



MANGALORE UNIVERSITY

DEPARTMENT OF MARINE GEOLOGY

MGS 505: GIS AND GPS

Course Outcome:

CO1: Students will be exposed to data and information, types of data - spatial and time variant.

CO2: Attain knowledge of Geographical Information System (GIS). Able to generate various databases.

CO3: Able to understand Global Positioning System (GPS), GPS system segments, GPS satellites and receivers. GPS-Error sources, measurements, accuracy and estimates of user position and time.

CO4: To understand the applications and limitations of GPS.



Geographical Information System

Unit 1	Introduction: Data and information: Types of data - spatial and time variant. Geographical Information System (GIS): Introduction, fundamentals and functions of GIS. Components of GIS. Generation of database, Database Management System (DBMS), DBMS Architecture and Model. Map Concept: Map features, scale, resolution and accuracy. Map Projection: Earth's size and shape in time and space. Spherical coordinates, Properties of map projections, Types of basic projections classification - Cylindrical, Conical and Azimuthal projections. UTM Coordinates.	8 hrs
Unit 2	Spatial Data Models: Raster and Vector models. Advantages and Disadvantages of Raster and Vector Models. Digitization, editing, topology creation and structuring of map data. Data quality and errors: Importance of Errors, Accuracy and Precision, Types of Errors, Sources of Inaccuracy and Imprecision, Problems of Propagation and Cascading, False precision and false accuracy, and dangers of undocumented data.	8 hrs
Unit 3	Spatial Analysis: Introduction, significance of spatial Analysis, spatial analysis tools in GIS. Vector Based - Various types of overlay analysis operations: Topological overlays, Polygon-in-polygon overlay, line-in-polygon overlay, Point-in-polygon overlay, Logical operations (Boolean operations), Conditional operations, Buffer analysis, Steps for performing Geographic analysis.	16 hrs

Raster Based - Introduction, Advantages and disadvantages of raster analysis, **Grid operations** used in map algebra, important raster analysis operations, **Grid based spatial analysis.**

Digital Elevation and Terrain Models (DEM & DTM): Generation and structure of DEM/DTM and their applications. Geospatial **Triangulated Irregular Network (TIN) model.** **Introduction to network analysis and its Applications.**

Unit 4 **Global Positioning System (GPS):** GPS system segments, **GPS satellites and receivers.** GPS-Error sources, Measurements, Accuracy and estimates of user position and time. **Application and limitations of GPS.** 8 hrs

List of References:

1. Remote Sensing and Image Interpretation – T. M. Lillesand and R. W. Kiefer – John Wiley and Sons
2. Remote Sensing and Photogrammetry, vol. 1 and vol. 2 – M. L. Jhanwar and T. S. Chouhan – VignanPrakasan, Jaipur
3. Applied Remote Sensing and Photo Interpretation – T. S. Chouhan and K. N. Joshi – VignanPrakasan, Jaipur
4. Remote Sensing in Geology – P. S. Siegal and A. R. Gillespie – John Wiley
5. Remote Sensing and its applications to Geology - Drury, John Wiley & Sons
6. Remote Sensing – Sabins, John Wiley & Sons
7. Manual of Remote Sensing - American Society of Photogrammetry
8. Geographical Information System: A Guide to Technology – John C. Antenucci – Van Nostrand Reinhold Publications
9. Principles of Geographical Information System for Land Resource Assessment – P. A. Burrough – Oxford University Press
10. Computers: Concepts and Uses – Mary Summer - Prentice Hall
11. The Hardware Bible – Winn L. Roseh – BPB Publications, New Delhi.
12. Computer Fundamentals - P K Sinha BPB
13. Introduction to computers - N Subramanian TMH
14. Understanding computers - R Rajagopalan TMH
15. Multi-media bible Indianapolis - Winn L Rosch 1995
16. Multimedia making it work - Osborne McGraw - Tay Vaughan Hill, 1998
17. Digital computer fundamentals Sixth Ed. McGraw Hill, 1991 - Thomas C Bartee
18. Computers today - Donald Sanders MGH
19. Computers today - Suresh K BasandraGalgotia
20. Computer concepts and applications, McGraw - Donald H Sanders Hill, (1987).
21. Outline of theory and problems of data processing - Martin M Schaum's
22. McGraw Hill international book company - Lipschutz and Seymour Lipschutz (1998).
23. Manual of Photo Interpretation – American Society of Photogrammetry

24. Photogeology and Image Interpretation – Shiv N. Pandey – Wiley Eastern, New Delhi
25. Fundamentals of Photogeology, Geomorphology – Verstappen – TTC Holland.
26. Elements of GPS: Nand Kishore Agrawal.
27. Geographic Information Analysis: Darid O, Sur - John Willey.
28. A Primer of GIS: Fundamental Geographic and Cartographic concept: Francis Harvey - Rawath Publisher.
29. Geoinformatics: G. Randy Keller & Chaithanya Bara - CUP
30. Remote Sensing in Geomorphology: Patrick Simon-Oxford Book Company.
31. Remote Sensing Techniques for Regional Development: Banarjee R. K- Concept Publishers.
32. Principles of Map Design: Tyner Judith A. - The Guil Ford Press.
33. Spatial Statistics and Spatio-Temporal Data: Covariance Functions and Directional Properties: Sheman Michael - John Velly and sons .
34. Remote Sensing in Geomorphology: S.M. Ramaswamy- New India.



