masing kriteria**
	Sangat Baik	**Baik**	**Cukup**	**Kurang**	**Sangat kurang**	
	Skor > 85	**Skor 71 - 84**	**Skor 61 - 70**	**Skor 51 – 60**	**Skor 41 - 50**	

Kriteria/ Dimensi	Penilaian mahasiswa					Nilai masing masing kriteria
	Sangat Baik	**Baik**	**Cukup**	**Kurang**	**Sangat kurang**	
	Skor > 85	**Skor 71 - 84**	**Skor 61 - 70**	**Skor 51 – 60**	**Skor 41 - 50**	
Penguasaan Materi –PM	Isi mampu menggugah pendengar untuk mengambangkan pikiran.	Isi akurat dan lengkap. Para pendengar menambah wawasan baru tentang topik tersebut.	Isi secara umum akurat, tetapi tidak lengkap. Para pendengar bisa mempelajari beberapa fakta yang tersirat, tetapi mereka tidak menambah wawasan baru tentang topik tersebut.	Isinya kurang akurat, karena tidak ada data faktual, tidak menambah pemahaman pendengar	Isinya tidak akurat atau terlalu umum. Pendengar tidak belajar apapun atau kadang menyesatkan.	20%
Sistematika – SI	terorganisasi dengan menyajikan fakta yang didukung oleh contoh yang telah dianalisis sesuai konsep	terorganisasi dengan baik dan menyajikan fakta yang meyakinkan untuk mendukung kesimpulan.	Presentasi mempunyai fokus dan menyajikan beberapa bukti yang mendukung kesimpulan.	Cukup fokus, namun bukti kurang mencukupi untuk digunakan dalam menarik kesimpulan	Tidak ada organisasi yang jelas. Fakta tidak digunakan untuk mendukung pernyataan.	10 %
Suara & Ekspresi _SE	Siswa menggunakan suara yang jelas dan volume yang sesuai, pengucapan istilah tepat. Semua penonton bisa mendengar presentasi.	Suara siswa jelas. Kadang terlalu cepat/lambat. Siswa mengucapkan istilah-istilah yang ada dengan benar. Kebanyakan penonton bisa mendengar presentasi.	Suara siswa cukup jelas, tapi ada beberapa yang kurang jelas. Sering cepat/lambat. Siswa mengucapkan istilah-istilah yang ada kadang kurang tepat. Kebanyakan penonton bisa mendengar presentasi.	Suara siswa pelan, kadang salah mengucapkan istilah. Penonton masih mengalami kesulitan mendengar presentasi.	Siswa bicara seperti bergumam, sering salah mengucapkan istilah, dan suaranya terlalu pelan sehingga penonton yang duduk di belakang tidak dapat mendengar dengan jelas.	10 %
Kepercayaan Diri – KD	Berbicara dengan semangat, menularkan semangat dan antusiasme pada pendengar	Pembicara tenang dan menggunakan intonasi yang tepat, berbicara tanpa bergantung pada catatan, dan berinteraksi secara intensif dengan pendengar. Pembicara selalu kontak mata dengan pendengar.	Secara umum pembicara tenang, tetapi dengan nada yang datar dan cukup sering bergantung pada catatan. Kadangkadang kontak mata dengan pendengar diabaikan.	Berpatokan pada catatan, tidak ada ide yang dikembangkan di luar catatan, suara monoton	Pembicara cemas dan tidak nyaman, dan membaca berbagaicatatan daripada berbicara. Pendengar sering diabaikan. Tidak terjadi kontak mata karena pembicara lebih banyak melihat ke papan tulis atau layar.	20 %
Efektifitas alat bantu presentasi – EF	menggunakan alat bantu visual untuk menjelaskan dengan tepat dan memperkuat presentasi	Alat bantu visual siswa mendukung presentasi.	Siswa menggunakan alat bantu visual tapi kurang tepat karena isi yang kurang sistematis atau kurang sesuai kaidah presentasi	Siswa menggunakan alat bantu visual namun kurang mendukung presentasi.	Siswa tidak menggunakan alat peraga ATAU menggunakan alat peraga secara berlebihan dan tidak tepat.	10 %
Kerjasama – KE	Kerjasama grup terlihat solid. Presentasi dilatih dan dipersiapkan dengan baik. Ada pembagian porsi yang jelas dengan pembagian waktu yang baik.	Cukup solid. Presentasi dilatih dengan baik. Ada pembagian porsi yang jelas meski kadang tumpang tindih dengan bagian anggota lain. Managemen waktu cukup baik.	Cukup solid. Presentasi kurang dilatih, pembagian porsi ada yang tidak seimbang. Manajemen waktu ada yang dominan memakai waktu, sehingga yang berikutnya tergesa gesa.	Kurang solid. Presentasi kurang dilatih. Ada pembagian porsi presentasi namun masih disertai sedikit miskomunikasi dengan anggota grup. Managemen waktu kurang diperhatikan.	Tidak solid. Persiapan presentasi kurang. Tidak ada pembagian porsi presentasi yang jelas. Beberapa miskomunikasi dengan anggota grup. Managemen waktu sangat buruk.	10 %

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Tanya jawab - TJ (Keaktifan)	Siswa menunjukkan pemahaman mendalam (lebih dari yang dibutuhkan) dengan menjawab semua pertanyaan yang diajukan	Siswa dengan percaya diri menguasai materi dan menjawab banyak pertanyaan dengan disertai beberapa penjelasan yang mendukung.	Siswa kurang yakin dengan informasi yang dipresentasikan dan kurang mampu menjawab pertanyaan dengan tepat.	Siswa tidak yakin dengan informasi yang dipresentasikan dan hanya mampu menjawab pertanyaan dasar saja tanpa mampu menjelaskan lebih lanjut.	Siswa tidak memiliki pemahaman informasi, siswa tidak bisa menjawab pertanyaan tentang topik yang dipresentasikan.	20 %