



MANGALORE UNIVERSITY

DEPARTMENT OF MARINE GEOLOGY

MG5 505: GIS AND GPS

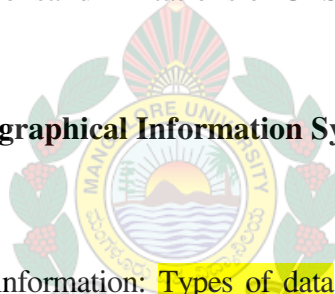
Course Outcome:

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

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| 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:

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25. Fundamentals of Photogeology, Geomorphology – Verstappen – TTC Holland.
26. Elements of GPS: Nand Kishore Agrawal.
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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 Guilford Press.
33. Spatial Statistics and Spatio-Temporal Data: Covariance Functions and Directional Properties: Sherman Michael - John Wiley and sons .
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