



UNIVERSITAS PENDIDIKAN INDONESIA

SEMESTER LEARNING PLAN (RPS)

COURSE IDENTITY

Course Name	Course Code	Credits	Workload	Course Group	Semester	Prerequisite Course	Date of Issue
MATHEMATICS AND PHYSICS	SA111	3	135	Study Programme Skill Development (PKPS)	1	-	2025-09-09 11:26:56

Prepared by Course Lecturer	Reviewed by Study Programme QA Team	Approved by Head of Study Programme
Totok Doyo Pamungkas, M.Eng.	Shafira Himayah, S.Pd., M.Sc.	Dr. Lili Somantri, S.Pd., S.S., M.Si.

COURSE DESCRIPTION AND GRADUATE LEARNING OUTCOMES (CPL)

Course Description	Mathematics and Physics is a study programme skill development course.
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Graduate Learning Outcomes (CPL) Assigned to This Course	
1	To be capable of mastering the foundational concepts of regional mapping surveys, the fundamentals and applications of mathematics, and statistics in the field of regional mapping surveys.
2	To be capable of planning, interpreting, analysing, classifying, extracting, validating, and visualising data and information derived from science and technology-based geographic information systems.
3	To be capable of applying logical, critical, systematic, and innovative thinking within the context of the development or implementation of knowledge and technology, while observing and applying humanistic values in accordance with the field of expertise.

Course Learning Outcomes (CPMK)	
1	S1: To be devout to God Almighty and to be capable of demonstrating religious attitudes and behaviours in daily life.
2	P2: To be capable of mastering the foundational concepts of regional mapping surveys, the fundamentals and applications of mathematics, and statistics in the field of regional mapping surveys.
3	KU5: To be capable of managing one's own learning independently.
4	KK2: To be capable of planning regional mapping survey activities; acquiring, validating, processing, and analysing mapping survey data; and visualising geospheric information based on science and technology.

Sub-CPMK		
1	CPMK - 2	To understand the theoretical concepts of mathematics in the application of mapping surveys and geographic information.
2	CPMK - 2	To understand the theoretical concepts of physics in the application of mapping surveys and geographic information.
3	CPMK - 3	To be capable of performing mathematical calculations in the application of mapping surveys and geographic information.
4	CPMK - 3	To be capable of performing physics calculations in the application of mapping surveys and geographic information.
5	CPMK - 4	To be capable of analysing case studies in mathematical calculations in the application of mapping surveys and geographic information.
6	CPMK - 4	To be capable of analysing case studies in physics calculations in the application of mapping surveys and geographic information.

Course Materials	
1	Fundamentals of mathematical geometry
2	Length, area, and volume of plane and solid figures
3	Trigonometry, bearing angles, and horizontal angles
4	Functions, coordinates, and coordinate systems

5	Position determination based on angles and distances
6	Matrices
7	Case study: Application of mathematics in regional mapping surveys
8	Mid-Semester Examination (UTS)
9	Kinematics
10	Dynamics
11	Work and Energy
12	Waves
13	Thermodynamics
14	Electricity and Magnetism
15	Geoelectric Measurement Project: Case Study of a Research Area
16	Final Semester Examination (UAS)

Demonstrable Learning Outcomes at the End of the Course	Specific academic papers; products resulting from the Mathematics and Physics course.
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Learning Strategy	Team-based Project
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Learning Steps	Theoretical instruction in foundational mathematics and foundational physics, delivered through both offline and online modalities (activity distribution over one semester: theory sessions in Weeks 1-8; Project-based Learning (PjBL) practice sessions in Weeks 9-16).
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References	
1	Purcell, Edwin J., Rigdon, Steven E., & Varberg, Dale. 2007. Calculus, 9th Edition. New Jersey: Pearson Prentice Hall.
2	Wongsotjitro, Soetomo. (1980). Land Surveying. Kanisius, Yogyakarta.
3	Sosrodarsono, Suyono & Takasaki, Masayoshi. (1997). Topographic Surveying and Mapping Techniques. Pradnya Paramita, Jakarta.
4	Abdullah, M. (2016). Basic Physics I Lecture Notes. Bandung: ITB.
5	Alonso, M. & Finn, E.J. (1990). Fundamentals of University Physics I (translated). Erlangga: Jakarta.
6	Halliday & Resnick. (1986). Physics I (translated). Jakarta: Erlangga.
7	Sears, F.W. (1986). Mechanics, Heat, and Sound. Bandung: Binacipta.

LEARNING PLAN

Week	Sub-CPMK	Achievement Indicators	Course Materials	Assessment Form	Weight (%)	Synchronous	Asynchronous	Duration	Ref. No.	Access Time
1	To understand the theoretical concepts of mathematics in the application of mapping surveys and geographic information.	Students are able to understand the theoretical concepts of mathematics.	Fundamentals of mathematical geometry	Participatory	4	Face-to-Face	-	1.7 hours	1,2,3	04-09-2025 07:00
2	To understand the theoretical concepts of mathematics in the application of mapping surveys and geographic information.	To understand the theoretical concepts of mathematics.	Length, area, and volume of plane and solid figures	Other	4	Face-to-Face	-	1.7 hours	1,2,3	11-09-2025 07:00
3	To understand the theoretical concepts of mathematics in the application of mapping surveys and geographic information.	Students understand the theoretical concepts of mathematics.	Trigonometry, bearing angles, and horizontal angles	Other	4	Face-to-Face		1.7 hours	1,2,3	19-09-2024 07:00
4	To be capable of performing mathematical calculations in the application of mapping surveys and geographic information.	Students are able to perform mathematical calculations.	Functions, coordinates, and coordinate systems	Essay	4	Face-to-Face		1.7 hours	1,2,3	26-09-2024 07:00
5	To be capable of performing mathematical calculations in the application of mapping surveys and geographic information.	Students are able to perform mathematical calculations.	Position determination based on angles and distances	Essay	4	Face-to-Face	-	1.7 hours	1,2,3	04-10-2024 07:00
6	To be capable of performing mathematical calculations in the application of mapping surveys and geographic information.	Students are able to perform mathematical calculations.	Matrices	Essay	4	Face-to-Face	-	1.7 hours	1,2,3	11-10-2024 07:00
7	To be capable of analysing case studies in mathematical	Students are able to analyse case studies in	Case study: Application of mathematics in	Other	4	Face-to-Face		1.7 hours	1,2,3	17-10-2024 07:00

	calculations in the application of mapping surveys and geographic information.	mathematical calculations.	regional mapping surveys							
8	MID-SEMESTER EXAMINATION (UTS)				19					24-10-2024 07:00
9	To understand the theoretical concepts of physics in the application of mapping surveys and geographic information.	Students are able to understand the theoretical concepts of physics.	Kinematics	Other	4	Face-to-Face	-	1.7 hours	4,5,6,7	30-10-2024 15:00
10	To understand the theoretical concepts of physics in the application of mapping surveys and geographic information.	Students are able to understand the theoretical concepts of physics.	Dynamics	Other	4	Face-to-Face		1.7 hours	4,5,6,7	07-11-2024 07:00
11	To be capable of performing physics calculations in the application of mapping surveys and geographic information.	Students are able to perform physics calculations.	Work and Energy	Other	4	Face-to-Face		1.7 hours	4,5,6,7	14-11-2024 07:00
12	To be capable of performing physics calculations in the application of mapping surveys and geographic information.	Students are able to perform physics calculations.	Waves	Multiple Choice	4	Face-to-Face		1.7 hours	4,5,6,7	21-11-2024 07:00
13	To be capable of performing physics calculations in the application of mapping surveys and geographic information.	Students are able to perform physics calculations.	Thermodynamics	Other	4	Face-to-Face		1.7 hours	4,5,6,7	28-11-2024 07:00
14	To be capable of analysing case studies in physics calculations in the application of mapping surveys and geographic information.	Students are able to analyse case studies in physics calculations.	Electricity and Magnetism	Other	4	Face-to-Face		1.7 hours	4,5,6,7	05-12-2024 08:00
15	To be capable of analysing case studies in physics calculations in	Students are able to analyse case studies in physics calculations.	Geoelectric Measurement Project:	Other	4	Face-to-Face		1.7 hours	4,5,6,7	12-12-2024 07:00

	the application of mapping surveys and geographic information.		Case Study of a Research Area							
16	FINAL SEMESTER EXAMINATION (UAS)				25					17-12-2024 09:00

STUDENT LEARNING WORKLOAD

LEARNING ACTIVITIES	SYNCHRONOUS (Face-to-Face / Virtual)	ASYNCHRONOUS (Structured / Independent)	STUDENT STUDY PREPARATION	TOTAL STUDENT LEARNING AND INSTRUCTION TIME
Lecture/Tutorial/Guided Response	12 x 100 min = 1,200 min	-	5 x 100 min = 500 min	1,700 minutes (28.3 hours)
Project-based Learning	4 x 200 min = 800 min	-	3 x 20 min = 60 min	860 minutes (14.3 hours)
Discussion (case-based learning)	-	-	-	0 minutes (0.0 hours)
TOTAL				2,560 minutes (42.7 hours)
ASSESSMENT				
Continuous Assessment				
Participation During Instruction	12 x 200 min = 2,400 min	1 x 50 min = 50 min	5 x 10 min = 50 min	2,500 minutes (41.7 hours)
Project Work	5 x 200 min = 1,000 min	-	5 x 20 min = 100 min	1,100 minutes (18.3 hours)
Assignments	4 x 50 min = 200 min	-	4 x 20 min = 80 min	280 minutes (4.7 hours)
Quizzes	2 x 50 min = 100 min	-	1 x 20 min = 20 min	120 minutes (2.0 hours)
Formative Assessment				100 minutes (1.7 hours)
Summative Assessment				100 minutes (1.7 hours)
TOTAL				4,200 minutes (70.0 hours)
TOTAL WORKLOAD				6,760 minutes (112.7 hours)
IDEAL NUMBER OF HOURS				135 Hours
CREDITS (SKS)				3
CONFORMITY WITH CREDIT HOURS				NON-COMPLIANT

CPMK ASSESSMENT CRITERIA

No	CPMK	CPL1	CPL2	CPL3	Weight	CPMK Achievement Criteria
1	S1: To be devout to God Almighty and to be capable of demonstrating religious attitudes and behaviours in daily life.	4			0	80% of all students achieve a score of at least 75 (on a scale of 100).
2	P2: To be capable of mastering the foundational concepts of regional mapping surveys, the fundamentals and applications of mathematics, and statistics in the field of regional mapping surveys.		4		20	80% of all students achieve a score of at least 75 (on a scale of 100).
3	KU5: To be capable of managing one's own learning independently.			6	24	80% of all students achieve a score of at least 75 (on a scale of 100).
4	KK2: To be capable of planning regional mapping survey activities; acquiring, validating, processing, and analysing mapping survey data; and visualising geospheric information based on science and technology.			6	56	80% of all students achieve a score of at least 75 (on a scale of 100).

COLLABORATIVE TASK DESIGN

TASK TITLE	Geoelectric Measurement Project: Case Study of a Research Area
LEARNING METHOD	Team-based Project
TIMEFRAME	
ASSESSMENT WEIGHT	50
SUB-CPMK	To be capable of analysing case studies in physics calculations in the application of mapping surveys and geographic information.
TASK DESCRIPTION	To conduct geoelectric method measurements in a specific area; to prepare a group project report.
TASK IMPLEMENTATION STEPS	To conduct geoelectric method measurements in a specific area; to prepare a group project report.
DETAILS OF REQUIRED OUTPUTS	Detailed activities to produce an academic paper report.
ASSESSMENT INDICATORS, CRITERIA, AND WEIGHTS	Assessment indicators for the academic paper and performance; weight assigned to written content (content, structure, etc.).
IMPLEMENTATION SCHEDULE	Note: The total number of days in one semester is $16 \times 7 = 112$ days. The implementation schedule may be determined based on a daily calculation.
Week 15	Team-based project activity: geoelectric instrument measurement in the field — 3 x 50 minutes.
OTHER NOTES	-
REFERENCES	1. Abdullah, M. (2016). Basic Physics I Lecture Notes. Bandung: ITB. 2. Alonso, M. & Finn, E.J. (1990). Fundamentals of University Physics I (translated). Erlangga: Jakarta. 3. Halliday & Resnick. (1986). Physics I (translated). Jakarta: Erlangga. 4. Sears, F.W. (1986). Mechanics, Heat, and Sound. Bandung: Binacipta.