



UNIVERSITAS PENDIDIKAN INDONESIA

SEMESTER LEARNING PLAN (RPS)

COURSE INFORMATION

Course Name	Course Code	Credits	Workload	Course Group	Semester	Prerequisite Course	Date of Issue
3-DIMENSIONAL MODELING	SA521	2	90	Study Program Elective Course	6	Cartography, GIS, Photogrammetry	2025-09-09 11:26:56

Prepared by	Reviewed by	Approved by
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COURSE DESCRIPTION AND LEARNING OUTCOMES

Course Description	The Three-Dimensional Modeling course discusses concepts, techniques, and applications in creating three-dimensional models used in various fields such as architecture, civil engineering, product design, animation, and geospatial mapping. Students will study geometric fundamentals, 3D object manipulation, texturing, lighting, and rendering using software such as AutoCAD, Blender, SketchUp, or 3D-based GIS. In addition, this course also covers modeling methods derived from spatial data, such as photogrammetry and LiDAR, for environmental analysis and spatial planning. Through projects and practical assignments, students are expected to be able to develop accurate and applicable 3D models in accordance with industry and research needs.		
Program Learning Outcome Assigned in the Course	1	• S6 Able to collaborate and demonstrate social sensitivity and concern for society and the environment.	
	2	• S9 Demonstrate a responsible attitude toward work in their field of expertise independently.	
	3	• P1 Able to master theoretical concepts of geography, apply geospatial technology to solve geosphere-related problems, and develop models and methods for solving geosphere problems.	
	4	• KU1 Able to apply logical, critical, systematic, and innovative thinking in the context of developing or implementing science and technology while considering and applying humanistic values in accordance with their field of expertise.	
Course Learning Outcome (CPMK)	1	Understand the Basic Concepts of 3D Modeling	
	2	Use 3D Modeling Software	
	3	Apply Spatial Data-Based Modeling Techniques	
	4	Develop Functional and Aesthetic 3D Models	
Sub-CPMK	1	CPMK - 1	Students are able to explain the basic principles of 3D geometry, object transformation, and model representation techniques in digital space for various fields of application.
	2	CPMK - 2	Students are able to operate 3D modeling software such as AutoCAD, Blender, SketchUp, or 3D-based GIS to design and modify three-dimensional objects with precision.
	3	CPMK - 3	Students are able to process data from photogrammetry, LiDAR, or other spatial sources to produce accurate 3D models for environmental analysis, spatial planning, and digital reconstruction.
	4	CPMK - 4	Students are able to design and present 3D models that comply with industry standards and specific needs, as well as evaluate model quality based on technical, aesthetic, and functional aspects.
Course Materials	1	Discussion of the learning syllabus	
	2	Introduction to the SFM model, Close Range, and level of detail	
	3	Practice of data acquisition and close range processing (available data)	
	4	Practice of data acquisition and close range processing (own data)	

	5	Creation of 3D flood models
	6	Creation of 3D tsunami models
	7	Creation of 3D landslide models
	8	Midterm examination
	9	Urban design modeling 1
	10	Urban design modeling 1
	11	3D modeling using RStudio
	12	3D modeling using RStudio
	13	Paper project for developing a 3D scheme
	14	Paper project for developing a 3D scheme
	15	Paper project for developing a 3D scheme
	16	Final examination
Learning outcomes demonstrated at the end of the course *)	After completing the 3D Modeling course, students are expected to have a strong understanding of the basic concepts and techniques involved in building and processing three-dimensional models for various purposes. Students will be able to use 3D modeling software such as AutoCAD, Blender, SketchUp, or 3D-based GIS software to design and visualize objects with precision. In addition, they will be able to process spatial data from photogrammetry and LiDAR for environmental modeling and spatial planning. With these skills, students are capable of producing 3D models that are accurate, aesthetically appealing, and functional in accordance with the needs of industry, research, and the development of 3D visualization-based technologies.	
Learning Strategy		Case Method
	✓	Team based Project
		Other
Learning Stages	Learning in the 3D Modeling course is conducted gradually, beginning with an understanding of fundamental concepts and continuing to the implementation of modeling techniques in various applications. Students will study theoretical concepts related to the principles of 3D geometry, object transformation, and the representation of models in digital space. Subsequently, practical sessions are carried out using 3D modeling software such as AutoCAD, Blender, or SketchUp to construct and modify three-dimensional objects. In addition, students will also be introduced to spatial data-based modeling techniques, such as photogrammetry and LiDAR, for geospatial and architectural analysis purposes. The learning process is carried out through a combination of theoretical lectures, software demonstrations, practical exercises, and collaborative projects, enabling students to develop the skills required to create accurate and applicable 3D models.	
References	1	Setiawan, S. I. A. (2011). Google SketchUp as an Alternative Tool in 3D Modeling. <i>Ultimatics: Journal of Information Technology Engineering</i> , 3(2), 6-10.
	2	Suwardhi, D., Mukhlisin, M., Darmawan, D., Trisyanti, S. W., Brahmantara, B., & Suhartono, Y. (2016). Survey and 3D (Three-Dimensional) Modeling for the Digital Documentation of Borobudur Temple. <i>Journal of Cultural Heritage Conservation</i> , 10(2), 10-22.

3	Tjahjadi, M. E., & Rifaan, M. (2019). Aerial Photography Using Unmanned Aerial Vehicles (UAV) for 3D Modeling of Highways. Remote Sensing, 1-6.
4	Darojat, E. Z. (2021). 3D Modeling of Agricultural Irrigation Reservoirs in Gunung Tumpeng Village Using DEM. Indonesian Journal of Computing and Modeling, 4(1), 29-32.
5	Mulia, D., & Handayani, H. H. (2014). Close-Range Photogrammetry Study in 3D Modeling and Object Volume Analysis. Geoid, 10(1), 32-39.
6	Siburian, L., Gumilar, I., & Wisayantono, D. (2017). 3D Modeling of Cisomang Bridge Using Terrestrial Laser Scanner Method. ITB Indonesian Journal of Geospatial, 6(1), 1-10.
7	Aristia, N. (2014). 3D Modeling of Cultural Heritage Sites Using Close-Range Photogrammetry Combining Terrestrial and Aerial Photos (Case Study: Sambisari Temple Area, Yogyakarta) (Doctoral dissertation, Universitas Gadjah Mada).

LEARNING PLAN

Week -	Sub-CPMK	Learning Indicator	Course Material	Assessment		Learning Method		Duration (hours)	Reference	Access Time
				Assessment Methode (test/non-test)	Assessment Weighting (%)	Synchronous	Asynchronous			
1	Students are able to explain the basic principles of 3D geometry, object transformations, and model representation techniques in digital space for various fields of application.	Discussion of the learning syllabus	Discussion of the learning syllabus	Observation	5	Face-to-face	Independent assignment	3	1,2	04-02-2025 13:00
2	Students are able to explain the basic principles of 3D geometry, object transformations, and model representation techniques in digital space for various fields of application.	Introduction to SFM and Close Range models	Introduction to SFM models, Close Range, and level of detail	Observation	5	Face-to-face	Independent assignment	3	3,4,5	11-02-2025 13:00
3	Students are able to operate 3D modeling software such as AutoCAD, Blender, SketchUp, or 3D-based GIS to design and modify three-dimensional objects with precision.	Practical session on data acquisition and processing for close range (available data)	Practical session on data acquisition and processing for close range (available data)	Participatory	5	Face-to-face	Project	3	4,5	18-02-2025 13:00
4	Students are able to process data from photogrammetry, LiDAR, or other spatial sources to produce accurate 3D models for environmental analysis, spatial planning, and digital reconstruction.	Practical session on data acquisition and processing for close range (own data)	Practical session on data acquisition and processing for close range (own data)	Participatory	5	Practical work	Project	3	5,6	25-02-2025 13:00
5	Students are able to process data from photogrammetry, LiDAR, or other spatial sources to produce accurate 3D models for environmental analysis, spatial planning, and digital reconstruction.	3D flood modeling (ArcGIS Pro)	3D flood modeling	Performance	5	Practical work	Project	3	5,6,7	04-03-2025 13:00

Week -	Sub-CPMK	Learning Indicator	Course Material	Assessment		Learning Method		Duration (hours)	Reference	Access Time
				Assessment Methode (test/non-test)	Assessment Weighting (%)	Synchronous	Asynchronous			
6	Students are able to process data from photogrammetry, LiDAR, or other spatial sources to produce accurate 3D models for environmental analysis, spatial planning, and digital reconstruction.	3D tsunami modeling (ArcGIS Pro)	3D tsunami modeling	Participatory	5	Practical work	Project	3	5,6,7	11-03-2025 13:00
7	Students are able to process data from photogrammetry, LiDAR, or other spatial sources to produce accurate 3D models for environmental analysis, spatial planning, and digital reconstruction	3D landslide modeling (ArcGIS Pro)	3D landslide modeling	Participatory	5	Practical work	Project	3	2,5,6	18-03-2025 13:00
8	Midterm Examination				15					25-03-2025 13:00
9	Students are able to design and present 3D models that comply with industry standards and specific requirements, as well as evaluate the quality of the models based on technical, aesthetic, and functional aspects.	Urban design 1 modeling (ArcGIS Pro)	Urban design 1 modeling	Participatory	5	Practical work	Project	3	2,4,6	01-04-2025 13:00
10	Students are able to design and present 3D models that comply with industry standards and specific requirements, as well as evaluate the quality of the models based on technical, aesthetic, and functional aspects.	Urban design 1 modeling (ArcGIS Pro)	Urban design 1 modeling	Participatory	5	Practical work	Project	3	2,4,6	08-04-2025 13:00

Week -	Sub-CPMK	Learning Indicator	Course Material	Assessment		Learning Method		Duration (hours)	Reference	Access Time
				Assessment Methode (test/non-test)	Assessment Weighting (%)	Synchronous	Asynchronous			
11	Students are able to design and present 3D models that comply with industry standards and specific requirements, as well as evaluate the quality of the models based on technical, aesthetic, and functional aspects.	3D modeling using RStudio (shapefile)	3D modeling using RStudio	Observation	5	Practical work	Project	3	2,4,7	15-04-2025 13:00
12	Students are able to design and present 3D models that comply with industry standards and specific requirements, as well as evaluate the quality of the models based on technical, aesthetic, and functional aspects.	3D modeling using RStudio (raster)	3D modeling using RStudio	Observation	5	Practical work	Project	3	1,4,7	22-04-2025 13:00
13	Students are able to explain the fundamental principles of 3D geometry, object transformations, and techniques for representing models within digital space for various applications..	Project paper on 3D scheme development	Project paper on 3D scheme development	Observation	5	Practical work	Project	3	2,6,7	29-04-2025 13:00
14	Students are able to design and present 3D models that comply with industry standards and specific requirements, as well as evaluate the quality of the models based on technical, aesthetic, and functional aspects.	Project paper on 3D scheme development	Project paper on 3D scheme development	Observation	5	Practical work	Project	3	2,4,5	06-05-2025 13:00
15	Students are able to design and present 3D models that comply with industry standards and specific requirements, as well as evaluate the quality of the models based on technical, aesthetic, and functional aspects.	Project paper on 3D scheme development	Project paper on 3D scheme development	Observation	5	Practical work	Project	3	2,3,5	13-05-2025 13:00

Week -	Sub-CPMK	Learning Indicator	Course Material	Assessment		Learning Method		Duration (hours)	Reference	Access Time
				Assessment Method (test/non-test)	Assessment Weighting (%)	Synchronous	Asynchronous			
16	Final Examination					15				20-05-2025 13:00

STUDENT LEARNING TIME (WORKLOAD)

		ACTIVITIES	SYNCHRONOUS (Face-to-Face / Virtual Meeting)	ASYNCHRONOUS (Structured / Independent)	STUDENT LEARNING PREPARATION	TOTAL STUDENT LEARNING AND INSTRUCTION TIME
LEARNING		Lectures/Responses/Tutorials	25 x 50 minutes = 1250 minutes	19 x 15 minutes = 285 minutes	-x-	1535 minutes (25.6 hours)
		Project-based learning	25 x 50 minutes = 1250 minutes	20 x 15 minutes = 300 minutes	-x-	1550 minutes (25.8 hours)
		Discussion (case-based learning)	20 x 10 minutes = 200 minutes	14 x 15 minutes = 210 minutes	-x-	410 minutes (6.8 hours)
		TOTAL				3495 minutes (58.3 hours)
ASSESSMENT		Continuous Assessment				
		Participation During Learning	7 x 35 minutes = 245 minutes	7 x 30 minutes = 210 minutes	15 x 30 minutes = 450 minutes	905 minutes (15.1 hours)
		Project Completion	7 x 50 minutes = 350 minutes	7 x 50 minutes = 350 minutes	-x-	700 minutes (11.7 hours)
		Assignments	5 x 10 minutes = 50 minutes	5 x 10 minutes = 50 minutes	-x-	100 minutes (1.7 hours)
		Quizzes	-x-	-x-	-x-	0 minutes (0.0 hours)
		Formative				100 minutes (1.7 hours)
		Summative				100 minutes (1.7 hours)
		TOTAL				1905 minutes (31.8 hours)
TOTAL WORKLOAD						5400 minutes (90 hours)
TOTAL IDEAL HOURS						90 hours
CREDITS						2
CONFORMITY WITH THE NUMBER OF CREDITS						APPROPRIATE

CPMK ASSESSMENT CRITERIA

No	CPMK	CPL				TAXONOMY	Weight	CPMK ACHIEVEMENT CRITERIA
		CPL-1	CPL-2	CPL-3	CPL-4			
1	Understanding the Basic Concepts of 3D Modeling					20	15	40% of all students obtain a score of at least 60 (100 scale)
2	Using 3D Modeling Software					10	5	40% of all students obtain a score of at least 60 (100 scale)
3	Applying Data-Based Modeling Techniques					30	20	40% of all students obtain a score of at least 60 (100 scale)
4	Developing Functional and Aesthetic 3D Models					40	30	40% of all students obtain a score of at least 60 (100 scale)

COLLABORATIVE ASSIGNMENT DESIGN

ASSIGNMENT TITLE	Creation and Analysis of 3D Models for Environmental or Infrastructure Visualization
LEARNING METHOD	Team based Project
TIME	
ASSESSMENT WEIGHT	40
SUB-CPMK	Students are able to explain the fundamental principles of 3D geometry, object transformation, and techniques for representing models in digital space for various fields of application.

ASSIGNMENT DESCRIPTION

In this assignment, each group will create a 3D model of an object or a real environment using 3D modeling software such as AutoCAD, Blender, SketchUp, or 3D-based GIS software. The model may represent a building, an urban area, a natural landscape, or other infrastructure. In addition to constructing the model, students must also analyze its accuracy and functionality and propose improvements for further development.

TASK COMPLETION STEPS

Work Stages

1. Selection of Object or Study Area

- Determine the object to be modeled, for example a historical building, bridge, traditional settlement, natural landscape, or urban infrastructure.
- Collect references in the form of images, maps, or spatial data to support the modeling process.

2. Creation of the 3D Model

- Use appropriate 3D modeling software to construct the model digitally.
- Apply basic techniques such as extrusion, texture mapping, lighting, and rendering to enhance the realism of the model.
- If possible, use data from photogrammetry or LiDAR to improve model accuracy.

3. Model Analysis and Evaluation

- Compare the created model with reference data and identify the level of accuracy and detail.
- Analyze the applicability of the model in specific fields, for example for geospatial mapping, urban planning, or architectural visualization.
- Identify challenges encountered during the modeling process and propose solutions to improve the quality of the model.

4. Report Preparation and Presentation

- Document the modeling steps, challenges, and model analysis in the form of a final report.
- Create visualizations or a short animation to present the results of the 3D model.
- Present the results in the form of slides or a video to explain the process and the group’s findings.

DEATAIL OF THE OUTPUTS PRODUCED

Expected Outputs

- ? **3D model** in digital format that can be visualized.
- ? **final report** (PDF) that includes the modeling process, analysis, and development recommendations.
- ? **Model visualization** in the form of images, animation, or a short video.
- ? **A group presentation** in the form of slides or a recorded explanatory video.

INDICATOR, CRITERIA, AND ASSESSMENT WEIGHTS

Assessment Criteria

- ? **Accuracy and Quality of the 3D Model** (30%)
- ? **Creativity and Detail of Visualization** (25%)
- ? **Model Analysis and Evaluation** (25%)
- ? **Documentation and Presentation** (20%)

IMPLEMENTATION SCHEDULE

Note: The number of days in one semester is $16 \times 7 = 112$ days. The implementation schedule may be determined based on the calculation of days.

Activity	Implementation Time
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OTHER

REFEREANCES

1. Setiawan, S. I. A. (2011). Google SketchUp as an Alternative Tool in 3D Modeling. Ultimatics: Jurnal Teknik Informatika, 3(2), 6–10.
2. Tjahjadi, M. E., & Rifaan, M. (2019). Aerial Photography Using Unmanned Aerial Vehicles (UAV) for 3D Modeling of Highways. Pengindraan Jauh, 1–6.
3. Darojat, E. Z. (2021). 3D Modeling of an Agricultural Irrigation Reservoir in Gunung Tumpeng Village Using DEM. Indonesian Journal of Computing and Modeling, 4(1), 29–32.
4. Mulia, D., & Handayani, H. H. (2014). Close-Range Photogrammetry Study in 3D Modeling and Object Volume Analysis. Geoid, 10(1), 32–39.
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