

SEMESTER LEARNING PLAN

**BIOLOGICAL MATHEMATICS COURSES
(23H01131403)**



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-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

CPL-7 (KK3) - The students are able to demonstrate mathematical skills which include interpretation, connecting problems, solving problems, and communicating individually or teamwork

Course Learning Outcomes (CLO)

CPMK-1: Students will be able to develop the ability to translate descriptions of biological scenarios into mathematical models (CPL5 dan CPL6)

CPMK-2: Students will have more freedom in making assumptions and assessing the impact of assumptions made as part of the modeling process (CPL5 dan CPL6)

CPMK-3: Students will be able to study various types of mathematical models for biological systems and several mathematical techniques that are very useful for extracting information from these models. (CPL5 dan CPL6)

CPMK-4: Students will be able to improve their ability to convey mathematical ideas, including mathematics learning outcomes, clearly in written form (CPL5, CPL6 dan CPL7)

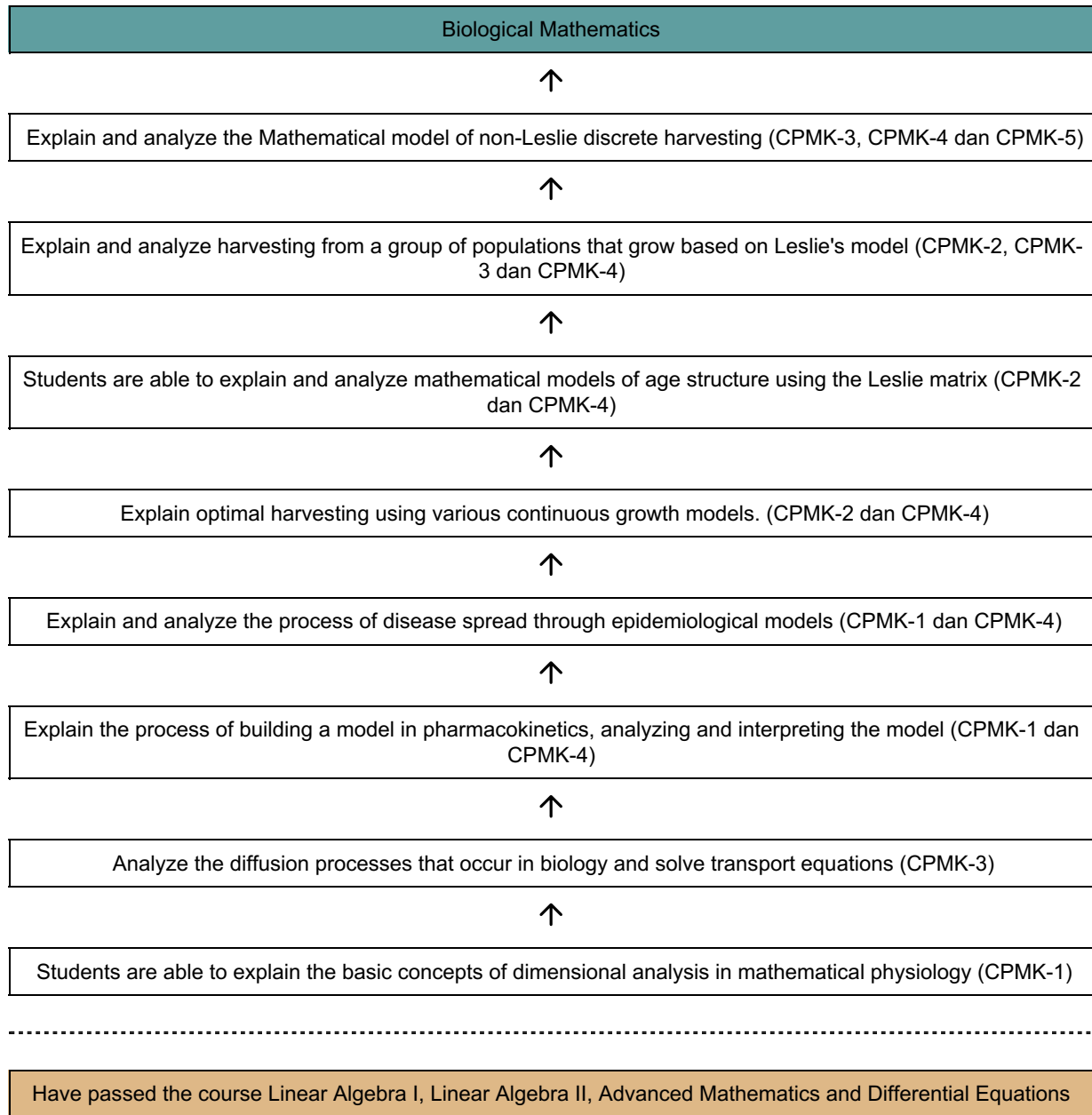
CPMK-5: Students will be able to collaborate effectively in team work and communicate effectively about mathematics to peers and teaching staff using available presentation equipment or software. (CPL5, CPL6 dan CPL7)

Sub-CLO

Sub CPMK-1: Students are able to explain the basic concepts of dimensional analysis in mathematical physiology (CPMK-1)

- Sub CPMK-2: Analyze the diffusion processes that occur in biology and solve transport equations (CPMK-3)
- Sub CPMK-3: Explain the process of building a model in pharmacokinetics, analyzing and interpreting the model (CPMK-1 dan CPMK-4)
- Sub CPMK-4: Explain and analyze the process of disease spread through epidemiological models (CPMK-1 dan CPMK-4)
- Sub CPMK-5: Explain optimal harvesting using various continuous growth models. (CPMK-2 dan CPMK-4)
- Sub CPMK-6: Students are able to explain and analyze mathematical models of age structure using the Leslie matrix (CPMK-2 dan CPMK-4)
- Sub CPMK-7: Explain and analyze harvesting from a group of populations that grow based on Leslie's model (CPMK-2, CPMK-3 dan CPMK-4)
- Sub CPMK-8: Explain and analyze the Mathematical model of non-Leslie discrete harvesting (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
Biological Mathematics		23H01131403	Elective Courses (Elective Courses)	3	5	10 Agustus 2024
AUTHORITY		SLP Developer Lecturer	Coordinator		Head of Study Program	
		Prof. Dr. Syamsuddin Toaha, M.Sc., Prof. Dr. Kasbawati, S.Si., M.Si.	Prof. Dr. Kasbawati, S.Si., M.Si.		Dr. Firman, S.Si.,M.Si.	
	SLOs that are imposed on the course					
	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-7:	Mahasiswa dapat menunjukkan keterampilan matematika termasuk menghubungkan masalah, menyelesaikan masalah, interpretasi, dan berkomunikasi secara individu atau dengan kerja tim				
	SLO ⇒ Course Learning Outcomes					
	After completing this course, it is expected:					
	SLO-5	CLO-1: Students will be able to develop the ability to translate descriptions of biological scenarios into mathematical models				
		CLO-2: Students will have more freedom in making assumptions and assessing the impact of assumptions made as part of the modeling process				
		CLO-3: Students will be able to study various types of mathematical models for biological systems and several mathematical techniques that are very useful for extracting information from these models.				
		CLO-4: Students will be able to improve their ability to convey mathematical ideas, including mathematics learning outcomes, clearly in written form				
		CLO-5: Students will be able to collaborate effectively in team work and communicate effectively about mathematics to peers and teaching staff using available presentation equipment or software.				
	SLO-6	CLO-1: Students will be able to develop the ability to translate descriptions of biological scenarios into mathematical models				
		CLO-2: Students will have more freedom in making assumptions and assessing the impact of assumptions made as part of the modeling process				
		CLO-3: Students will be able to study various types of mathematical models for biological systems and several mathematical techniques that are very useful for extracting information from these models.				
		CLO-4: Students will be able to improve their ability to convey mathematical ideas, including mathematics learning outcomes, clearly in written form				

Learning Outcomes Course		CLO-5: Students will be able to collaborate effectively in team work and communicate effectively about mathematics to peers and teaching staff using available presentation equipment or software.									
	SLO-7	CLO-4: Students will be able to improve their ability to convey mathematical ideas, including mathematics learning outcomes, clearly in written form									
		CLO-5: Students will be able to collaborate effectively in team work and communicate effectively about mathematics to peers and teaching staff using available presentation equipment or software.									
	CLO ⇒ Sub-CLO										
	CLO-1	Sub-CLO-1:Students are able to explain the basic concepts of dimensional analysis in mathematical physiology									
		Sub-CLO-3:Explain the process of building a model in pharmacokinetics, analyzing and interpreting the model									
		Sub-CLO-4:Explain and analyze the process of disease spread through epidemiological models									
	CLO-3	Sub-CLO-2:Analyze the diffusion processes that occur in biology and solve transport equations									
		Sub-CLO-7:Explain and analyze harvesting from a group of populations that grow based on Leslie's model									
		Sub-CLO-8:Explain and analyze the Mathematical model of non-Leslie discrete harvesting									
	CLO-4	Sub-CLO-3:Explain the process of building a model in pharmacokinetics, analyzing and interpreting the model									
		Sub-CLO-4:Explain and analyze the process of disease spread through epidemiological models									
		Sub-CLO-5:Explain optimal harvesting using various continuous growth models.									
		Sub-CLO-6:Students are able to explain and analyze mathematical models of age structure using the Leslie matrix									
		Sub-CLO-7:Explain and analyze harvesting from a group of populations that grow based on Leslie's model									
		Sub-CLO-8:Explain and analyze the Mathematical model of non-Leslie discrete harvesting									
	CLO-2	Sub-CLO-5:Explain optimal harvesting using various continuous growth models.									
Sub-CLO-6:Students are able to explain and analyze mathematical models of age structure using the Leslie matrix											
Sub-CLO-7:Explain and analyze harvesting from a group of populations that grow based on Leslie's model											
CLO-5	Sub-CLO-8:Explain and analyze the Mathematical model of non-Leslie discrete harvesting										
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							
				Short Q&A	Independent Assignment	Quiz	Case Studies	Group task			
SLO-6	CLO-1	SUB-CLO-1	Discipline, perseverance, activeness.	5	5	0	0	0	10		

SLOs that are charged on the Course	CPMK	SUB CPMK	Form of Assessment*						Weight	Value	Student Score
			Formative	Sumative							
				Short Q&A	Independent Assignment	Quiz	Case Studies	Group task			
SLO-6	CLO-3	SUB-CLO-2	Discipline, perseverance, activeness.	0	0	5	8	0	13		
SLO-7	CLO-4	SUB-CLO-3	Discipline, perseverance, activeness.	0	0	0	8	5	13		
SLO-7	CLO-4	SUB-CLO-4	Discipline, perseverance, activeness.	4	0	0	10	0	14		
SLO-7	CLO-4	SUB-CLO-5	Discipline, perseverance, activeness.	0	4	0	10	0	14		
SLO-7	CLO-4	SUB-CLO-6	Discipline, perseverance, activeness.	0	0	5	8	0	13		
SLO-7	CLO-4	SUB-CLO-7	Discipline, perseverance, activeness.	0	5	0	8	0	13		
SLO-7	CLO-5	SUB-CLO-8	Discipline, perseverance, activeness.	0	0	5	0	5	10		
				9	14	15	52	10	100		
Course Description		This module is taught to Semester 5 students who will introduce the application of mathematics to biological, ecological, physiological and medical problems such as molecular or protein diffusion, drug transformation (problems in pharmacokinetics), disease outbreaks and ecological problems. The modeling process challenges participants to identify a set of variables or aspects that is small enough for a mathematical approach without failing to capture the essence of what is happening. The mathematics used will include ordinary and partial differential equations, matrix theory, and optimization theory. At the end of this module, participants will be able to derive mathematical models of biological phenomena, solve mathematical problems, carry out simulations, and interpret the results.									
Learning Materials/Subjects		1. Dimensional analysis in mathematical physiology (Dimensional analysis in mathematical physiology) 2. The mathematics of diffusion (The mathematics of diffusion) 3. Pharmacokinetics (Drug distribution in pharmacology) 4. Mathematical Models in Epidemiology (Mathematical modeling in epidemiology) 5. Harvesting (Mathematical Model of Harvesting) 6. Leslie Matrix: Age Structured Model (Mathematical Model with Age Structured: Leslie Matrix) 7. Harvesting with Age Structured (Mathematical Model of Harvesting with Age Structured) 8. Forest harvesting model									
Reference		Main References									
		1. J. MaZumdar ; An Introduction to Mathematical Physiology and Biology. Cambridge University Press. 2. J.D. Murray, Mathematical Biolgy I, Springer, New York.									
		Additional References									
		1. Suhartini, S. <i>et al.</i> (2024). Biomass Valorization for Bioenergy Production. In: Lubis, M.A.R., <i>et al.</i> Biomass Conversion and Sustainable Biorefinery. Green Energy and Technology. Springer, Singapore. https://doi.org/10.1007/978-981-99-7769-7_4									

Teaching Team		Prof. Dr. Syamsuddin Toaha, M.Sc., Prof. Dr. Kasbawati, S.Si., M.Si.					
Course requirement		Linear Algebra I, Linear Algebra II, Advanced Mathematics, Differential Equations					
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 explain the basic concepts of dimensional analysis in mathematical physiology (CPMK-1)	Formative: accuracy of answers Sumative: .- Student accuracy in determining dimensions in physiology math - Student accuracy in nondimensionalizing a mathematical model dimensions	Formative Criteria: Discipline, perseverance, activeness. dinilai dengan rubrik 01 Sumative Criteria: Short Q&A (5) dinilai dengan rubrik 04 Independent Assignment (5) dinilai dengan rubrik 01 Assessment Technique: Test and Non-Test	Studying: Collaborative learning (Collaborative Learning) TM: 1x3x50 minutes; PT: 1x3x60; BM: 1x3x50;		- Tuition Contract - Dimensional Analysis in mathematical physiology	10

2-3	Analyze the diffusion processes that occur in biology and solve transport equations (CPMK-3)	Formative: accuracy of answers Sumative: .- Students' accuracy in explaining the diffusion process with examples in biology - Accuracy of assumptions (dominant factors) used - Accuracy of concept implementation - Method selection precision - Teamwork - Discipline	Formative Criteria: Discipline, perseverance, activeness. dinilai dengan rubrik 01 Sumative Criteria: Quiz (5) dinilai dengan rubrik 01 Case Studies (8) dinilai dengan rubrik 01 Assessment Technique: Test and Non-Test	Studying: Case Study, Collaborative Learning TM: 2x3x50 minutes; PT: 2x3x60; BM: 2x3x50;		Diffusion Mathematics	13
4-5	Explain the process of building a model in pharmacokinetics, analyzing and interpreting the model (CPMK-1, CPMK-4)	Formative: accuracy of answers Sumative: .- Accuracy of describing the processes that occur in pharmacokinetics - Accuracy of assumptions (dominant factors) that used	Formative Criteria: Discipline, perseverance, activeness. dinilai dengan rubrik 01 Sumative Criteria: Group task (5) dinilai dengan rubrik 01 Case Studies (8) dinilai dengan rubrik 01 Assessment Technique: Test and Non-Test	Studying: Case Study, Collaborative Learning TM: 2x3x50 minutes; PT: 2x3x60; BM: 2x3x50;		Pharmacokinetics	13

6-8	Explain and analyze the process of disease spread through epidemiological models (CPMK-1, CPMK-4)	Formative: accuracy of answers Sumative: .- Accuracy of describing the model formation process Epidemiology - Accuracy of assumptions (dominant factors) used - Accuracy of concept implementation - Clarity of interpretation of model solutions	Formative Criteria: Discipline, perseverance, activeness. dinilai dengan rubrik 01 Sumative Criteria: Short Q&A (4) dinilai dengan rubrik 01 Case Studies (10) dinilai dengan rubrik 01 Assessment Technique: Test and Non-Test	Studying: Case Study, Collaborative Learning TM: 2x3x50 minutes; PT: 2x3x60; BM: 2x3x50;		Deep Mathematical Models Epidemiology	14
9-11	Explain optimal harvesting using various continuous growth models. (CPMK-2, CPMK-4)	Formative: accuracy of answers Sumative: - Student accuracy in solving logistic equations - Correct application of the concept	Formative Criteria: Discipline, perseverance, activeness. dinilai dengan rubrik 04 Sumative Criteria: Independent Assignment (4) dinilai dengan rubrik 01 Case Studies (10) dinilai dengan rubrik 01 Assessment Technique: Test and Non-Test	Studying: Case Study, Collaborative Learning TM: 2x3x50 minutes; PT: 2x3x60; BM: 2x3x50;		Harvesting (Supporting [1])	14

12-13	Students are able to explain and analyze mathematical models of age structure using the Leslie matrix (CPMK-2, CPMK-4)	Formative: accuracy of answers Sumative: Accuracy of explaining and analyzing the Mathematical model of age structure using Leslie matrix	Formative Criteria: Discipline, perseverance, activeness. dinilai dengan rubrik 01 Sumative Criteria: Quiz (5) dinilai dengan rubrik 01 Case Studies (8) dinilai dengan rubrik 01 Assessment Technique: Test and Non-Test	Studying: Case Study, Collaborative Learning TM: 2x3x50 minutes; PT: 2x3x60; BM: 2x3x50;		Leslie Matrix: Structure Model Age	13
14-15	Explain and analyze harvesting from a group of populations that grow based on Leslie's model (CPMK-2, CPMK-3, CPMK-4)	Formative: accuracy of answers Sumative: Students' accuracy in explaining and analyzing harvesting from a group a growing population based on leslie's model	Formative Criteria: Discipline, perseverance, activeness. dinilai dengan rubrik 01 Sumative Criteria: Independent Assignment (5) dinilai dengan rubrik 01 Case Studies (8) dinilai dengan rubrik 01 Assessment Technique: Test and Non-Test	Studying: Case Study, Collaborative Learning Materials on mathematical models of forest conservation presented by Mr. Eko Yuwono, S.Hut. m.si. Practitioner lecturer from Conservation of Natural Resources, Ministry of Environment, South Sulawesi Province. TM: 2x3x50 minutes; PT: 2x3x60; BM: 2x3x50;		Harvesting with Age Structure	13

16	Explain and analyze the Mathematical model of non-Leslie discrete harvesting (CPMK-3, CPMK-4, CPMK-5)	Formative: accuracy of answers Sumative: .- Student accuracy in explaining and analyzing Mathematical models non Leslie discrete harvesting - Systematic application of the concept - Clarity of interpretation of model solutions - Teamwork - Discipline	Formative Criteria: Discipline, perseverance, activeness. dinilai dengan rubrik 01 Sumative Criteria: Group task (5) dinilai dengan rubrik 02 Quiz (5) dinilai dengan rubrik 01 Assessment Technique: Test and Non-Test	Studying: Case Study, Collaborative Learning <i>Advanced material on mathematical models of forest conservation presented by Mr. Eko Yuwono, S.Hut. M.Sc. Practitioner lecturer from Conservation of Natural Resources, Ministry of Environment, South Sulawesi Province.</i> TM: 1x3x50 minutes; PT: 1x3x60; BM: 1x3x50;	Harvesting model forest	10
						100

Matrix of SLO, CLO, and Assessment Method

SLO / CLO	CLO-1	CLO-2	CLO-3	CLO-4	CLO-5
CPL-5 (KK1)	Short Q&A (Weight 5%) Independent Assignment (Weight 5%) Group task (Weight 5%) Case Studies (Weight 8%) Short Q&A (Weight 4%) Case Studies (Weight 10%)	Independent Assignment (Weight 4%) Case Studies (Weight 10%) Quiz (Weight 5%) Case Studies (Weight 8%) Independent Assignment (Weight 5%) Case Studies (Weight 8%)	Quiz (Weight 5%) Case Studies (Weight 8%) Independent Assignment (Weight 5%) Case Studies (Weight 8%) Group task (Weight 5%) Quiz (Weight 5%)	Group task (Weight 5%) Case Studies (Weight 8%) Short Q&A (Weight 4%) Case Studies (Weight 10%) Independent Assignment (Weight 4%) Case Studies (Weight 10%) Quiz (Weight 5%) Case Studies (Weight 8%) Independent Assignment (Weight 5%) Case Studies (Weight 8%) Group task (Weight 5%) Quiz (Weight 5%)	Group task (Weight 5%) Quiz (Weight 5%)

SLO / CLO	CLO-1	CLO-2	CLO-3	CLO-4	CLO-5
CPL-6 (KK2)	Short Q&A (Weight 5%) Independent Assignment (Weight 5%) Group task (Weight 5%) Case Studies (Weight 8%) Short Q&A (Weight 4%) Case Studies (Weight 10%)	Independent Assignment (Weight 4%) Case Studies (Weight 10%) Quiz (Weight 5%) Case Studies (Weight 8%) Independent Assignment (Weight 5%) Case Studies (Weight 8%)	Quiz (Weight 5%) Case Studies (Weight 8%) Independent Assignment (Weight 5%) Case Studies (Weight 8%) Group task (Weight 5%) Quiz (Weight 5%)	Group task (Weight 5%) Case Studies (Weight 8%) Short Q&A (Weight 4%) Case Studies (Weight 10%) Independent Assignment (Weight 4%) Case Studies (Weight 10%) Quiz (Weight 5%) Case Studies (Weight 8%) Independent Assignment (Weight 5%) Case Studies (Weight 8%) Group task (Weight 5%) Quiz (Weight 5%)	Group task (Weight 5%) Quiz (Weight 5%)

SLO / CLO	CLO-1	CLO-2	CLO-3	CLO-4	CLO-5
CPL-7 (KK3)				Group task (Weight 5%) Case Studies (Weight 8%) Short Q&A (Weight 4%) Case Studies (Weight 10%) Independent Assignment (Weight 4%) Case Studies (Weight 10%) Quiz (Weight 5%) Case Studies (Weight 8%) Independent Assignment (Weight 5%) Case Studies (Weight 8%) Group task (Weight 5%) Quiz (Weight 5%)	Group task (Weight 5%) Quiz (Weight 5%)

Evaluation Type and Assessment Weight

Type	Assessment Weight
Short Q&A	9
Independent Assignment	14
Quiz	15
Case Studies	52
Group task	10
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							
				Short Q&A	Independent Assignment	Quiz	Case Studies	Group task			
SLO-6	CLO-1	SUB-CLO-1	Discipline, perseverance, activeness.	5	5	0	0	0	10		
SLO-6	CLO-3	SUB-CLO-2	Discipline, perseverance, activeness.	0	0	5	8	0	13		
SLO-7	CLO-4	SUB-CLO-3	Discipline, perseverance, activeness.	0	0	0	8	5	13		
SLO-7	CLO-4	SUB-CLO-4	Discipline, perseverance, activeness.	4	0	0	10	0	14		
SLO-7	CLO-4	SUB-CLO-5	Discipline, perseverance, activeness.	0	4	0	10	0	14		
SLO-7	CLO-4	SUB-CLO-6	Discipline, perseverance, activeness.	0	0	5	8	0	13		
SLO-7	CLO-4	SUB-CLO-7	Discipline, perseverance, activeness.	0	5	0	8	0	13		
SLO-7	CLO-5	SUB-CLO-8	Discipline, perseverance, activeness.	0	0	5	0	5	10		
				9	14	15	52	10	100		

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, sangat 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 (diskusi 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