LORETO COLLEGE
TIME PLAN 2025

Name of the teacher: Dr. Ambika Roy Bardhan
Initials: A.R.
Teaching Objective:

- To give a holistic knowledge on the concept of maps and scales and equip the students to calculate and draw various types of scales.
- To discuss the various types of bearing and concepts of geoid and spheroid with respect to WGS-84.

UG Semester I (IDC)Topic-wise Time Plan

Topics	***Hours allotted***	***Topics (as per curriculum)***	***Teaching method***	***Learning outcome (output)***	***Assessment***
Maps and scales	45 minutes	IDC-01-Th- Geomatics and Spatial Analysis 1.Concept and applications of scales and projections. Components and classification of maps.	**Demonstration method**	. Define maps. .State the characteristics and importance of maps. . List the components of maps . Classify maps. .Define the various types of scales . List the properties of different types of scales . State the merits and demerits of various types of scales. . Differentiate among the various types of scales	**Oral Assessment**
Projections	45 minutes	IDC-01-Th- Geomatics and Spatial Analysis 1.Concept and applications of scales and projections. Components. And classification of maps.	**Demonstration Method**	. Define projections . State the importance of map projections. . List the elements of Map projections.	**Oral Assessment**

				. Classify different types of projections.	
Bearing: Magnetic and true, whole-circle and reduced. Concept of geoid and spheroid with special reference to WGS-84.	1 hour 30 minutes	IDC-01-Th- Geomatics and Spatial Analysis 2.Bearing: Magnetic and true, whole-circle and reduced. Concept of geoid and spheroid with special reference to WGS-84.	**Demonstration Method**	. Explain the concepts of magnetic and true, whole-circle and reduced bearings. . Concept of geoid and spheroid with special reference to WGS-84	**Oral Assessment**
Simple Conical Projection and Universal Transverse Mercator(UTM)	45 minutes	IDC-01-Th- Geomatics and Spatial Analysis 3.Map Projections: Classification, properties and uses with special reference to simple conical projection and Universal Transverse Mercator(UTM)	**Demonstration Method**	. State the properties, merits and demerits of Simple Conical Projection and Universal Transverse Mercator(UTM)	**Oral Assessment**
Simple Conical Projection with one standard parallel	1 hour 30 minutes	IDC-01-P- Geomatics and Spatial Analysis 1.Construction of simple conical projection with one standard parallel	**Experiential learning**	. Calculate and construct simple conical projection with one standard parallel	**Formative Assessment**
Traverse survey and plotting UTM co-ordinates using smartphone GNSS application.	1 hour 30 minutes	IDC-01-P- Geomatics and Spatial Analysis 2.Traverse survey and plotting UTM co-ordinates using smartphone GNSS application.	**Experiential learning**	. Record latitude and longitude of locations using smartphone GNSS application . Plot latitude and longitude of locations obtained from smartphone GNSS application on a graph paper.	**Formative Assessment**

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Name of the teacher: Dr. Suman Chatterjee
Initials: SCH

Teaching Objective:

- **Define surveying and explain its classifications**, including distinctions between Plane and Geodetic surveying.
- **Describe the functions and capabilities of basic and advanced surveying instruments**, such as Dumpy Level, Theodolite, and Total Station.
- **Explain the principles of levelling**, and accurately define key levelling terms (BS, FS, IS, CP, RL, HI).
- **Apply and compare levelling methods** (Height of Collimation and Rise & Fall), and discuss common levelling errors and their corrections.
- **Explain the types, parts, and working principles of a theodolite**, including its role in angle measurement and temporary adjustments.
- **Describe the methods of traversing**, including repetition, reiteration, and face left/right techniques, with theoretical justification.
- **Explain the structure and functions of Total Station**, and evaluate its advantages, limitations, and applications in mapping and GIS.
- **Understand the evolution and functioning of GNSS**, and describe how it determines position, along with its tools, systems, and applications in surveying.

UG Semester I Topic-wise Time Plan
GEO-H-IDC01-1/2/3-Th – Geomatics and Spatial Analysis (Unit II: Surveying & Unit III: Remote Sensing and Geographical Information System)

Topics	***Hours allotted***	***Topics (as per curriculum)***	***Teaching method***	***Learning outcome (output)***	***Assessment***
Unit II: Surveying 10 hours					
Basic concepts of surveying	45 minutes	- Concepts, Classification of Surveying (Plane vs. Geodetic, by method, object, field), - Principles Basic and advanced Survey equipment, and their capabilities	- Lecture with PPT - Technology based learning - Interactive Q&A	-Define surveying and its classifications. - Differentiate between Plane and Geodetic Surveying. - Identify and describe basic and advanced survey instruments.	Interactive Group Discussion and Quiz

				- Recall key concepts through visual and interactive engagement.	
Levelling – Concepts and Instruments: Dumpy Level	1.5 hours	- Definition and Principle of Levelling and Levelling Methods, - Terminologies (Backsight (BS), Foresight (FS), Intermediate Sight (IS) Change Point (CP), Reduced Level (RL) Height of Instrument (HI))	- Physical demonstration of Dumpy Level & Staff - Technology based learning - Peer teaching	- Explain the principle of levelling and its methods. - Use and define levelling terms accurately. - Identify and handle Dumpy Level and staff. - Interpret field setups and cross-sections.	- Hands-on viva on instrument parts and set-up. - Assignment: Fill a sample level book from given data
Levelling – Methods, Errors & Corrections	45 minutes	- Height of Collimation Method, Rise & Fall Method, - Common Errors and Corrections (Curvature, Refraction), - Levelling Challenges and Special Cases	- Chalk-and-talk with board problem-solving - PPT walkthrough of sample level book entries - Group problem-solving activity	- Apply Height of Collimation and Rise & Fall methods. - Identify and correct common levelling errors. - Solve problems using level book formats. - Collaborate to compute and verify RLs.	- In-class exercise: compute RL using both methods - Group discussion on difficult terrain issues
Theodolite – Basics, Parts & Operations	1 hour	- Types: Transit, Vernier, Micrometer - Parts: Telescope, Tripod, Horizontal & Vertical Circles - Temporary Adjustments: Centering, Levelling, Focusing - Angle Measurement: Horizontal & Vertical	- Physical demonstration of theodolite - Technology based learning - Group Q&A on setup steps	- Identify types and parts of a theodolite. - Perform centering, levelling, and focusing. - Understand how to measure angles.	- Spot viva: Identify parts and their functions - Short test on concepts and procedures

				- Explain angle measurement procedures.	
Theodolite – Traversing, Angle Measurement Methods	45 minutes	- Traversing (Open & Closed) Repetition & Reiteration Method Face Left/Right, Changing Face	- Simulation using diagrams and Technology based learning - Board walkthrough of angle repetition	- Explain open and closed traversing. - Differentiate repetition and reiteration. - Describe face left/right procedures. - Use diagrams to understand traversing setups.	- Presentation by students on field layout using theodolite
Total Station – Features and Applications	45 minutes	- Components: Theodolite + EDM + Data Processor Functions: Measurement, Coordinate Calculation - Applications in Mapping, Layout, GIS - Advantages & Limitations	- Technology based learning (field survey clip) - Group-Learning and Teaching: Simulate data collection and plotting	- List and describe total station components. - Explain its functions in measurement and coordinate calculation. - Simulate basic data collection workflow. - Identify its applications in mapping and GIS.	- Class test on Total Station features and applications - Viva on advantages over conventional methods
Recap and Project-based Problem Solving	1.5 hour	Basic concepts of surveying, survey equipment, and their capabilities: Dumpy level, theodolite, total station	- Individual learning/self-study - Group-based discussion and task solving - Peer review and short presentation	- Summarize key concepts and instrument functions. - Work collaboratively to solve field-based tasks. - Present and explain solutions in peer discussions. - Reflect on learning progress	- Final class test - Presentation grading

				through feedback.	
Fundamentals of GNSS and Navigation	45 minutes	- Introduction - Why Use Navigation Systems? Basic Function of GNSS Concept of Ranging Using Time of Arrival (ToA) Evolution of Navigation: • Celestial Navigation • Radio Navigation • Satellite Navigation	- Lecture with short interactive demonstrations - Audio-visuals (short video clips on navigation evolution)	Understand the need and evolution of navigation systems leading to GNSS	PPT presentation, Viva, Timeline-based written task on navigation evolution
GNSS System Architecture and Principles	45 minutes	- Global Navigation Satellite System overview - Segments of GNSS: • Space Segment • Control Segment • User Segment - Working Principle: • Trilateration • Pseudorange Measurements • Carrier-phase Measurements	- Lecture + PPT demonstration with satellite orbit visualizations	Comprehend how GNSS calculates position and understand the system's internal functioning.	Class Test, Quiz, Diagram-based questions - Labeling activities, Matching exercises (segments vs. function)
GNSS Programmes, Instruments & Applications	45 minutes	- Overview of Major GNSS Programmes (GPS, GLONASS, Galileo, Beidou, IRNSS) - Types of GNSS Receivers & Data Formats - Differential GPS (DGPS) - Accuracy & Error Sources in GNSS Applications: Surveying, Environment, LBS, Agriculture, Military, etc.	- Interactive demo using actual or mock GNSS receivers	Gain awareness of global systems, tools used, and wide-ranging applications.	- Table/comparison exercise on GNSS programmes - Case-based short questions on applications - Fill-in-the-blanks or MCQs (receiver types, DGPS) - Error identification scenario questions
Recap, Discussion, and Assessment	45 minutes	- Recap of Key Concepts (through quick questions and concept maps) - Group Discussion: GNSS advantages and challenges	- Individual learning/self-study - Discussion, interactive recap, group-based presentations	Reinforce and evaluate learning through collaborative review and	- Mini class test (mix of short questions & concept application) - Group presentation

		- Student Presentations: On one real-life GNSS application (per group)	- Mini class test & individual oral feedback	problem-solving.	rubric (clarity, relevance, content) - Peer/group feedback - Individual oral viva (one key concept per student)
Unit III: Remote Sensing and Geographical Information System					
Principles of remote sensing (RS).	45 min	Introduction to Remote Sensing and Electromagnetic Radiation (EMR)	Lecture, Audio-Visual	Understand RS and EMR principles	Short oral Q&A during class (formative)
	45 min	EMR Interaction: Atmosphere & Earth's Surface	Lecture, Technology based learning	Explain scattering, absorption, reflection	Think-pair-share activity (in-class discussion)
	45 min	Spectral Signatures of Vegetation, Soil, Water	Interactive Demo, Technology based learning	Identify object-specific spectral responses	Label and identify spectral curves (worksheet)
	45 min	Remote Sensing Platforms and Orbits	Lecture, Audio-Visual	Distinguish terrestrial, airborne, satellite platforms	Group quiz (interactive)
	45 min	Types of Satellites & Sensors: IRS, Landsat	Technology based learning	Describe types of RS satellites and sensors	Viva (individual, short)
	45 min	Case Study: Landsat vs IRS mission capabilities	Discussion, Problem-solving	Compare IRS and Landsat missions for applications	**Class Test** (MCQ + short answer)
Principles of Preparing FCCs and Supervised Classification	45 min	Digital Image Basics & Bands	Lecture, Technology based learning	Understand bands and spectral ranges	Quick written task (identify bands and ranges)
	45 min	Concept of True Colour vs False Colour Composite (FCC)	Demonstration with PPT	Visualize differences in image composites	Short oral quiz using sample images
	45 min	Preparing FCC using Band Combinations	Interactive Demo	Apply standard band combinations for FCC	**Assignment**: Prepare FCC using sample data
	45 min	Concept and Types of Image Classification	Lecture + Video	Understand supervised vs unsupervised classification	Concept map creation (submitted in class)

	45 min	Steps of Supervised Classification	Hands-on Demo, Discussion	Execute basic supervised classification	**Group Presentation**: Classification workflow on sample data
GIS Data Types – Spatial and Non-Spatial	45 min	Introduction to GIS, Spatial and Non-Spatial Data	Lecture	Distinguish between spatial and non-spatial data	Oral discussion – differences and examples
	45 min	Vector and Raster Data Models	Demonstration with PPT	Identify and explain raster vs vector formats	Visual identification worksheet
	45 min	Metadata and Attribute Tables	Interactive Demo	Understand metadata structure and function of attribute tables	**Assignment**: List and explain metadata elements from given dataset
Attribute Table, Data Manipulation, Query, and Overlay	45 min	Introduction to Attribute Tables	Lecture, Demo	Learn the structure and function of attribute tables	Interactive fill-in-the-blanks worksheet
	45 min	Data Entry and Field Types	Interactive Demo	Insert and format attribute data	Live demonstration follow-up (each student edits table)
	45 min	Data Manipulation (Field Calculator, Reclassification)	Demo + Problem-solving	Perform attribute-based operations	Hands-on mini-task (field calculator)
	45 min	Query Operations: SQL and Selection by Attributes	PPT + Hands-on	Execute basic queries for spatial data	Short written test: write basic queries
	45 min	Query Operations: Selection by Location	Interactive Demo	Apply spatial selection techniques	Discussion of query outputs (group)
	45 min	Spatial Overlay: Concept & Types (Union, Intersect)	Lecture + Visual Examples	Understand overlay functions in GIS	Draw a conceptual model of overlay types
	45 min	Performing Overlay in QGIS or ArcGIS	Hands-on Demonstration	Conduct basic overlay analysis	Class Test
	45 min	Use Cases of Overlay and Queries in Urban/Rural Planning	Discussion	Link query/overlay skills to real-world planning	Group brainstorming poster (submit idea sheet)

	45 min	Recap and Group Problem Solving: Land Suitability Analysis	Group-based Task	Integrate skills for applied spatial analysis	Group Project Submission + Presentation + Viva Voce