

SMRJ Government College, Siwani (Bhiwani)

(Affiliated to Chaudhary Bansi Lal University, Bhiwani)

Session: 2026-27

Teaching Plan (Department of Geography)



Teacher: Dr. Mukesh Kumar
Class: M.Sc. Previous
Semester: 1st
Maximum Marks: 100
End Term Exam Marks: 50+20

Course Type & Title: DEC-1 – Foundations of Geospatial Technology (Theory & Practical)
Course Code: 25 PG GEO 110
Credits: 3+1
Internal Assessment Marks: 20+10
Practical Marks: 30 (20+10)

Course Outcomes: After completing the course, a student will be able to:

- Understand the fundamental principles of geospatial technologies including GIS, GPS, and remote sensing.
- Apply spatial data models and tools for real-world geographic problem-solving.
- Use open-source and commercial GIS software for mapping, analysis, and decision support.
- Critically evaluate geospatial applications in environment, disaster management, urban planning, and development.

Sr. No.	Week/Month, 2026	Unit/ Topic/ Chapter to be covered	Assignment/ Test/ Remarks, if any
1	24.08.2026 – 29.08.2026	Fundamentals of Geospatial Technology: Introduction to geospatial technologies: GIS, Remote Sensing, GPS, Web GIS, Spatial data types: raster vs. vector, attributes and metadata,	
2	31.08.2026 – 05.09.2026	Coordinate systems: Geographic vs. projected; UTM, WGS84, transformations, Open-source and proprietary geospatial software: QGIS, ArcGIS,	
3	07.09.2026 – 12.09.2026	Google Earth Engine. Spatial Data Models and Processing: Spatial databases and data formats (Shapefile, GeoTIFF, KML, GPKG),	
4	14.09.2026 – 19.09.2026	Topology and spatial relationships, Geospatial data collection: digitization,	
5	21.09.2026 – 26.09.2026	GPS field data, crowdsourced platforms (OSM), Data quality, accuracy, and standards (FGDC, ISO).	
6	28.09.2026 – 03.10.2026	Applications and Contemporary Trends: Applications: urban planning, environmental monitoring, disaster risk reduction, agriculture, and public health,	
7	05.10.2026 – 10.10.2026	Introduction to spatial analysis: overlay, buffer, proximity, raster operations, Emerging trends:	
8	12.10.2026 – 17.10.2026	AI in GIS, drone mapping, cloud-based platforms (GEE, ArcGIS Online),	Assignment
9	19.10.2026 – 24.10.2026	Ethical and legal considerations: geoprivacy, data sharing, licensing	Test
10	26.10.2026 – 31.10.2026	Exercises: Familiarization with GIS interface (QGIS/ArcGIS):	

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		Loading and visualizing raster and vector data	
11	02.11.2026 – 04.11.2026	Working with coordinate systems and projections: CRS assignment, transformation, and reprojection	
12	12.11.2026 – 14.11.2026	Digitization and editing of spatial features from toposheets or satellite imagery	
13	16.11.2026 – 21.11.2026	Attribute data handling and table joins: Querying and data management in GIS	
14	23.11.2026 – 28.11.2026	Georeferencing scanned maps using control points	
15	30.11.2026 – 01.12.2026	Buffering, overlay, and spatial query tools for spatial analysis	

Suggested Readings:

- Burrough, P. A., & McDonnell, R. A. (1998). *Principles of geographical information systems* (2nd ed.). Oxford University Press.
- Chang, K. T. (2020). *Introduction to geographic information systems* (9th ed.). McGraw-Hill Education.
- Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographic information systems and science* (4th ed.). Wiley.
- Schowengerdt, R. A. (2007). *Remote sensing: Models and methods for image processing* (3rd ed.). Elsevier.
- Bolstad, P. (2019). *GIS fundamentals: A first text on geographic information systems* (6th ed.). Eider Press.
- Tomlinson, R. (2007). *Thinking about GIS: Geographic information system planning for managers* (4th ed.). Esri Press.
- Jensen, J. R., & Jensen, R. R. (2013). *Introductory geographic information systems*. Pearson.
- Open Geospatial Consortium (OGC). (2021). *OGC Standards and Best Practices*. <https://www.ogc.org>

Signature of the teacher concerned

Head of the Department

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Teaching Plan (Department of Geography)



Teacher: Dr. Mukesh Kumar

Class: M.Sc. Final

Semester: 3rd

Maximum Marks: 100

End Term Exam Marks: 50+20

Course Type & Title: DEC-3 – Geographic Information Systems (GIS) and Applications (Theory & Practical)

Course Code: 25 PG GEO 310

Credits: 3+1

Internal Assessment Marks: 20+10

Practical Marks: 30 (20+10)

Course Outcomes: After completing the course, a student will be able to:

- Understand the concepts, components, spatial data structures, and functional capabilities of Geographic Information Systems and their significance in geographical analysis.
- Analyze spatial and attribute data using GIS techniques for addressing geographical, environmental, and socio-economic problems.
- Evaluate the applications of GIS in resource management, planning, environmental monitoring, and decision-making processes.
- Apply GIS tools and geospatial techniques for data creation, spatial analysis, thematic mapping, and interpretation of geographical phenomena.

Sr. No.	Week/Month, 2026	Unit/ Topic/ Chapter to be covered	Assignment/ Test/ Remarks, if any
1	01.08.2026	Familiar with syllabus	
2	03.08.2026 – 08.08.2026	Foundations of Geographic Information Systems: Nature, scope, evolution, and significance of GIS;	
3	10.08.2026 – 14.08.2026	components and functional elements of GIS; spatial concepts in GIS;	
4	17.08.2026 – 22.08.2026	geographic coordinate systems and map projections; spatial data models: raster and vector; spatial and attribute data;	
5	24.08.2026 – 29.08.2026	sources of spatial data; data acquisition methods: maps, GPS, Remote Sensing, field survey, and secondary sources; database concepts in GIS; data quality, errors, accuracy, and metadata.	
6	31.08.2026 – 05.09.2026	Spatial Data Handling and GIS Analysis: Data input, editing, and management in GIS;	
7	07.09.2026 – 12.09.2026	georeferencing, digitization, topology creation, and database management; spatial query and retrieval; geoprocessing techniques;	
8	14.09.2026 – 19.09.2026	buffering, overlay analysis, proximity analysis, and reclassification;	

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9	21.09.2026 – 26.09.2026	Digital Elevation Models (DEMs) and terrain analysis; map algebra; spatial interpolation techniques; preparation and interpretation of thematic maps.	
10	28.09.2026 – 03.10.2026	GIS Applications and Contemporary Developments: Applications of GIS in physical geography, urban and regional planning,	Assignment
11	05.10.2026 – 10.10.2026	Applications in natural resource management, environmental assessment, disaster management, transportation, agriculture, and public health;	
12	12.10.2026 – 17.10.2026	Integration of GIS with Remote Sensing and GPS; Web GIS and open-source GIS platforms;	
13	19.10.2026 – 24.10.2026	Geospatial technologies for sustainable development; emerging trends in GIS, including mobile GIS, volunteered geographic information, and geospatial decision support systems.	Test
14	26.10.2026 – 31.10.2026	Creation, editing, and management of spatial databases using GIS software	
15	02.11.2026 – 04.11.2026	Georeferencing, digitization, and topology building from topographic maps and satellite imagery	
16	12.11.2026 – 14.11.2026	Spatial analysis using buffering, overlay, proximity, and map algebra techniques.	
17	16.11.2026 – 21.11.2026	Generation and analysis of Digital Elevation Models (DEMs), slope, aspect, and contour maps	
18	23.11.2026 – 28.11.2026	Preparation and interpretation of thematic maps using GIS tools	
19	30.11.2026 – 01.12.2026	GIS-based mini-project involving spatial data integration, analysis, and map preparation.	

Suggested Readings:

- Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographical information systems and science* (4th ed.). Wiley.
- Burrough, P. A., McDonnell, R. A., & Lloyd, C. D. (2015). *Principles of geographical information systems* (3rd ed.). Oxford University Press.
- Chang, K. T. (2021). *Introduction to geographic information systems* (10th ed.). McGraw-Hill Education.
- Bolstad, P. (2019). *GIS fundamentals: A first text on geographic information systems* (6th ed.). XanEdu Publishing.
- Heywood, I., Cornelius, S., & Carver, S. (2011). *An introduction to geographical information systems* (4th ed.). Pearson Education.
- DeMers, M. N. (2009). *Fundamentals of geographic information systems* (4th ed.). Wiley.
- O'Sullivan, D., & Unwin, D. J. (2014). *Geographic information analysis* (2nd ed.). Wiley.
- Tomlinson, R. F. (2013). *Thinking about GIS: Geographic information system planning for managers* (5th ed.). Esri Press.
- ESRI. (Latest edition). *ArcGIS Pro documentation*. Esri Press.
- QGIS Development Team. (Latest edition). *QGIS user guide*. QGIS Project.

Signature of the teacher concerned

Head of the Department