



UNIVERSITAS PENDIDIKAN INDONESIA

SEMESTER LEARNING PLAN (RPS)

COURSE IDENTITY

Course Name	Course Code	Credits	Workload	Course Group	Semester	Prerequisite Course	Date Issued
SPATIAL MODELLING	SA414	3	135	Study Program Expertise Development	4	Remote Sensing, Basic Cartography, Geographic Information Systems.	2025-09-09 11:26:56

Prepared By	Reviewed By	Approved By
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COURSE DESCRIPTION

Course Description	Learning in the Spatial Modelling course is conducted through a combination of theoretical instruction and practical sessions in order to develop students' understanding and skills in analyzing spatial data. Students will study the fundamental concepts of spatial modelling, including 3D analysis, network analysis, spatial interpolation, and the use of model builder. The learning process involves lectures, discussions, and individual as well as group assignments in completing case studies and spatial analyses. Practical sessions constitute an important component in applying theoretical concepts to various spatial modelling scenarios that are relevant to real-world conditions.		
Program Learning Outcomes (CPL)	1	S9 - Demonstrating a responsible attitude toward work in the field of expertise independently;	
	2	P5 - Mastering theoretical concepts related to spatial systems, spatial analysis, and spatial modelling;	
	3	KU2 - Being able to demonstrate independent, quality, and measurable performance;	
	4	KK1 - Being able to apply geographic knowledge and geospatial technology to analyze spatial phenomena;	
	5	KK4 - Being able to plan, interpret, analyze, classify, extract, validate, and visualize data and information derived from Geographic Information Systems based on science and technology.	
Course Learning Outcomes (CPMK)	1	Understanding the concepts and theories of spatial systems, models, and spatial modelling (S9, P5)	
	2	Understanding the concepts and being able to practice spatial data processing using vector geoprocessing methods (P5, KU2)	
	3	Understanding the concepts and being able to practice three-dimensional analysis and network analysis in GIS (P5, KU2, KK1)	
	4	Understanding the concepts and being able to practice spatial modelling for suitability modelling and potential modelling (P5, KU2, KK1)	
Sub-CPMK	1	CPMK - 1	Understanding the concepts and theories of spatial systems, models, and spatial modelling
	2	CPMK - 2	Understanding the concepts and being able to practice spatial data processing using vector geoprocessing methods
	3	CPMK - 3	Understanding the concepts and being able to practice three-dimensional analysis in GIS
	4	CPMK - 3	Understanding the concepts and being able to practice network analysis in GIS
	5	CPMK - 2	Understanding the concepts and being able to practice quantitative modelling
	6	CPMK - 2	Understanding the concepts and being able to practice Euclidean proximity analysis
	7	CPMK - 4	Understanding the concepts and being able to practice spatial modelling using Geographically Weighted Regression (GWR)
	8	CPMK - 4	Understanding the concepts and being able to practice spatial modelling using the Maximum Entropy (MaxEnt) method

	9	CPMK - 4	Understanding the concepts and being able to practice spatial modelling using the Soil and Water Analysis Tool (SWAT)
	10	CPMK - 4	Conducting a group project on spatial modelling with a specific theme
Lecture Materials	1	Theory and concepts of spatial modelling	
	2	Spatial data processing using vector geoprocessing methods	
	3	Three-dimensional analysis in GIS	
	4	Network analysis in GIS	
	5	Binary quantitative approach using Model Builder	
	6	Weighted hierarchical quantitative approach	
	7	Euclidean proximity analysis	
	8	Midterm Examination	
	9	Types of spatial modelling	
	10	Spatial modelling of stunting cases using Geographically Weighted Regression (GWR)	
	11	Spatial modelling of rare species habitats using the Maximum Entropy method	
	12	Hydrological modelling using the Soil and Water Analysis Tool (SWAT)	
	13	Spatial Modelling Group Project 1	
	14	Spatial Modelling Group Project 2	
	15	Spatial Modelling Group Project 3	
	16	Final Examination	
Demonstrable Learning Outcomes at the End of the Course *)	Practicum reports and spatial modelling project reports		
Learning Strategy		Case Method	
	✓	Team based Project	
		Others	

Learning Steps	Learning in the Spatial Modelling course is conducted through a combination of lectures, discussions, and practicum activities. The learning process begins with the explanation of theoretical concepts related to spatial modelling, followed by guided practice sessions to apply the concepts using Geographic Information Systems (GIS). Students are given individual and group assignments in the form of case studies and spatial analysis exercises. Through these activities, students are expected to develop analytical skills in processing spatial data, performing modelling processes, and interpreting the results of spatial analysis. The learning process is also supported by project-based activities in which students work collaboratively to complete a spatial modelling project related to real-world spatial problems.	
References	1	Burrough.1986. Principles of Geographical Information System for Land Resources Assessment. New York: Oxford University Press.
	2	Chang, K. 2002. Introduction to Geographic Information Systems.McGraw-Hill Higher Education. New York.
	3	Demers, Michael N.1997.Fundamental of Geographic Information System. University of New Mexico,John Wiley and Sons,Inc.
	4	Dulbahri.1995. Sistem Informasi Geografis. Yogyakarta:Diktat Mata Kuliah SIG UGM
	5	Longley, P.A., Goodchild, M.F., Maguire, D.J. and Rhind, D.W. (2015) Geographic Information Science and Systems. :Ne York: John Wiley & Sons
	6	Gao, J. (2022). Fundamentals of spatial analysis and modelling. Springer
	7	Abdul-Rahman, A., & Pilouk, M. (2007). Spatial data modelling for 3D GIS. Springer.

LEARNING PLAN

Week	Sub-CPMK	Indicators of Sub-CPMK Achievement Demonstrated by Students	Lecture Materials	Assessment		Learning Methods		Duration (hours)	Reference	Access Time
				Assessment Form (test/non test)	Assessment Weight(%)	Synchronous	Asynchronous			
1	Understanding the concepts and theories of spatial systems, models, and spatial modelling	Students are able to understand the concepts and theories of spatial systems, models, and spatial modelling	Theory and concepts of spatial modelling	Others	10	Delivery of lecture material	Students study independently based on the provided references and other relevant learning sources	5	1,2,3,4	05-02-2025 10:20
2	Understanding the concepts and being able to practice spatial data processing using vector geoprocessing methods	Students are able to understand and practice spatial data processing using vector geoprocessing methods	Spatial data processing using vector geoprocessing methods	Performance	10	Delivery of lecture material and practicum	Practicum and preparation of practicum reports	10	1,2	12-02-2025 10:20
3	Understanding the concepts and being able to practice three-dimensional analysis in GIS	Students are able to understand and practice three-dimensional analysis in GIS	Three-dimensional analysis in GIS	Performance	5	Delivery of lecture material and practicum	Practicum and preparation of practicum reports	5	3,4	19-02-2025 09:29
4	Understanding the concepts and being able to practice network analysis in GIS	Students understand and are able to practice network analysis in GIS	Network analysis in GIS	Performance	5	Delivery of lecture material and practicum	Practicum and preparation of practicum reports	5	1,2	26-02-2025 09:30
5	Understanding the concepts and being able to practice quantitative modelling	Students are able to understand and practice binary quantitative modelling using Model Builder	Binary Quantitative Approach Using Model Builder	Performance	5	Delivery of lecture material and practicum	Practicum and preparation of practicum reports	3	3,4	05-03-2025 13:00

Week	Sub-CPMK	Indicators of Sub-CPMK Achievement Demonstrated by Students	Lecture Materials	Assessment		Learning Methods		Duration (hours)	Reference	Access Time
				Assessment Form (test/non test)	Assessment Weight(%)	Synchronous	Asynchronous			
6	Understanding the concepts and being able to practice Euclidean proximity analysis	Students are able to understand and practice weighted hierarchical quantitative modelling	Weighted Hierarchical Quantitative Approach	Performance	5	Delivery of lecture material and practicum	Practicum and preparation of practicum reports	3	2,4	12-03-2025 13:00
7	Understanding the concepts and being able to practice Euclidean proximity analysis	Students are able to understand and practice proximity tools for Euclidean distance	Euclidean Proximity Analysis	Performance	5	Delivery of lecture material and practicum	Practicum and preparation of practicum reports	3	2,4	20-03-2025 13:00
8	Midterm Examination				10					24-03-2025 13:12
9	Understanding the concepts and theories of spatial systems, models, and spatial modelling	Students understand the types of spatial modelling	Types of Spatial Modelling	Attitude scale	5	Synchronous face-to-face learning	Independent assignment	3	5,6,7	09-04-2025 10:20
10	Understanding the concepts and being able to practice spatial modelling using Geographically Weighted Regression (GWR)	Students understand and practice spatial modelling using Geographically Weighted Regression (GWR)	Spatial Modelling of Stunting Cases Using Geographically Weighted Regression (GWR)	Performance	5	Synchronous face-to-face learning	Practicum and preparation of practicum reports	3	5,6,7	16-04-2025 10:20
11	Understanding the concepts and being able to practice spatial modelling using the Maximum Entropy (MaxEnt) method	Students understand and practice spatial modelling using the Maximum Entropy (MaxEnt) method	Spatial Modelling of Rare Species Habitats Using the Maximum Entropy Method	Performance	5	Synchronous face-to-face learning	Practicum and preparation of practicum reports	3	5,6,7	23-04-2025 10:20

Week	Sub-CPMK	Indicators of Sub-CPMK Achievement Demonstrated by Students	Lecture Materials	Assessment		Learning Methods		Duration (hours)	Reference	Access Time
				Assessment Form (test/non test)	Assessment Weight(%)	Synchronous	Asynchronous			
12	Understanding the concepts and being able to practice spatial modelling using Soil and Water Analysis Tool (SWAT)	Students understand and practice spatial modelling using Soil and Water Analysis Tool (SWAT)	Hydrological Modelling Using the Soil and Water Analysis Tool (SWAT)	Performance	5	Synchronous face-to-face learning	Practicum and preparation of practicum reports	3	5,6,7	26-04-2025 10:20
13	Conducting a spatial modelling group project with a specific theme	Students are able to conduct a spatial modelling group project with a specific theme	Spatial Modelling Group Project 1	Performance	5	Synchronous face-to-face learning	Group practice	3	5,6,7	07-05-2025 10:20
14	Conducting a spatial modelling group project with a specific theme	Students are able to conduct a spatial modelling group project with a specific theme	Spatial Modelling Group Project 2	Performance	5	Synchronous face-to-face learning	Group practice	3	5,6,7	14-05-2025 10:20
15	Conducting a spatial modelling group project with a specific theme	Students are able to conduct a spatial modelling group project with a specific theme	Spatial Modelling Group Project 3	Performance	5	Synchronous face-to-face learning	Group practice	3	5,6,7	21-05-2025 11:20
16	Final Examination				10					22-05-2025 08:00

STUDENT WORKLOAD

LEARNING ACTIVITIES	Learning Activities		Synchronous Activities (Face-to-Face / Virtual)	Asynchronous Activities (Structured / Independent)	Student Learning Preparation	Total Student Learning Time
	Lectures / Response / Tutorial		14 x 180 minutes = 2520 minutes	14 x 60 minutes = 840 minutes	16 x 30 minutes = 480 minutes	3840 minutes (64.0 hours)
	Project-Based Learning		4 x 180 minutes = 720 minutes	4 x 60 minutes = 240 minutes	4 x 30 minutes = 120 minutes	1080 minutes (18.0 hours)
	Discussion (Case-Based Learning)		8 x 60 minutes = 480 minutes	8 x 60 minutes = 480 minutes	8 x 30 minutes = 240 minutes	1200 minutes (20.0 hours)
	TOTAL					6120 minutes (102.0 hours)
ASSESSMENT		Continuous Assessment				
		Participation During Learning	14 x 60 minutes = 840 minutes	14 x 30 minutes = 420 minutes	-x-	1260 minutes (21.0 hours)
		Project Work	4 x 30 minutes = 120 minutes	4 x 30 minutes = 120 minutes	-x-	240 minutes (4.0 hours)
		Assignments	8 x 30 minutes = 240 minutes	-x-	-x-	240 minutes (4.0 hours)
		Quiz	-x-	-x-	-x-	0 minutes (0.0 hours)
		Formative Assessment				120 minutes (2.0 hours)
		Summative Assessment				120 minutes (2.0 hours)
	TOTAL					1980 minutes (33.0 hours)
TOTAL COURSE WORKLOAD						8100 Minutes (135 Hours)
IDEAL TOTAL HOURS						135 Hours
CREDITS (SKS)						3
COMPABILITY WITH CREDIT LOAD						APPROPRIATE

CPMK ASSESSMENT CRITERIA

No	CPMK	CPL					Taxonomy	Weight	CPMK Achievement Criteria
		CPL-1	CPL-2	CPL-3	CPL-4	CPL-5			
1	Understanding the concepts and theories of spatial systems, models, and spatial modelling (S9, P5)						3	15	75% of all students obtain a minimum score of 75 (scale of 100)
2	Understanding the concepts and being able to practice spatial data processing using vector geoprocessing methods (P5, KU2)						4	25	75 of all students obtain a minimum score of 75 (scale of 100)
3	Understanding the concepts and being able to practice three-dimensional analysis and network analysis in GIS (P5, KU2, KK1)						5	10	75% of all students obtain a minimum score of 75 (scale of 100)
4	Understanding the concepts and being able to practice spatial modelling for suitability modelling and potential modelling (P5, KU2, KK1).						6	30	75% of all students obtain a minimum score of 75 (scale of 100)

COLLABORATIVE ASSIGNMENT DESIGN

ASSIGNMENT TITLE	Final Semester Project: Applications of Spatial Modelling in Various Fields
LEARNING METHOD	Team based Project
TIME	
ASSESSMENT WEIGHT	40
SUB-CPMK	Conducting a group project practice on spatial modelling with a specific theme.

ASSIGNMENT DESCRIPTION

Students carry out a Final Semester Project entitled Applications of Spatial Modelling in Various Fields, which is completed in groups. The assignment is given at the end of the semester as the final output of the Spatial Modelling course. It is expected that this assignment represents students' understanding as well as their technical software skills based on the learning process from meeting 1 to meeting 12, which includes both the presentation of course materials and practicum activities.

TASK PROCEDURE

Form groups consisting of 7–8 students. Subsequently, prepare a Scientific Article/Research Paper with the general theme of Spatial Modelling, with the following theme options:

- Transportation
- Economy
- Tourism
- Education
- Health
- Disaster Management
- Hydrology

Each group is required to select a different theme and a different research area.

OUTPUT DETAILS

Maps and analytical report
Presentation materials (PowerPoint)
Research poster in A0 size (portrait orientation)

ASSESSMENT INDICATORS, CRITERIA, AND WEIGHT

IMPLEMENTATION SCHEDULE

Notes: The total number of days in one semester is calculated as 16 x 7 = 112 days. The implementation schedule may be determined based on this calculation of the total number of days.

Activity	Implementation Time
Explanation and group formation for the Spatial Modelling Project.	Week -13
Students discuss the determination of the project theme, the variables involved, as well as the required data and materials, and begin processing the data.	Week -14
Students conduct spatial data processing, begin producing outputs in the form of maps and posters, and prepare presentation slides.	Week -15
Presentation of the results of the spatial modelling project.	Week -16
OTHERS	
REFERENCES	
1. Burrough.1986. Principles of Geographical Information System for Land Resources Assessment. New York: Oxford University Press. 2. Chang, K. 2002. Introduction to Geographic Information Systems.McGraw-Hill Higher Education. New York. 3. Demers, Michael N.1997.Fundamental of Geographic Information System. University of New Mexico,John Wiley and Sons,Inc. 4. Dulbahri.1995. Sistem Informasi Geografis. Yogyakarta:Diktat Mata Kuliah SIG UGM 5. Longley, P.A., Goodchild, M.F., Maguire, D.J. and Rhind, D.W. (2015) Geographic Information Science and Systems. :Ne York: John Wiley & Sons 6. Gao, J. (2022). Fundamentals of spatial analysis and modelling. Springer 7. Abdul-Rahman, A., & Pilouk, M. (2007). Spatial data modelling for 3D GIS. Springer.	