

SEMESTER COURSE PLAN

**SEISMIC DATA INTERPERATION (P1) COURSES
(23H06131603)**



TEACHING TEAM

Ir. Bambang Hari Mei Soeprapto, M.Si.
196105011990031003

Sabrianto Aswad, S.Si., MT
197805242005011002

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

Mission

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 science and technology, SBUD BMI;
2. Carrying out research to produce reliable and competitive scientific work oriented towards scientific development 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-4 (P1) - Mastering theoretical concepts of land, sea and geophysics atmosphere, principles of exploration, and design exploration necessary for identification and mapping natural resources and natural disaster mitigation;
- CPL-6 (P3) - Mastering the principles and methods of exploration geophysics in the analysis and interpretation of Geophysical measurement data;
- CPL-8 (KU1) - Able to apply logical, critical, systematic and innovative thinking in developing or applying geophysical science by considering human values, and able to analyze and communicate case studies and research results using geophysical tools through scientific reports, international presentations and article publications, as well as uploading them on the university website.
- CPL-12 (KK2) - Able to discover new natural resources through a process of exploration, analysis, interpretation of data and information based on environmentally friendly exploration geophysical principles

Course Learning Outcomes (CLO)

- CPMK-1: Students are able to analyze seismic waves and their relationship to aspects of earth science and exploration (CPL4 dan CPL6)
- CPMK-2: Students are able to identify regional geological potential in Indonesia and hydrocarbon and geotechnical exploration processes (CPL8 dan CPL12)

Sub-CLO

- Sub CPMK-1: Students are able to analyze the scope of seismic data interpretation (CPMK-1)
- Sub CPMK-2: Students are able to analyze the Basic Principles of Interpretation (CPMK-1)

Sub CPMK-3: Students are able to analyze seismic data types and resolution (CPMK-1)

Sub CPMK-4: Students are able to analyze the basic concepts of well log data and binding (CPMK-1)

Sub CPMK-5: Students are able to apply Subsurface Mapping with Seismic data (CPMK-1)

Sub CPMK-6: Students are able to apply Structural Interpretation of Seismic Data (CPMK-1)

Sub CPMK-7: Students are able to analyze direct hydrocarbon indicators and single attribute seismic (CPMK-1)

Sub CPMK-8: Students are able to apply direct hydrocarbon indicators and multiple seismic attributes in field experiments (CPMK-2)

Sub CPMK-9: Students are able to analyze the Principles of Seismic Stratigraphy (1) (CPMK-2)

Sub CPMK-10: Students are able to apply the basic concepts of AVO and its applications (1) (CPMK-2)

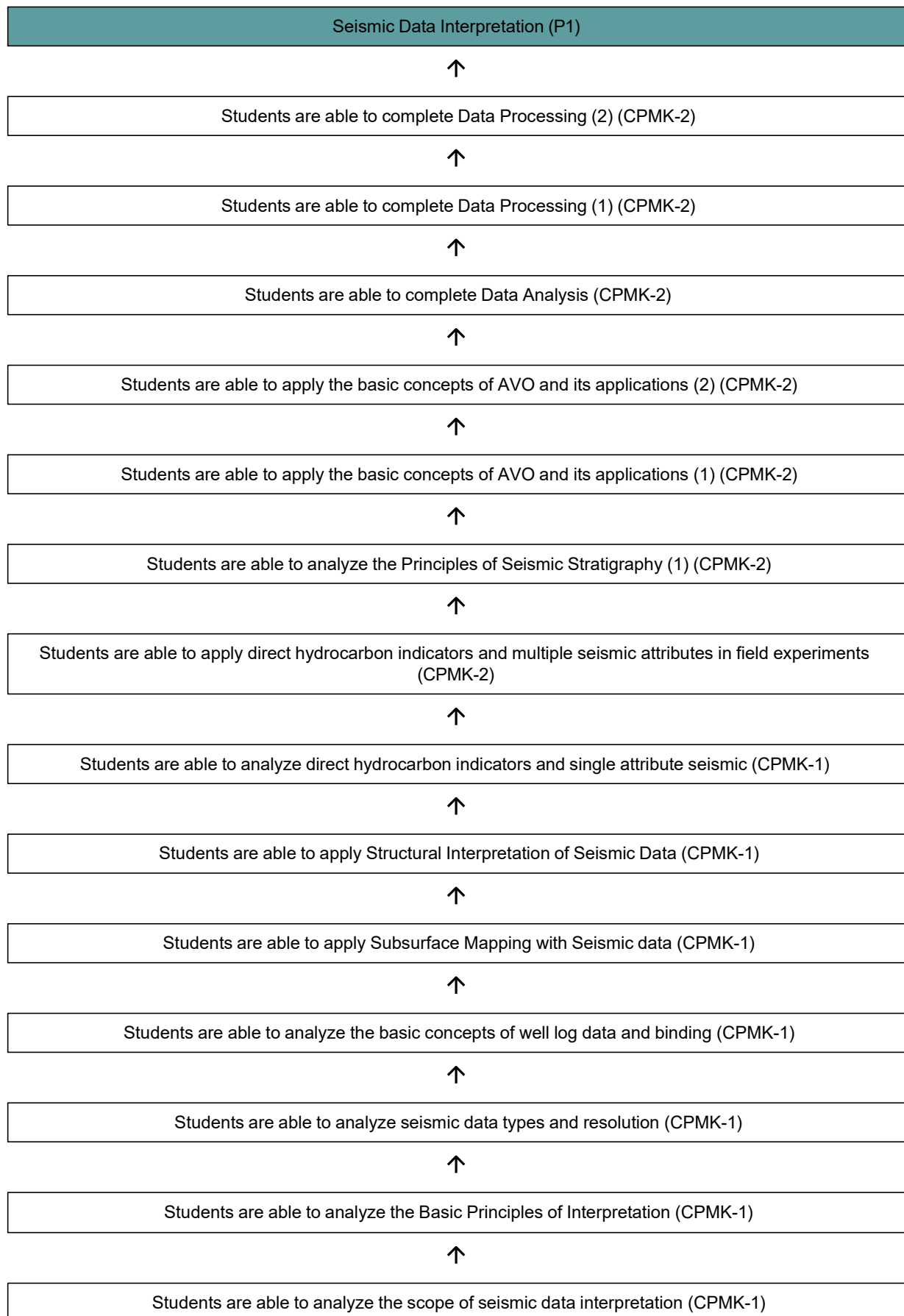
Sub CPMK-11: Students are able to apply the basic concepts of AVO and its applications (2) (CPMK-2)

Sub CPMK-12: Students are able to complete Data Analysis (CPMK-2)

Sub CPMK-13: Students are able to complete Data Processing (1) (CPMK-2)

Sub CPMK-14: Students are able to complete Data Processing (2) (CPMK-2)

Learning Analytics





HASANUDDIN UNIVERSITY

FAKULTY OF MATHEMATICS AND NATURAL SCIENCES

STUDY PROGRAM OF GEOPHYSICS - S1

SEMESTER LEARNING PLAN

Course		Code	Course Group	Credits	SEMESTER	Compilation Date
Seismic Data Interpretation (P1)		23H06131603	Solid Geophysics	3	5	1 Juli 2025
AUTHORITY		SLP Developer Lecturer	Coordinator		Head of Study Program	
		Ir. Bambang Hari Mei Soeprapto, M.Si., Sabrianto Aswad, S.Si., MT	Sabrianto Aswad, S.Si., MT		Dr. Muhammad Alimuddin, Eng.	
Learning Outcomes Course	SLOs that are imposed on the course					
	SLO-4:	Menguasai konsep teoritis Geofisika darat, laut dan atmosfer, prinsip-prinsip eksplorasi, dan perancangan eksplorasi yang diperlukan untuk identifikasi dan pemetaan SDA serta mitigasi bencana alam;				
	SLO-6:	Menguasai prinsip dan metode geofisika eksplorasi dalam analisis dan interpretasi data pengukuran Geofisika;				
	SLO-8:	Mampu menerapkan pemikiran logis, kritis, sistematis, dan inovatif dalam mengembangkan atau menerapkan ilmu geofisika dengan mempertimbangkan nilai-nilai kemanusiaan, serta mampu menganalisis dan mengkomunikasikan studi kasus dan hasil penelitian menggunakan perangkat geofisika melalui laporan ilmiah, presentasi internasional, dan publikasi artikel, serta mengunggahnya pada laman universitas.				
	SLO-12:	Mampu menemukan sumber Daya alam baru melalui proses eksplorasi, analisis, interpretasi data dan informasi berdasarkan prinsip-prinsip geofisika eksplorasi yang ramah lingkungan				
	SLO ⇒ Course Learning Outcomes					
	After completing this course, it is expected:					
	SLO-4	CLO-1: Students are able to analyze seismic waves and their relationship to aspects of earth science and exploration				
	SLO-6	CLO-1: Students are able to analyze seismic waves and their relationship to aspects of earth science and exploration				
	SLO-8	CLO-2: Students are able to identify regional geological potential in Indonesia and hydrocarbon and geotechnical exploration processes				
	SLO-12	CLO-2: Students are able to identify regional geological potential in Indonesia and hydrocarbon and geotechnical exploration processes				
	CLO ⇒ Sub-CLO					
		Sub-CLO-1:Students are able to analyze the scope of seismic data interpretation				
		Sub-CLO-2:Students are able to analyze the Basic Principles of Interpretation				
		Sub-CLO-3:Students are able to analyze seismic data types and resolution				
		Sub-CLO-4:Students are able to analyze the basic concepts of well log data and binding				

	CLO-1	
		Sub-CLO-5: Students are able to apply Subsurface Mapping with Seismic data
		Sub-CLO-6: Students are able to apply Structural Interpretation of Seismic Data
		Sub-CLO-7: Students are able to analyze direct hydrocarbon indicators and single attribute seismic
	CLO-2	Sub-CLO-8: Students are able to apply direct hydrocarbon indicators and multiple seismic attributes in field experiments
		Sub-CLO-9: Students are able to analyze the Principles of Seismic Stratigraphy (1)
		Sub-CLO-10: Students are able to apply the basic concepts of AVO and its applications (1)
		Sub-CLO-11: Students are able to apply the basic concepts of AVO and its applications (2)
		Sub-CLO-12: Students are able to complete Data Analysis
		Sub-CLO-13: Students are able to complete Data Processing (1)
		Sub-CLO-14: Students are able to complete Data Processing (2)
	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			
				Project/Case Study			
SLO-6	CLO-1	SUB-CLO-1	Participation	5	5		
SLO-6	CLO-1	SUB-CLO-2	Participation	8	8		
SLO-6	CLO-1	SUB-CLO-3	Participation	8	8		
SLO-6	CLO-1	SUB-CLO-4	Participation	8	8		
SLO-6	CLO-1	SUB-CLO-5	Participation	8	8		
SLO-6	CLO-1	SUB-CLO-6	Participation	8	8		
SLO-6	CLO-1	SUB-CLO-7	Participation	8	8		
SLO-12	CLO-2	SUB-CLO-8	Participation	5	5		
SLO-12	CLO-2	SUB-CLO-9	Participation	8	8		
SLO-12	CLO-2	SUB-CLO-10	Participation	5	5		
SLO-12	CLO-2	SUB-CLO-11	Participation and Participation	5	5		

SLOs that are charged on the Course		CPMK	SUB CPMK	Form of Assessment*		Weight	Value	Student Score
				Formative	Sumative			
					Project/Case Study			
SLO-12		CLO-2	SUB-CLO-12	Participation	8	8		
SLO-12		CLO-2	SUB-CLO-13	Participation and Participation	8	8		
SLO-12		CLO-2	SUB-CLO-14	Participation	8	8		
					100	100		
Course Description		The course is a review of seismic methods for oil and gas exploration. The inaugural meeting was filled with basic principles of seismic data interpretation, An interpretation will be successful if you understand the basic principles of interpretation. To be able to carry out the interpretation, you must understand the types of data produced from data processing. After knowing the data type, the data must be remembered so that it is xline or online, when running it does not lose the offset value, so the data must be bound. After that, subsurface mapping was carried out to avoid misinterpretation of the structure. The topics presented after the mid-semester exam are the topics of Direct Hydrocarbon Indicators and Single Attribute Seismic; Direct hydrocarbon indicators and Multi Attribute Seismic; Principles of Seismic Stratigraphy; Basic Concepts of AVO and their applications (1); Basic concepts of AVO and its applications (2); Data analysis ; Data Processing (1); Data Processing (2);						
Learning Materials/Subjects		1.Seismic data types and resolution; 2.Basic Concepts of Well Log and Binding data; 3.Structural Interpretation of Seismic Data; 4.Applications of Seismic Attributes 5.Seismic Principles Stratigraphy; 6.Amplitude Versus Offset (AVO) Analysis						
Reference		Main References						
		1. Bacon, M., Simm, R. and Redshaw, T., 2003, 3-D Seismic Interpetation, Cambridge University Press, Cambridge 2. Brown A. R. (2004) Interpretation of three-dimensional seismic data: SEG and AAPG 3. Ozdogan Yilmaz and Stephen M. Doherty, 2000, Seismic Data Analysis: Processing, Inversion, and Interpretation of Seismic Data, SEG, Tulsa						
		Additional References						
		1.Yilmaz, O., Seismic Data Processing, Society of Exploration Geophysics, 1987 2.Sheriff, R.E. & Geldart, L.P. Exploration Seismology. 198						
Teaching Team		Ir. Bambang Hari Mei Soeprapto, M.Si., Sabrianto Aswad, S.Si., MT						
Course requirement								
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	Students are able to analyze the scope of seismic data interpretation (CPMK-1)	Formative: Accuracy of analyzing the concept of data interpretation space Sumative: -	Formative Criteria: Participation Sumative Criteria: Project/Case Study (5) Assessment Technique: Non Test	Studying: Case Study (Case Study) TM [1x3x50`]		Material: The benefits of knowledge that studied Understanding seismic interpretation as a result of data processing.	5
2	Students are able to analyze the Basic Principles of Interpretation (CPMK-1)	Formative: Accuracy of analyzing the basic principles of seismic data interpretation Sumative: -	Formative Criteria: Participation dinilai dengan rubrik 1 Sumative Criteria: Project/Case Study (8) Assessment Technique: Non Test	Studying: Case Study (Case Study) TM [1x3x50`]		Material: 1. Acoustic Impedance 2. Reflection coefficient 3. Polarization and Wavelet Phase	8
3	Students are able to analyze seismic data types and resolution (CPMK-1)	Formative: Activity and precision in selecting data types and seismic resolution Sumative: -	Formative Criteria: Participation Sumative Criteria: Project/Case Study (8) Assessment Technique: Non Test	Studying: Case Study (Case Study) TM [1x3x50`]		Material: 1. Acoustic Impedance 2. Reflection coefficient	8

4	Students are able to analyze the basic concepts of well log data and binding (CPMK-1)	Formative: Accuracy in analyzing basic concepts of log data and Well Seismic Tie Sumative: -	Formative Criteria: Participation Sumative Criteria: Project/Case Study (8) Assessment Technique: Non Test	Studying: Case Study (Case Study) TM [1x3x50`]		Material : 1. Mega-regional data 2. Local subsurface data 3. Data from wells 4. Vertical resolution 5. Horizontal resolution	8
5	Students are able to apply Subsurface Mapping with Seismic data (CPMK-1)	Formative: Accuracy in making subsurface maps Sumative: -	Formative Criteria: Participation Sumative Criteria: Project/Case Study (8) Assessment Technique: Non Test	Studying: Case Study (Case Study) TM [1x3x50`]		Material : 1. Selection (picking) Horizon 2D/3D 2. Fault Selection 3. Extrapolating 2D/3D horizon surfaces 4. Creation of time structure maps 5. Depth structure map creation	8
6	Students are able to apply Structural Interpretation of Seismic Data (CPMK-1)	Formative: Accuracy in applying structural interpretation of seismic data Sumative: -	Formative Criteria: Participation Sumative Criteria: Project/Case Study (8) Assessment Technique: Test and Non-Test	Studying: Case Study (Case Study) TM [1x3x50`]		Material : 1. Fracture identification 2. Extensional faults 3. Constructional fault 4. Lateral faults (Uplift and subsidence)	8

7	Students are able to analyze direct hydrocarbon indicators and single attribute seismic (CPMK-1)	Formative: Activity and accuracy in analyzing direct indicators and single attributes Sumative: -	Formative Criteria: Participation Sumative Criteria: Project/Case Study (8) Assessment Technique: Non Test	Studying: Case Study (Case Study) TM [1x3x50`]		Material: 1. Bright spot and dimspot 2. Flat spot 3. Polarity reversal 4. Attribute amplitude 5. Time/horizon attribute 6. Frequency attribute	8
8	Students are able to apply direct hydrocarbon indicators and multiple seismic attributes in field experiments (CPMK-2)	Formative: Activity and accuracy in applying direct and multi-attribute indicators in field experiments Sumative: -	Formative Criteria: Participation Sumative Criteria: Project/Case Study (5) Assessment Technique: Non Test	Studying: Case Study (Case Study) TM [1x3x50`]		Material : 1. Phase attributes 2. Amplitude Attribute 3. Frequency attribute 4. Time attribute	5
9	Students are able to analyze the Principles of Seismic Stratigraphy (1) (CPMK-2)	Formative: Accuracy in analyzing seismic stratigraphic principles Sumative: -	Formative Criteria: Participation Sumative Criteria: Project/Case Study (8) Assessment Technique: Non Test	Studying: Case Study (Case Study) TM [1x3x50`]		Materials: 1. Demultiplex & gain recovery 2. Field Geometry 3. Labeling 4. Editing and Muting 5. CDP Gather 6. Initial Gather 7. Amplitude of Gain recovery	8

10	Students are able to apply the basic concepts of AVO and its applications (1) (CPMK-2)	Formative: Activity and accuracy in applying basic AVO concepts Sumative: -	Formative Criteria: Participation Sumative Criteria: Project/Case Study (5) Assessment Technique: Non Test	Studying: Case Study (Case Study) TM [1 x 3 x 50']		Material : 1. AVO {Castagna} basic equation 2. Rock physics for reservoir characteristics 3. Fluid substitution modeling 4. Intercept and Gradient Method	5
11	Students are able to apply the basic concepts of AVO and its applications (2) (CPMK-2)	Formative: Activeness and accuracy in implementing advanced AVO concepts and their applications Sumative: -	Formative Criteria: Participation Participation Sumative Criteria: Project/Case Study (5) Assessment Technique: Non Test	Studying: Case Study (Case Study) TM [1 x 3 x 50']		Material: 1. Speed analysis 2. Clusters in the diagram 3. Crossplot Vp/Vs vs passion ratio 4. Murdock 's line	5
12	Students are able to complete Data Analysis (CPMK-2)	Formative: Activity and accuracy in theory and concepts, Down hole seismic, Cross hole Tomography Sumative: -	Formative Criteria: Participation Sumative Criteria: Project/Case Study (8) Assessment Technique: Non Test	Studying: Case Study (Case Study) TM [1 x 3 x 50']		Material: 1. Linear Phase Shift 2. Auto correlation 3. Cross correlation 4. Convolution, Phase wave 5. Deconvolution; Inverse filter, Wiener filtering	8

13	Students are able to complete Data Processing (1) (CPMK-2)	Formative: Accuracy in completing basic level processing of seismic data. Sumative: -	Formative Criteria: Participation Participation Sumative Criteria: Project/Case Study (8) Assessment Technique: Non Test	Studying: Case Study (Case Study) TM [1x3x50`]		Material: 1. Static correction 2. Intercept time method 3. Plus minus method 4. GRM Method (Generalized Reciprocal Method) 5. Delay time method 6. Practicum	8
14	Students are able to complete Data Processing (2) (CPMK-2)	Formative: Accuracy in completing advanced data processing Sumative: -	Formative Criteria: Participation Sumative Criteria: Project/Case Study (8) Assessment Technique: Non Test	Studying: Case Study (Case Study) TM [1x3x50`]		Material: 1. Deconvolution 2. Stacking 3. Speed analysis 4. 2D Fourier Transform; f-k domain 5. Practicum	8
							100

Matrix of SLO, CLO, and Assessment Method

SLO / CLO	CLO-1	CLO-2
CPL-4 (P1)	Project/Case Study (Weight 5%) Project/Case Study (Weight 8%) Project/Case Study (Weight 8%) Project/Case Study (Weight 8%) Project/Case Study (Weight 8%) Project/Case Study (Weight 8%) Project/Case Study (Weight 8%)	
CPL-6 (P3)	Project/Case Study (Weight 5%) Project/Case Study (Weight 8%) Project/Case Study (Weight 8%) Project/Case Study (Weight 8%) Project/Case Study (Weight 8%) Project/Case Study (Weight 8%) Project/Case Study (Weight 8%)	

SLO / CLO	CLO-1	CLO-2
CPL-8 (KU1)		Project/Case Study (Weight 5%) Project/Case Study (Weight 8%) Project/Case Study (Weight 5%) Project/Case Study (Weight 5%) Project/Case Study (Weight 8%) Project/Case Study (Weight 8%) Project/Case Study (Weight 8%)
CPL-12 (KK2)		Project/Case Study (Weight 5%) Project/Case Study (Weight 8%) Project/Case Study (Weight 5%) Project/Case Study (Weight 5%) Project/Case Study (Weight 8%) Project/Case Study (Weight 8%) Project/Case Study (Weight 8%)

Evaluation Type and Assessment Weight

Type	Assessment Weight
Project/Case Study	100
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			
				Project/Case Study			
SLO-6	CLO-1	SUB-CLO-1	Participation	5	5		
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SLO-12	CLO-2	SUB-CLO-10	Participation	5	5		
SLO-12	CLO-2	SUB-CLO-11	Participation and Participation	5	5		
SLO-12	CLO-2	SUB-CLO-12	Participation	8	8		
SLO-12	CLO-2	SUB-CLO-13	Participation and Participation	8	8		
SLO-12	CLO-2	SUB-CLO-14	Participation	8	8		
				100	100		

