



UNIVERSITAS PENDIDIKAN INDONESIA

SEMESTER LEARNING PLAN (RPS)

COURSE IDENTITY

Course Title	Course Code	Credits	Workload	Course Group	Semester	Prerequisite Course	Date Issued
GEO-BUILDING INFORMATION MODELLING (BIM)	SA522	2	90	Study Program Elective Course	6	CAD, GIS, Introduction to Geographic Information Science	2025-09-09 11:26:56

Prepared by	Reviewed by	Approved by
Haikal Muhammad Ihsan, M.Sc.	Shafira Himayah, S.Pd., M.Sc.	Dr. Lili Somantri, S.Pd., S.S., M.Si.

COURSE DESCRIPTION AND LEARNING OUTCOMES

Course Description	This course is an advanced course for undergraduate students of the Geographic Information Science Study Program. This course introduces students to the concept and technology of GEO-Building Information Modeling, which integrates Building Information Modeling (BIM) with geospatial data to enhance planning, design, and construction project management. Students will learn how to utilize geospatial data and BIM technology to create building models that are more accurate, efficient, and grounded in geographical data. The learning objectives of the GEO-BIM course are as follows: to understand the fundamental concepts of GEO-BIM and its integration with geographic information systems (GIS), to be able to apply GEO-BIM technology in construction project planning, design, and management, and to master GEO-BIM tools and software for spatial analysis and building modeling. This course is designed to provide students with a solid theoretical understanding as well as relevant practical experience in the field of GEO-BIM, preparing them for the challenges of the modern construction industry.		
(CPL) Assigned to the Course	1	Possess a sound understanding of the concepts and technology of GEO-Building Information Modeling.	
	2	Be able to understand the theoretical foundations of GEO-Building Information Modeling technology.	
	3	Have experience in conducting spatial data processing with GeoBIM.	
	4	Be able to analyze and interpret spatial data using geographic science and technology.	
	5	Be able to present data resulting from processing and analysis in a form that is easily understood.	
Course Learning Outcomes (CPMK)	1	Understand the concepts and technology of GEO-Building Information Modeling.	
	2	Understand the integration of GEO-Building Information Modeling technology with geographic information systems (GIS).	
	3	Apply GEO-BIM technology in construction project planning, design, and management.	
	4	Understand 3D Modeling and Visualization in GEO-BIM, including applications and GEO-BIM data analysis.	
	5	Understand the software utilized in GEO-BIM data processing.	
	6	Understand the procedures and conduct data processing to obtain Basic Building Modeling Using BIM.	
Sub-CPMK	1	CPMK - 1	Course syllabus, concepts, and technology of GEO-Building Information Modeling.
	2	CPMK - 2	Understand the basic theory of technology and components in GEO-BIM.
	3	CPMK - 3	Understand the Integration of Geospatial Data with BIM.
	4	CPMK - 4	Understand 3D Modeling and Visualization in GEO-BIM, including applications and GEO-BIM data analysis.
	5	CPMK - 5	Understand the software utilized in GEO-BIM data processing.
	6	CPMK - 6	Understand the procedures and conduct data processing to obtain Basic Building Modeling Using BIM.

	7	CPMK - 6	Be able to implement Project Management, geospatial analysis, and GEO-BIM simulation in Infrastructure.
Course Material	1	Course Syllabus, concepts, and technology of GEO-Building Information Modeling.	
	2	Technology and Components in GEO-BIM.	
	3	Spatial Data in Geo-BIM and Integration of Geospatial Data with BIM.	
	4	Spatial Analysis in Geo-BIM, 3D Modeling and Visualization in GEO-BIM.	
	5	Collaboration and Data Management in GEO-BIM.	
	6	GEO-BIM Applications in Infrastructure and Urban Mapping.	
	7	Data Analysis and Simulation in GEO-BIM.	
	8	Midterm Examination (UTS)	
	9	Introduction to GEO-BIM Software.	
	10	Basic Building Modeling Using BIM.	
	11	Integration of Geospatial Data in the BIM Model.	
	12	3D Visualization and Simulation in GEO-BIM.	
	13	Project Management with GEO-BIM.	
	14	Geospatial Analysis and Simulation in GEO-BIM.	
	15	Application of GEO-BIM in Infrastructure.	
	16	Final Examination (UAS).	
Demonstrable Learning Outcomes at End of Course *)	The GEO-BIM (Geospatial Building Information Modeling) learning product is designed to provide understanding and skills in the integration of geospatial data and building information models (BIM) in order to support intelligent and sustainable infrastructure planning, construction, and management. Through interactive modules, students will study the fundamental concepts of GEO-BIM, data formats such as IFC and shapefile, as well as the use of software including ArcGIS, QGIS, and Autodesk Revit. The instruction encompasses spatial analysis of buildings within the context of their surrounding environments, digital city modeling, and the implementation of WebGIS for cloud-based collaboration. This learning product also incorporates case studies and real-world problem-solving projects, enabling participants to apply GEO-BIM skills across various sectors, including urban planning, disaster mitigation, and infrastructure asset management.		
Learning Strategy		Case Method	
	✓	Team based Project	
		Others	

Learning Steps	GEO-BIM (Geospatial Building Information Modeling) instruction begins with understanding the fundamental concepts of BIM and geospatial technology, including how both can be integrated for spatial analysis and infrastructure management. Students will study data formats such as IFC (Industry Foundation Classes) for BIM and GIS standards such as GeoJSON and shapefile. Subsequently, they will be introduced to software including ArcGIS, QGIS, Autodesk Revit, and FME for linking BIM data with GIS systems. The analysis process encompasses the overlay of geospatial data with 3D building models for urban planning, asset management, and disaster mitigation. Students will also study how WebGIS and cloud technology are utilized in the implementation of GEO-BIM for multi-stakeholder collaboration. Instruction concludes with case studies and a digital city modeling project that integrates BIM and GIS for sustainable development solutions.	
References	1	Eastman, C., et al. (2018). BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers, and Contractors.
	2	ASCE Journal of Construction Engineering and Management. This is a professional journal published quarterly. Copies are available in the Engineering library. You can also access the journal publications since 1999 by accessing http://scitation.aip.org/coo/ from any computer on campus
	3	Building Information Modeling (BIM): A framework for Structural Design, by Nawari & Kuenstle, CRC press ISBN-13: 978-1482240436, ISBN-10: 1482240432, CRC Press, Taylor and Francis Group http://www.crcpress.com/ ; spring 2015. By N. Nawari & M. Kuenstle
	4	Fundamentals of Building Construction, by Allen, Edward, Wiley
	5	Karan, E.P., & Irizarry, J. (2015). Extending BIM Interoperability for Real-Time Visualization of Building Sensor Data.
	6	De Laat, R., & Van Berlo, L. (2011). Integration of BIM and GIS: The development of the CityGML GeoBIM extension. Advances in 3D geo-information sciences, 211-225.
	7	Noardo, F., Ellul, C., Harrie, L., Overland, I., Shariat, M., Arroyo Otori, K., & Stoter, J. (2020). Opportunities and challenges for GeoBIM in Europe: developing a building permits use-case to raise awareness and examine technical interoperability challenges. Journal of Spatial Science, 65(2), 209-233.
	8	Arroyo Otori, K., Diakité, A., Krijnen, T., Ledoux, H., & Stoter, J. (2018). Processing BIM and GIS models in practice: experiences and recommendations from a GeoBIM project in the Netherlands. ISPRS International journal of geo-information, 7(8), 311.
	9	Svensson, M., & Friberg, O. (2017). GeoBIM—a tool for optimal geotechnical design. In Proc. of the 19th Int. Conf. on Soil Mechanics and Geotechnical Engineering, (Seoul) (pp. 1781-4).
	10	Noardo, F., Harrie, L., Arroyo Otori, K., Biljecki, F., Ellul, C., Krijnen, T., ... & Stoter, J. (2020). Tools for BIM-GIS integration (IFC georeferencing and conversions): Results from the GeoBIM benchmark 2019. ISPRS international journal of geo-information, 9(9), 502.

SEMESTER LEARNING PLAN

Week	Sub-CPMK	Sub-CPMK Achievement Indicators	Course Material	Assessment		Learning Methods		Duration (hrs)	Ref. No.	Access Date
				Assessment Form (Test/Non-test)	Assessment Weight (%)	Synchronous (Face-to-face / Online)	Asynchronous (Independent / Group Assignments)			
1	Course syllabus, concepts, and technology of GEO-Building Information Modeling.	Students are able to understand the course syllabus and to explain the concepts and technology of GEO-Building Information Modeling.	Course Syllabus, concepts, and technology of GEO-Building Information Modeling.	Observation	5	Praktikum	Project	3	1,2,3,4	04-02-2025 07:00
2	Understand the basic theory of technology and components in GEO-BIM.	Students are able to explain and understand the technology and components in GEO-BIM.	Technology and Components in GEO-BIM.	Observation	5	Praktikum	Project	3	3,4,5	11-02-2025 07:00
3	Understand the Integration of Geospatial Data with BIM.	Students are able to explain and understand Spatial Data in Geo-BIM and the Integration of Geospatial Data with BIM.	Spatial Data in Geo-BIM and Integration of Geospatial Data with BIM.	Participatory	5	Praktikum	Project	3	3,4,5,6	18-02-2025 07:00
4	Understand 3D Modeling and Visualization in GEO-BIM, including applications and GEO-BIM data analysis.	Students are able to explain and understand the application of Geo-BIM, 3D Modeling and Visualization in GEO-BIM.	Spatial Analysis in Geo-BIM, 3D Modeling and Visualization in GEO-BIM.	Observation	5	Praktikum	Project	3	6,7,8	24-02-2025 07:00
5	Understand the software utilized in GEO-BIM data processing.	Students are able to understand, collaborate on, and manage data in GEO-BIM.	Collaboration and Data Management in GEO-BIM.	Participatory	5	Praktikum	Project	3	3,4,5	03-03-2025 07:00

Week	Sub-CPMK	Sub-CPMK Achievement Indicators	Course Material	Assessment		Learning Methods		Duration (hrs)	Ref. No.	Access Date
				Assessment Form (Test/Non-test)	Assessment Weight (%)	Synchronous (Face-to-face / Online)	Asynchronous (Independent / Group Assignments)			
6	Understand the procedures and conduct data processing to obtain Basic Building Modeling Using BIM.	Students are able to apply GEO-BIM technology in Infrastructure and Urban Mapping.	GEO-BIM Applications in Infrastructure and Urban Mapping.	Participatory	5	Practicum	Project	3	7,9,10	10-03-2025 07:00
7	Understand the Integration of Geospatial Data with BIM.	Students are able to explain, understand, and analyze Data and Simulation in GEO-BIM.	Data Analysis and Simulation in GEO-BIM.	Performance	5	Practicum	Project	3	6,7,8	17-03-2025 07:00
8	Midterm Examination (UTS)				15					24-03-2025 07:00
9	Understand the procedures and conduct data processing to obtain Basic Building Modeling Using BIM.	Students are able to understand the software/applications utilized in GEO-BIM.	Introduction to GEO-BIM Software.	Performance	5	Practicum	Project	3	5,6,7	01-04-2025 07:00
10	Understand the procedures and conduct data processing to obtain Basic Building Modeling Using BIM.	Students are able to understand Basic Building Modeling Using BIM.	Basic Building Modeling Using BIM.	Performance	5	Practicum	Project	3	7,8,9	08-04-2025 07:00
11	Understand the procedures and conduct data processing to obtain Basic Building Modeling Using BIM.	Students are able to understand the integration of geospatial data in the BIM Model.	Integration of Geospatial Data in the BIM Model.	Performance	5	Practicum	Project	3	8,9,10	15-04-2025 07:00

Week	Sub-CPMK	Sub-CPMK Achievement Indicators	Course Material	Assessment		Learning Methods		Duration (hrs)	Ref. No.	Access Date
				Assessment Form (Test/Non-test)	Assessment Weight (%)	Synchronous (Face-to-face / Online)	Asynchronous (Independent / Group Assignments)			
12	Understand the procedures and conduct data processing to obtain Basic Building Modeling Using BIM.	Students are able to understand 3D visualization and simulation in GEO-BIM.	3D Visualization and Simulation in GEO-BIM.	Performance	5	Practicum	Project	3	5,8,10	22-04-2025 07:00
13	Be able to implement Project Management, geospatial analysis, and GEO-BIM simulation in Infrastructure.	Students are able to collaborate on and manage projects with GEO-BIM.	Project Management with GEO-BIM.	Performance	5	Practicum	Project	3	2,5,9	29-04-2025 07:00
14	Be able to implement Project Management, geospatial analysis, and GEO-BIM simulation in Infrastructure.	Students are able to understand Geospatial Analysis and Simulation in GEO-BIM.	Geospatial Analysis and Simulation in GEO-BIM.	Performance	5	Practicum	Project	3	5,8,10	06-05-2025 07:00
15	Be able to implement Project Management, geospatial analysis, and GEO-BIM simulation in Infrastructure.	Students are able to understand the application of GEO-BIM in Infrastructure.	Application of GEO-BIM in Infrastructure.	Performance	5	Practicum	Project	3	2,6,9,10	13-05-2025 07:00
16	Final Examination (UAS)				15					20-05-2025 07:00

STUDENT LEARNING WORKLOAD (WORKLOAD)

INSTRUCTION	Learning Activities		SYNCHRONOUS (Face-to-face / Online)	Asynchronous Activities (Structured / Independent)	Student Learning Preparation	Total Student Learning Time
	Lectures / Response / Tutorial		25 x 50 min = 1,250 min	19 x 15 min = 285 min	-x-	1,535 min (25.6 hrs)
	Project-Based Learning		25 x 50 min = 1,250 min	20 x 15 min = 300 min	-x-	1,550 min (25.8 hrs)
	Discussion (Case-Based Learning)		20 x 10 min = 200 min	14 x 15 min = 210 min	-x-	410 min (6.8 hrs)
	TOTAL					3,495 min (58.3 hrs)
ASSESSMENT		Continuous Assessment				
		Participation During Learning	7 x 35 min = 245 min	7 x 30 min = 210 min	15 x 30 min = 450 min	905 min (15.1 hrs)
		Project Work	7 x 50 min = 350 min	7 x 50 min = 350 min	-x-	700 min (11.7 hrs)
		Assignments	5 x 10 min = 50 min	5 x 10 min = 50 min	-x-	100 min (1.7 hrs)
		Quiz	-x-	-x-	-x-	0 min (0.0 hrs)
		Formative Assessment				100 min (1.7 hrs)
		Summative Assessment				100 min (1.7 hrs)
	TOTAL					1,905 min (31.8 hrs)
TOTAL COURSE WORKLOAD						5,400 Minutes (90 Hours)
IDEAL TOTAL HOURS						90 Hours
CREDITS (SKS)						2
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	Understand the concepts and technology of GEO-Building Information Modeling.						10	5	40% of all students achieve a score of at least 60 (on a scale of 100)
2	Understand the integration of GEO-Building Information Modeling technology with geographic information systems (GIS)						20	5	40% of all students achieve a score of at least 60 (on a scale of 100).
3	Apply GEO-BIM technology in construction project planning, design, and management						15	10	40% of all students achieve a score of at least 60 (on a scale of 100).
4	Understand 3D Modeling and Visualization in GEO-BIM, including applications and GEO-BIM data analysis.						15	5	40% of all students achieve a score of at least 60 (on a scale of 100).
5	Understand the software utilized in GEO-BIM data processing.						20	5	40% of all students achieve a score of at least 60 (on a scale of 100)
6	Understand the procedures and conduct data processing to obtain Basic Building Modeling Using BIM.						20	40	40% of all students achieve a score of at least 60 (on a scale of 100)

COLLABORATIVE TASK DESIGN

Task Title	Integration of Geospatial Data and BIM for Urban Area Analysis
Learning Method	Team based Project
Duration	
Assessment Weight	40
SUB-CPMK	Course Syllabus, concepts, and technology of GEO-Building Information Modeling.

Task Description
In this assignment, each group will integrate geospatial data and a BIM model to analyze a specific urban area or infrastructure project. The geospatial data used may include satellite imagery, DEM (Digital Elevation Model), and other GIS data, while the BIM model will be employed for building and infrastructure modeling.
Task Completion Steps

Completion Steps

1. **Case Study Selection**

- Select an urban area or infrastructure project to be analyzed.
- Collect relevant geospatial data, such as topographic maps, land use data, or meteorological data.

2. **Geospatial Data Processing**

- Utilize GIS software (QGIS/ArcGIS) to analyze spatial data.
- Identify environmental aspects, accessibility, and risk factors (flooding, pollution, etc.).

3. **BIM Model Creation**

- Create or import a BIM model using Revit, ArchiCAD, or other BIM software.
- Integrate the BIM model with geospatial data using tools such as Autodesk InfraWorks or Esri ArcGIS GeoBIM.

4. **Collaborative Analysis**

- Conduct an impact analysis of construction on the surrounding environment.
- Review potential design optimizations based on the results of the Geo-BIM integration.

5. **Presentation and Final Report**

- Present the analysis results in the form of a report and visualizations (3D maps, BIM model, interactive dashboard).
- Discuss the principal findings and recommendations for design improvement or development policy.

Detailed Expected Outputs

Outputs Expected

- ? Geospatial maps produced from analysis (raster/vector format).
- ? BIM model integrated with geospatial data.
- ? Final report (PDF) containing analysis and recommendations.
- ? Video or presentation explaining the project results.

Indicators, Criteria, and Assessment Weights

? **Assessment:**

? Quality of Data and Geospatial Analysis (30%)

? **Geo-BIM Integration and Model Accuracy (30%)**

? **Innovation and Creativity in Solutions (20%)**

? **Presentation and Final Report (20%)**

Implementation Schedule

Note: The total number of days in one semester is $16 \times 7 = 112$ days. The schedule may be established based on daily calculations.

Activity	Implementation Time
OTHERS	
GEO-BIM Creativity	

References

1. Sumague, J. A. (2020). Fundamental Concepts of Language Teaching. Society Publishing. e-book Edition 2020 ISBN: 978-1-77407-567-8 (e-book)
2. Eastman, C., et al. (2018). BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers, and Contractors.
3. ASCE Journal of Construction Engineering and Management. This is a professional journal published quarterly. Copies are available in the Engineering library. You can also access the journal publications since 1999 by accessing <http://scitation.aip.org/coo/> from any computer on campus
4. Building Information Modeling (BIM): A framework for Structural Design, by Nawari & Kuenstle, CRC press ISBN-13: 978-1482240436, ISBN-10: 1482240432, CRC Press, Taylor and Francis Group <http://www.crcpress.com/>; spring 2015. By N. Nawari & M. Kuenstle
5. Fundamentals of Building Construction, by Allen, Edward, Wiley
6. Karan, E.P., & Irizarry, J. (2015). Extending BIM Interoperability for Real-Time Visualization of Building Sensor Data.
7. De Laat, R., & Van Berlo, L. (2011). Integration of BIM and GIS: The development of the CityGML GeoBIM extension. Advances in 3D geo-information sciences, 211-225.
8. Noardo, F., Ellul, C., Harrie, L., Overland, I., Shariat, M., Arroyo Otori, K., & Stoter, J. (2020). Opportunities and challenges for GeoBIM in Europe: developing a building permits use-case to raise awareness and examine technical interoperability challenges. Journal of Spatial Science, 65(2), 209-233.
9. Arroyo Otori, K., Diakit , A., Krijnen, T., Ledoux, H., & Stoter, J. (2018). Processing BIM and GIS models in practice: experiences and recommendations from a GeoBIM project in the Netherlands. ISPRS International journal of geo-information, 7(8), 311.