

SEMESTER LEARNING PLAN

**DIFFERENTIAL EQUATIONS COURSES
(23H01120603)**



TEACHING TEAM

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

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

Vision

The scientific vision is to become a study program with an international reputation in the development of mathematics based on the Indonesian maritime continent by 2030

Vision Strategy

Mission

To fulfill the above vision, the Undergraduate Mathematics Study Program has four missions, namely:

- Organizing innovative and effective mathematics learning to improve the quality and creativity of students in order to compete nationally and internationally.
- Improving a research culture that produces internationally reputable publications.
- Playing an active role in community service activities and collaborating with other academic institutions, government, business, media and society.
- Carry out governance in the Mathematics Study Program that is effective, efficient and transparent based on IT and ISO 9001:2015 standards to achieve the tridharma goals.

Graduate Profiles

Gagal diterjemahkan

PLO charged to courses

CPL-1 (ILO 1) - Students are able to demonstrate an advanced understanding of basic pure and simple applied mathematics.

CPL-2 (P2) - The students are able to identify objects, techniques, and theorems in fundamental mathematics, and making a connection for solving problems

CPL-5 (KK1) - The students are able to construct mathematical modelling with relatively new ideas and present the results orally and in writing

CPL-6 (KK2) - The students are able to apply the mathematical method for solving a mathematical related-problem with or without the aid of computers and software

Course Learning Outcomes (CLO)

CPMK-1: Students are able to classify and solve ordinary differential equations. (CPL1 dan CPL2)

CPMK-2: Students are able to identify techniques and methods and make connections to solve ordinary differential equation problems. (CPL1 dan CPL2)

CPMK-3: Students are able to apply concepts effectively to solve differential equation problems in mathematics, science and engineering. (CPL1, CPL2 dan CPL5)

CPMK-4: Students are able to apply the concepts of mathematical methods in solving differential equations through the use of appropriate technology. (CPL1 dan CPL6)

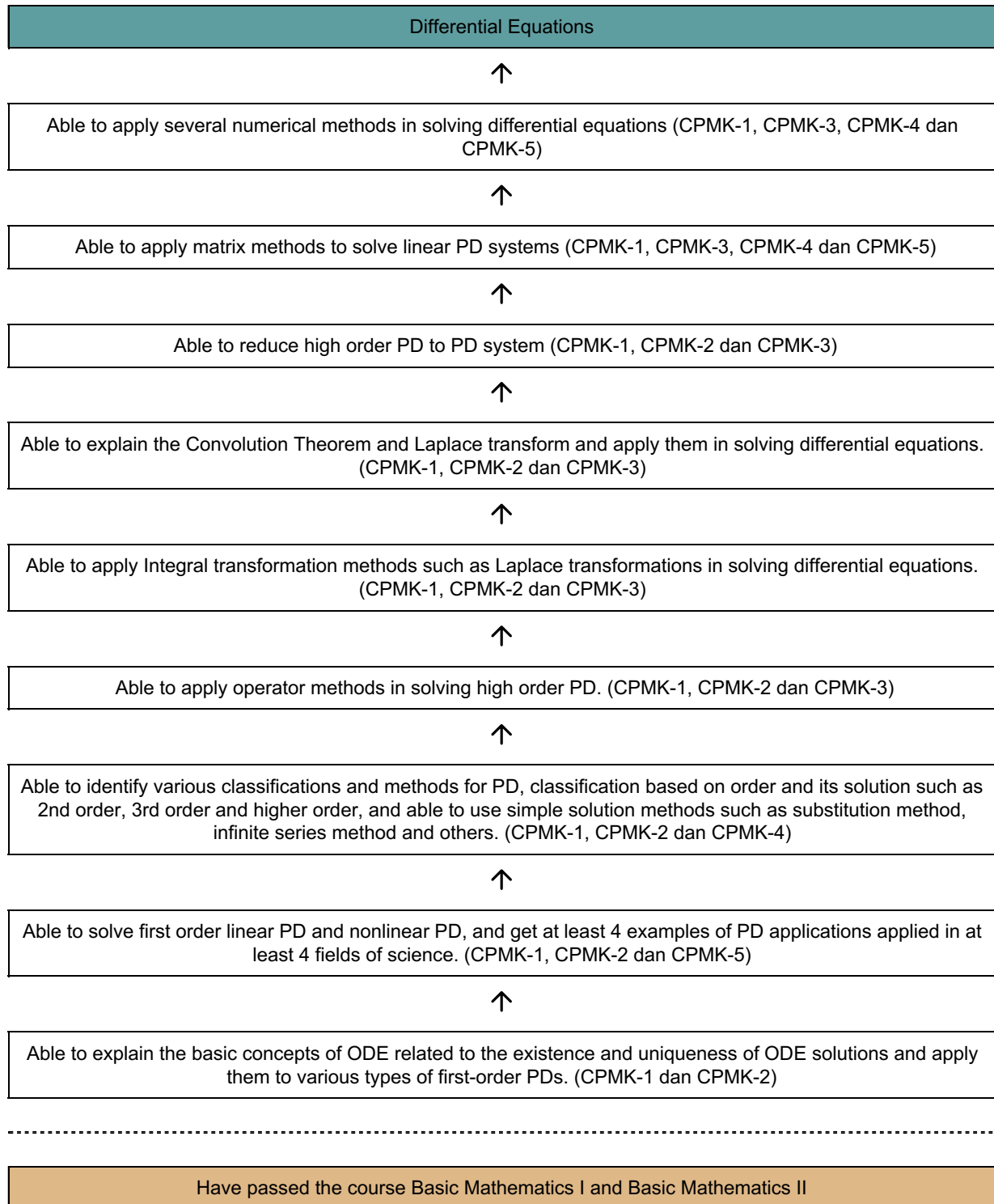
CPMK-5: Students are able to communicate mathematical ideas in appropriate contexts both verbally and in writing with groups. (CPL2 dan CPL5)

Sub-CLO

Sub CPMK-1: Able to explain the basic concepts of ODE related to the existence and uniqueness of ODE solutions and apply them to various types of first-order PDs. (CPMK-1 dan CPMK-2)

- Sub CPMK-2: Able to solve first order linear PD and nonlinear PD, and get at least 4 examples of PD applications applied in at least 4 fields of science. (CPMK-1, CPMK-2 dan CPMK-5)
- Sub CPMK-3: Able to identify various classifications and methods for PD, classification based on order and its solution such as 2nd order, 3rd order and higher order, and able to use simple solution methods such as substitution method, infinite series method and others. (CPMK-1, CPMK-2 dan CPMK-4)
- Sub CPMK-4: Able to apply operator methods in solving high order PD. (CPMK-1, CPMK-2 dan CPMK-3)
- Sub CPMK-5: Able to apply Integral transformation methods such as Laplace transformations in solving differential equations. (CPMK-1, CPMK-2 dan CPMK-3)
- Sub CPMK-6: Able to explain the Convolution Theorem and Laplace transform and apply them in solving differential equations. (CPMK-1, CPMK-2 dan CPMK-3)
- Sub CPMK-7: Able to reduce high order PD to PD system (CPMK-1, CPMK-2 dan CPMK-3)
- Sub CPMK-8: Able to apply matrix methods to solve linear PD systems (CPMK-1, CPMK-3, CPMK-4 dan CPMK-5)
- Sub CPMK-9: Able to apply several numerical methods in solving differential equations (CPMK-1, CPMK-3, CPMK-4 dan CPMK-5)

Learning Analytics





HASANUDDIN UNIVERSITY

FAKULTY OF MATHEMATICS AND NATURAL SCIENCES

STUDY PROGRAM OF MATHEMATICS - S1

SEMESTER LEARNING PLAN

Course		Code	Course Group	Credits	SEMESTER	Compilation Date
Differential Equations		23H01120603	Applied Mathematics	3	3	10 Agustus 2024
AUTHORITY		SLP Developer Lecturer		Coordinator		Head of Study Program
		Prof. Dr. Jeffry Kusuma		Prof. Dr. Jeffry Kusuma		Dr. Firman, S.Si.,M.Si.
	SLOs that are imposed on the course					
	SLO-1:	Mahasiwa memiliki pemahaman yang relatif mendalam dalam matematika murni dan matematika terapan sederhana.				
	SLO-2:	Mahasiswa mampu mengidentifikasi objek, teknik, dan sifat dalam matematika dasar, dan membuat koneksi untuk menyelesaikan masalah				
	SLO-5:	Mahasiswa dapat membangun pemodelan matematika dengan ideide yang relatif baru dan mempresentasikan hasil dengan jelas secara lisan dan tertulis				
	SLO-6:	Mahasiswa dapat menerapkan metode matematika untuk memecahkan masalah terkait matematika dengan atau tanpa bantuan komputer dan perangkat lunak				
	SLO ⇒ Course Learning Outcomes					
	After completing this course, it is expected:					
	SLO-1	CLO-1: Students are able to classify and solve ordinary differential equations.				
		CLO-2: Students are able to identify techniques and methods and make connections to solve ordinary differential equation problems.				
		CLO-3: Students are able to apply concepts effectively to solve differential equation problems in mathematics, science and engineering.				
		CLO-4: Students are able to apply the concepts of mathematical methods in solving differential equations through the use of appropriate technology.				
	SLO-2	CLO-1: Students are able to classify and solve ordinary differential equations.				
		CLO-2: Students are able to identify techniques and methods and make connections to solve ordinary differential equation problems.				
		CLO-3: Students are able to apply concepts effectively to solve differential equation problems in mathematics, science and engineering.				
		CLO-5: Students are able to communicate mathematical ideas in appropriate contexts both verbally and in writing with groups.				
	SLO-5	CLO-3: Students are able to apply concepts effectively to solve differential equation problems in mathematics, science and engineering.				
		CLO-5: Students are able to communicate mathematical ideas in appropriate contexts both verbally and in writing with groups.				
	SLO-6	CLO-4: Students are able to apply the concepts of mathematical methods in solving differential equations through the use of appropriate technology.				

**Learning
Outcomes
Course**

CLO ⇒ Sub-CLO	
CLO-1	Sub-CLO-1: Able to explain the basic concepts of ODE related to the existence and uniqueness of ODE solutions and apply them to various types of first-order PDs.
	Sub-CLO-2: Able to solve first order linear PD and nonlinear PD, and get at least 4 examples of PD applications applied in at least 4 fields of science.
	Sub-CLO-3: Able to identify various classifications and methods for PD, classification based on order and its solution such as 2nd order, 3rd order and higher order, and able to use simple solution methods such as substitution method, infinite series method and others.
	Sub-CLO-4: Able to apply operator methods in solving high order PD.
	Sub-CLO-5: Able to apply Integral transformation methods such as Laplace transformations in solving differential equations.
	Sub-CLO-6: Able to explain the Convolution Theorem and Laplace transform and apply them in solving differential equations.
	Sub-CLO-7: Able to reduce high order PD to PD system
	Sub-CLO-8: Able to apply matrix methods to solve linear PD systems
	Sub-CLO-9: Able to apply several numerical methods in solving differential equations
CLO-2	Sub-CLO-1: Able to explain the basic concepts of ODE related to the existence and uniqueness of ODE solutions and apply them to various types of first-order PDs.
	Sub-CLO-2: Able to solve first order linear PD and nonlinear PD, and get at least 4 examples of PD applications applied in at least 4 fields of science.
	Sub-CLO-3: Able to identify various classifications and methods for PD, classification based on order and its solution such as 2nd order, 3rd order and higher order, and able to use simple solution methods such as substitution method, infinite series method and others.
	Sub-CLO-4: Able to apply operator methods in solving high order PD.
	Sub-CLO-5: Able to apply Integral transformation methods such as Laplace transformations in solving differential equations.
	Sub-CLO-6: Able to explain the Convolution Theorem and Laplace transform and apply them in solving differential equations.
	Sub-CLO-7: Able to reduce high order PD to PD system
CLO-5	Sub-CLO-2: Able to solve first order linear PD and nonlinear PD, and get at least 4 examples of PD applications applied in at least 4 fields of science.
	Sub-CLO-8: Able to apply matrix methods to solve linear PD systems
	Sub-CLO-9: Able to apply several numerical methods in solving differential equations
CLO-4	Sub-CLO-3: Able to identify various classifications and methods for PD, classification based on order and its solution such as 2nd order, 3rd order and higher order, and able to use simple solution methods such as substitution method, infinite series method and others.
	Sub-CLO-8: Able to apply matrix methods to solve linear PD systems
	Sub-CLO-9: Able to apply several numerical methods in solving differential equations
	Sub-CLO-4: Able to apply operator methods in solving high order PD.
	Sub-CLO-5: Able to apply Integral transformation methods such as Laplace transformations in solving differential equations.

	CLO-3	Sub-CLO-6:Able to explain the Convolution Theorem and Laplace transform and apply them in solving differential equations.										
		Sub-CLO-7:Able to reduce high order PD to PD system										
		Sub-CLO-8:Able to apply matrix methods to solve linear PD systems										
		Sub-CLO-9:Able to apply several numerical methods in solving differential equations										
	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					Written Exam			
				Independent Assignment	Mid Test	Quiz	Written Exam	Case Studies				
SLO-2	CLO-2	SUB-CLO-1	Discussion	5	5	0	0	0	6	16		
SLO-5	CLO-5	SUB-CLO-2	Discussion	0	5	5	0	0	6	16		
SLO-6	CLO-4	SUB-CLO-3	Discussion	5	10	0	0	0	9	24		
SLO-5	CLO-3	SUB-CLO-4	Discussion	5	0	0	10	0	9	24		
SLO-5	CLO-3	SUB-CLO-6	Discussion and Q&A	0	0	0	0	10	0	10		
SLO-5	CLO-3	SUB-CLO-7	Discussion and Q&A	0	0	0	0	10	0	10		
SLO-5	CLO-5	SUB-CLO-8	Discussion and Q&A and Discussion and Q&A	0	0	0	0	20	0	20		
SLO-5	CLO-5	SUB-CLO-9	Discussion and Q&A	0	0	0	0	10	0	10		
				15	20	5	40	50	40	130		
Course Description		Differential Equations is a mandatory course that provides understanding and development of skills in the form of solving models continuous mathematics in the form of ordinary differential equations which are easy to find and apply in various fields of applied mathematics. This course provides students with the opportunity to practice recognizing and solving ordinary differential equations or systems given differential equation. The learning material in this course includes identification and completion of first order PD with variable coefficients, second order PD, high order PD, and PD systems. Several methods for solving PD will also be discussed, including the series method, Laplace transformation, a method that uses infinite series and numerical methods that can be used to solve initial and boundary value problems of various types.										

Learning Materials/Subjects		1. Understanding & PD classification (Definition and classification of ODE) 2. PD first order Linear and Nonlinear (first order Linear and Nonlinear of ODE) 3. Second order PD and high order PD (second order and high order of ODE) 4. PD with series method (sequences method) 5. PD with the Operator method (Operator method for solving differential equations) 6. PD with Laplace transformation (Laplace Transformation) 7. Convolution theorem for Laplace Transformation (Convolution theorem for Laplace Transformation) 8. Reducing high order PD into a PD system (Reduction of high order differential equation into system of differential equation) 9. Matrix Method for Linear PD Systems (Matrice method for solving systems of ODE) 10. Second order PD with variable coefficient (Second order with variable coefficient) 11. Introduction to numerical methods for solving first order differential equations					
Reference		Main References					
		1. Jeffry Kusuma, Elementary Differential Equations, Lecture Diktat, Unhas 2. Boyce and Di Prima, 1992, Elementary Differential Equations and Boundary Value Problems 3. Michael D. Greenberg, 1998, Advanced Engineering Mathematics, 2nd Ed					
		Additional References					
		1. Kreyzig, Erwin, Advanced Engineering Mathematics 2. https://bookboon.com/en/statistics-and-mathematics-ebooks					
Teaching Team		Prof. Dr. Syamsuddin Toaha, M.Sc., Prof. Dr. Jeffry Kusuma, Prof. Dr. Kasbawati, S.Si., M.Si.					
Course requirement		Basic Mathematics I, Basic Mathematics II					
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

1-2	Able to explain the basic concepts of ODE related to the existence and uniqueness of ODE solutions and apply them to various types of first-order PDs. (CPMK-1, CPMK-2)	Formative: Active student participation Sumative: Accuracy of explanation concept of existence with examples; Accuracy explains the concept of singleness with examples; Clarity description; Completeness in solving first order PD examples	Formative Criteria: Discussion Sumative Criteria: Independent Assignment (5) dinilai dengan rubrik 01 Mid Test (5) dinilai dengan rubrik 01 Assessment Technique: Test and Non-Test	Studying: Self-Directed Learning, Collaborative Learning 2x3x50	Studying: Self-Directed Learning 2x3x120	Tuition Contract Introduction PD (definition, existence and uniqueness of solutions, initial value problems) and first order PD. PD separate variable, PD Linear (PD homogeneous, Exact PD, Integration Factors)	10
3	Able to solve first order linear PD and nonlinear PD, and get at least 4 examples of PD applications applied in at least 4 fields of science. (CPMK-1, CPMK-2, CPMK-5)	Formative: Active student participation Sumative: Accuracy of solving Linear PD and first order Nonlinear PD.; Clarity and completeness of description; Accuracy 4 examples of PD applications applied to at least 4 fields of science	Formative Criteria: Discussion Sumative Criteria: Quiz (5) dinilai dengan rubrik 01 Mid Test (5) dinilai dengan rubrik 01 Assessment Technique: Test and Non-Test	Studying: Self-Directed Learning, Collaborative Learning, Other methods 1x3x50	Studying: Self-Directed Learning 1x3x120	Linear PD Non-Linear PD (PD Bernoulli, Ricatti, Claireut). PD Order one and First order PD application	10

4-5	Able to identify various classifications and methods for PD, classification based on order and its solution such as 2nd order, 3rd order and higher order, and able to use simple solution methods such as substitution method, infinite series method and others. (CPMK-1, CPMK-2, CPMK-4)	Formative: Active student participation Sumative: Precision methods for solving various types of PD order 2; Precision methods for solving various types of PD order 3; Precision method in resolve various types of PD order high; Precise use of the substitution method; Precise use infinite series method	Formative Criteria: Discussion Sumative Criteria: Independent Assignment (5) dinilai dengan rubrik 04 Mid Test (10) dinilai dengan rubrik 01 Assessment Technique: Test and Non-Test	Studying: Self-Directed Learning 2x3x50	Studying: Self-Directed Learning 2x3x120	Linear PD of order 2 and order high with coefficient homogeneous constant, High order linear PD constant coefficients that non-homogeneous with using functions complementary	15
6-7	Able to apply operator methods in solving high order PD. (CPMK-1, CPMK-2, CPMK-3)	Formative: Active student participation Sumative: Ability using method inner operator complete the PD order tall; Clarity of the description of the settlement	Formative Criteria: Discussion dinilai dengan rubrik 04 Sumative Criteria: Independent Assignment (5) dinilai dengan rubrik 01 Written Exam (10) dinilai dengan rubrik 01 Assessment Technique: Test and Non-Test	Studying: Self-Directed Learning 2x3x50	Studying: Self-Directed Learning 2x3x120	Operator method for High order linear PD constant coefficient non-homogeneous and functional complementary with operator method.	15
8	Written Exam						30

9-10	Able to apply matrix methods to solve linear PD systems (CPMK-1, CPMK-3, CPMK-4, CPMK-5)	Formative: Active student participation Sumative: Ability using the matrix method; Clarity of settlement description; completion of completion	Formative Criteria: Discussion and Q&A Sumative Criteria: Case Studies (10) dinilai dengan rubrik 02 Assessment Technique: Non Test	Response and Tutorial: Case Study (Case Study) 2x3x50	Response and Tutorial: Case Study (Case Study) 2x3x120	Laplace Transform	10
11	Able to explain the Convolution Theorem and Laplace transform and apply them in solving differential equations. (CPMK-1, CPMK-2, CPMK-3)	Formative: Active student participation Sumative: Abilities and accuracy of use convolution theorem Laplace transformation to complete differential equations normal	Formative Criteria: Discussion and Q&A Sumative Criteria: Case Studies (10) dinilai dengan rubrik 02 Assessment Technique: Non Test	Response and Tutorial: Case Study (Case Study) 1x3x50	Response and Tutorial: Case Study (Case Study) 1x3x120	Convolution Theorem for Laplace transform	10
12	Able to reduce high order PD to PD system (CPMK-1, CPMK-2, CPMK-3)	Formative: Active student participation Sumative: Reduction accuracy Higher order PD becomes PD system; Accuracy of completing the PD system	Formative Criteria: Discussion and Q&A Sumative Criteria: Case Studies (10) dinilai dengan rubrik 01 Assessment Technique: Non Test	Response and Tutorial: Case Study (Case Study) 1x3x50	Response and Tutorial: Case Study (Case Study) 1x3x120	Reduces high order PD into a PD system	10

13-14	Able to apply matrix methods to solve linear PD systems (CPMK-1, CPMK-3, CPMK-4, CPMK-5)	Formative: Active student participation Sumative: Accuracy of use matrix method for complete the PD system linear	Formative Criteria: Discussion and Q&A Sumative Criteria: Case Studies (10) dinilai dengan rubrik 01 Assessment Technique: Non Test	Response and Tutorial: Case Study (Case Study) 2x3x50	Response and Tutorial: Case Study (Case Study) 2x3x120	System of equations differential with matrices order 2, order 3 and order n	10
15	Able to apply several numerical methods in solving differential equations (CPMK-1, CPMK-3, CPMK-4, CPMK-5)	Formative: Active student participation Sumative: Deep precision using a computer in completing PD with numerical methods	Formative Criteria: Discussion and Q&A Sumative Criteria: Case Studies (10) dinilai dengan rubrik 02 Assessment Technique: Non Test	Response and Tutorial: Case Study (Case Study) 1x3x50	Response and Tutorial: Case Study (Case Study) 1x3x120	Numerical overview for complete regular PD	10
							130

Matrix of SLO, CLO, and Assessment Method

SLO / CLO	CLO-1	CLO-2	CLO-3	CLO-4	CLO-5
CPL-1 (ILO 1)	Independent Assignment (Weight 5%)	Independent Assignment (Weight 5%)	Independent Assignment (Weight 5%) Written Exam (Weight 10%) Case Studies (Weight 10%) Case Studies (Weight 10%) Case Studies (Weight 20%) Case Studies (Weight 10%)	Independent Assignment (Weight 5%) Mid Test (Weight 10%) Case Studies (Weight 20%) Case Studies (Weight 10%)	
	Mid Test (Weight 5%)				
	Quiz (Weight 5%)	Mid Test (Weight 5%)			
	Mid Test (Weight 5%)	Quiz (Weight 5%)			
	Independent Assignment (Weight 5%)	Mid Test (Weight 5%)			
	Mid Test (Weight 10%)	Independent Assignment (Weight 5%)			
	Independent Assignment (Weight 5%)	Mid Test (Weight 10%)			
	Written Exam (Weight 10%)	Independent Assignment (Weight 5%)			
	Case Studies (Weight 10%)	Written Exam (Weight 10%)			
	Case Studies (Weight 10%)	Case Studies (Weight 10%)			
	Case Studies (Weight 20%)	Case Studies (Weight 10%)			
	Case Studies (Weight 10%)				

SLO / CLO	CLO-1	CLO-2	CLO-3	CLO-4	CLO-5
CPL-2 (P2)	Independent Assignment (Weight 5%) Mid Test (Weight 5%) Quiz (Weight 5%) Mid Test (Weight 5%) Independent Assignment (Weight 5%) Mid Test (Weight 10%) Independent Assignment (Weight 5%) Written Exam (Weight 10%) Case Studies (Weight 10%) Case Studies (Weight 10%) Case Studies (Weight 20%) Case Studies (Weight 10%)	Independent Assignment (Weight 5%) Mid Test (Weight 5%) Quiz (Weight 5%) Mid Test (Weight 5%) Independent Assignment (Weight 5%) Mid Test (Weight 10%) Independent Assignment (Weight 5%) Written Exam (Weight 10%) Case Studies (Weight 10%) Case Studies (Weight 10%)	Independent Assignment (Weight 5%) Written Exam (Weight 10%) Case Studies (Weight 10%) Case Studies (Weight 10%) Case Studies (Weight 20%) Case Studies (Weight 10%)		Quiz (Weight 5%) Mid Test (Weight 5%) Case Studies (Weight 20%) Case Studies (Weight 10%)
CPL-5 (KK1)			Independent Assignment (Weight 5%) Written Exam (Weight 10%) Case Studies (Weight 10%) Case Studies (Weight 10%) Case Studies (Weight 20%) Case Studies (Weight 10%)		Quiz (Weight 5%) Mid Test (Weight 5%) Case Studies (Weight 20%) Case Studies (Weight 10%)

SLO / CLO	CLO-1	CLO-2	CLO-3	CLO-4	CLO-5
CPL-6 (KK2)				Independent Assignment (Weight 5%) Mid Test (Weight 10%) Case Studies (Weight 20%) Case Studies (Weight 10%)	

Evaluation Type and Assessment Weight

Type	Assessment Weight
Independent Assignment	15
Mid Test	20
Quiz	5
Written Exam	40
Case Studies	50
Total	130

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					Written Exam			
				Independent Assignment	Mid Test	Quiz	Written Exam	Case Studies				
SLO-2	CLO-2	SUB-CLO-1	Discussion	5	5	0	0	0	6	16		
SLO-5	CLO-5	SUB-CLO-2	Discussion	0	5	5	0	0	6	16		
SLO-6	CLO-4	SUB-CLO-3	Discussion	5	10	0	0	0	9	24		
SLO-5	CLO-3	SUB-CLO-4	Discussion	5	0	0	10	0	9	24		
SLO-5	CLO-3	SUB-CLO-6	Discussion and Q&A	0	0	0	0	10	0	10		
SLO-5	CLO-3	SUB-CLO-7	Discussion and Q&A	0	0	0	0	10	0	10		
SLO-5	CLO-5	SUB-CLO-8	Discussion and Q&A and Discussion and Q&A	0	0	0	0	20	0	20		
SLO-5	CLO-5	SUB-CLO-9	Discussion and Q&A	0	0	0	0	10	0	10		
				15	20	5	40	50	40	130		

Lampiran Rubrik 01 | ASSESMENT TERTULIS

Kriteria Penilaian	Bobot/Skor Penilaian				
	5	4	3	2	1/0
Konsep/ metode yang digunakan	Penjelasan konsep /metode (*) sangat lengkap dan akurat	Penjelasan konsep/metode (*) cukup jelas tetapi beberapa informasi tidak dituliskan secara lengkap.	Penjelasan konsep/metode (*) kurang jelas dan banyak informasi yang tidak dituliskan	Penjelasan yang dituliskan hampir tidak berkaitan dengan konsep/ metode (*)	Tidak memberikan konsep yang dibutuhkan
Sistematika penulisan/ pembuktian	Sistematika penulisan/ pembuktian sangat jelas dan terstruktur	Sistematika penulisan/ pembuktian cukup jelas namun ada langkah yang hilang	Sistematika penulisan/ pembuktian kurang jelas	Sistematika penulisan/ pembuktian tidak jelas	Jawaban tidak benar/ tidak ada
Interpretasi geometri/ kualitatif/ kuantitatif.	Interpretasi geometri/ kualitatif/ kuantitatif (*) tepat dan lengkap	Interpretasi geometri/ kualitatif/ kuantitatif (*) cukup lengkap/ tepat	Interpretasi geometri/ kualitatif/ kuantitatif (*) kurang lengkap/ tepat	Interpretasi geometri/ kualitatif/ kuantitatif (*) tidak lengkap/ tepat	Interpretasi geometri/ kualitatif/kuantitatif(*) tidak benar
Perhitungan/kesimpulan	Perhitungan/ kesimpulan sangat akurat/tepat dan disertai alasan yang mendasarinya	Perhitungan/ kesimpulan cukup akurat/tepat dan disertai alasan yang mendasarinya	Kesimpulan cukup tepat, namun tidak disertai alasan yang jelas	Perhitungan/ kesimpulan kurang akurat/tepat dan tidak disertai alasan yang mendasarinya	Perhitungan/kesimpulan salah

Lampiran Rubrik 02 | ASSESMENT PRESENTASI

Kriteria Penilaian	Bobot/Skor Penilaian				
	5	4	3	2	1
Penguasaan Materi	Mahasiswa sangat menguasai materi	Mahasiswa menguasai materi	Mahasiswa cukup menguasai materi	Mahasiswa kurang menguasai materi	Mahasiswa tidak menguasai materi
Sistematika Penyajian	Mahasiswa menyajikan materi presentasi dengan sangat sistematis	Mahasiswa menyajikan materi presentasi dengan sistematis	Mahasiswa menyajikan materi presentasi dengan cukup sistematis	Mahasiswa menyajikan materi presentasi dengan kurang sistematis	Mahasiswa menyajikan materi presentasi dengan tidak sistematis
Suara dan Ekspresi	Mahasiswa menjelaskan dengan suara yang sangat jelas, volume yang sangat sesuai, pengucapan istilah sangat tepat	Mahasiswa menjelaskan dengan suara yang jelas, volume yang sesuai, pengucapan istilah tepat	Mahasiswa menjelaskan dengan suara yang cukup jelas, volume yang cukup sesuai, pengucapan istilah cukup tepat	Mahasiswa menjelaskan dengan suara yang kurang jelas, volume yang kurang sesuai, pengucapan istilah kurang tepat	Mahasiswa menjelaskan dengan suara yang tidak jelas, volume yang tidak sesuai, pengucapan istilah tidak tepat
Kepercayaan Diri	Mahasiswa berbicara dengan sangat semangat, menularkan semangat dan antusiasme pada pendengar, eye contact ke semua peserta (audience)	Mahasiswa berbicara dengan semangat, menularkan semangat dan antusiasme pada pendengar, eye contact ke semua peserta (audience)	Mahasiswa berbicara dengan cukup semangat, cukup menularkan semangat dan antusiasme pada pendengar, eye contact ke semua peserta (audience)	Mahasiswa berbicara dengan kurang semangat, kurang menularkan semangat dan antusiasme pada pendengar, eye contact yang kurang ke semua peserta (audience)	Mahasiswa berbicara dengan tidak semangat, tidak dapat menularkan semangat dan antusiasme pada pendengar, tidak ada eye contact ke semua peserta (audience)
Kemampuan menjawab pertanyaan	Mahasiswa mampu menjawab semua pertanyaan dengan sangat tepat, mendalam (lebih dari yang dibutuhkan), dan sangat tajam	Mahasiswa mampu menjawab semua pertanyaan dengan tepat, mendalam (lebih dari yang dibutuhkan), dan tajam	Mahasiswa mampu menjawab semua pertanyaan dengan cukup tepat, cukup mendalam, dan cukup tajam	Mahasiswa mampu menjawab semua pertanyaan dengan kurang tepat, kurang mendalam, dan kurang tajam	Mahasiswa mampu menjawab semua pertanyaan dengan tidak tepat, tidak mendalam, dan tidak tajam
Kepemimpinan (presentasi kelompok)	Mahasiswa sangat mampu menginisiasi, menggerakkan, mengarahkan, mengorganisir jalannya presentasi	Mahasiswa mampu menginisiasi, menggerakkan, mengarahkan, mengorganisir jalannya presentasi	Mahasiswa cukup mampu menginisiasi, menggerakkan, mengarahkan, mengorganisir jalannya presentasi	Mahasiswa kurang mampu menginisiasi, menggerakkan, mengarahkan, mengorganisir jalannya presentasi	Mahasiswa tidak mampu menginisiasi, menggerakkan, mengarahkan, mengorganisir jalannya presentasi

Lampiran Rubrik 04 | ASSESMENT DISKUSI

Kriteria Penilaian	Bobot/Skor Penilaian				
	5	4	3	2	1
Kelugasan argumen	Mahasiswa menyampaikan pendapat menggunakan bahasa yang sangat baik, sangat mudah dimengerti, intonasi suara yang sangat jelas	Mahasiswa menyampaikan pendapat menggunakan bahasa yang baik, mudah dimengerti, intonasi suara yang jelas	Mahasiswa menyampaikan pendapat menggunakan bahasa yang cukup baik, cukup mudah dimengerti, intonasi suara yang cukup jelas	Mahasiswa menyampaikan pendapat menggunakan bahasa yang kurang baik, kurang mudah dimengerti, intonasi suara yang kurang jelas	Mahasiswa menyampaikan pendapat menggunakan bahasa yang tidak baik, tidak mudah dimengerti, intonasi suara yang tidak jelas
Parsipitasi aktif	Mahasiswa sangat aktif menyampaikan pendapat/masukannya, sangat aktif memberi jawaban, dan sangat berinisiatif mencari solusi	Mahasiswa aktif menyampaikan pendapat/masukannya, aktif memberi jawaban, dan berinisiatif mencari solusi	Mahasiswa cukup aktif menyampaikan pendapat/masukannya, cukup aktif memberi jawaban, dan cukup berinisiatif mencari solusi	Mahasiswa kurang aktif menyampaikan pendapat/masukannya, kurang aktif memberi jawaban, dan kurang berinisiatif mencari solusi	Mahasiswa tidak aktif menyampaikan pendapat/masukannya, tidak aktif memberi jawaban, dan tidak berinisiatif mencari solusi
Etika dan sikap tata nilai	Mahasiswa sangat mengindahkan etika diskusi akademik secara umum	Mahasiswa mengindahkan etika diskusi akademik secara umum	Mahasiswa cukup mengindahkan etika diskusi akademik secara umum	Mahasiswa kurang mengindahkan etika diskusi akademik secara umum	Mahasiswa tidak mengindahkan etika diskusi akademik secara umum
Kepemimpinan (diskusi kelompok)	Mahasiswa sangat mampu menginisiasi, menggerakkan, mengarahkan, mengorganisir jalannya diskusi	Mahasiswa mampu menginisiasi, menggerakkan, mengarahkan, mengorganisir jalannya diskusi	Mahasiswa cukup mampu menginisiasi, menggerakkan, mengarahkan, mengorganisir jalannya diskusi	Mahasiswa kurang mampu menginisiasi, menggerakkan, mengarahkan, mengorganisir jalannya diskusi	Mahasiswa tidak mampu menginisiasi, menggerakkan, mengarahkan, mengorganisir jalannya diskusi