Title: Online Certificate course in Remote Sensing and GIS (OCC-RSG)

(Theory and Practical)

Organizer: Department of Geography, Hiralal Bhakat College, Nalhati, Birbhum

in collaboration with

Friend of Environment (Center for Environmental Research, Education and Development)

Objectives:

1. Understanding GIS: The course will introduce students to the fundamental concepts of GIS, including data types, coordinate systems, data structures, and spatial analysis techniques. Students will gain a solid foundation in GIS theory and principles.

2. Mastering GIS software: Students will learn to use popular GIS software applications such as ArcGIS, QGIS, or ENVI. They will develop practical skills in data input, manipulation, visualization, and analysis using these tools.

3. Remote Sensing Principles: The course will cover the principles of remote sensing, including the electromagnetic spectrum, sensor types, data acquisition techniques (e.g., aerial photography, satellite imagery), and image interpretation.

4. Image Processing: Students will learn how to process and enhance remotely sensed imagery using software tools such as ENVI, ERDAS Imagine, or IDRISI. They will acquire skills in image preprocessing, image classification, change detection, and image interpretation.

5. Spatial Analysis: The course will focus on spatial analysis techniques using GIS and remote sensing data. Students will learn how to perform spatial queries, overlay analyses, proximity analysis, and modeling using spatial data.

6. Data Integration: Students will understand how to integrate GIS and remote sensing data to solve real-world problems. They will learn about data formats, data conversion, and

the integration of different data sources to support decision-making and planning processes.

7. Application Areas: The course will explore various application areas of GIS and remote sensing, such as environmental management, urban planning, agriculture, natural resource management, disaster management, and transportation planning. Students will learn how to apply GIS and remote sensing techniques to address specific problems in these domains.

8. Critical Thinking and Problem-Solving: The course will emphasize the development of critical thinking skills and problem-solving abilities. Students will be challenged to analyze spatial data, interpret remote sensing imagery, and apply appropriate GIS techniques to solve complex spatial problems.

9. Project Work: The course may include a practical project where students will have the opportunity to apply GIS and remote sensing techniques to a specific research or real-world problem. This project will allow them to demonstrate their understanding of the concepts and skills learned throughout the course.

10. Ethical and Legal Considerations: The course may touch upon the ethical and legal aspects of using GIS and remote sensing data. Students will learn about data privacy, intellectual property rights, and the responsible use of geospatial technologies.

Syllabus:

Theory	
1.	PHYSICS OF REMOTE SENSING: Definition, Concept and Principles, Orbital Characteristics of Satellite Kepler's law of Planetary motion, EMR and its Characteristics, Wavelength Regions and their significance, Interaction of EMR with earth surface features and atmosphere, Spectral signatures and visual interpretation keys.
2	EO PLATFORMS AND SENSORS : Active and Passive, classification of platforms on the basis of positionSpace borne, Air borne; Classification on the basis of Bands-Panchromatic, Multispectral, Hyper spectral; Sensor Resolution; Sensors-Optical, SAR, Thermal; Weather and Communication satellites, Resolution types.
3	VISUAL IMAGE INTERPRETATION: Elements of Visual Image Interpretation, Interpretation keys, Generation of Thematic Maps
4	DIGITAL IMAGE PROCESSING: Introduction; Filters; Detectors; Scanning techniques-Across track and along track; Thermal remote sensing-Blackbody Radiation, Thermal imaging; Pre-processing (Radiometric and Geometric correction), Image Enhancement, Image Classification (Unsupervised and Supervised) and Accuracy assessment.
5	GPS and GNSS: Satellite based positioning system, working principle of GPS, Errors in GPS, Positioning method, GPS receivers, Application of GNSS
6	GIS : Introduction, components, GIS data sources, Spatial and attribute data, GIS data formats (coverage, geodatabase, shapefile, grid, dxf, dwg, geotiff, GML), Attribute types (nominal, ordinal, interval, ratio), Spatial Data Models (Raster and Vector), Digitizing, Editing and structuring map data, Concept of Topology, spaghetti; Map overlay, spatial join, Buffering analysis.
7	APPLICATION OF REMOTE SENSING: Land cover and Land Use, Agricultural Sector, Forestry, Hydrology, Mapping, Oceans and Coastal Monitoring.

Practical	
1.	Georeferencing of raster image
2	Vector data generation
3	Digitization
4	Data attachment
5	Thematic mapping
6	Layout preparation
7	Satellite image classification
8	Remote sensing indices like NDVI, NDWI, NDBI
9	Extraction of land surface temperature
10	Preparation of contour mapping from google map
11	Preparation of DEM
12	Slope map, aspect, hillshade from DEM
13	Prediction map using ANN model

Outcome:

1. Proficiency in GIS Software: Students will gain proficiency in using popular GIS software applications such as ArcGIS, QGIS, or ENVI. They will be able to perform tasks such as data input, manipulation, visualization, and analysis using these tools.

2. Understanding of Remote Sensing Principles: Students will have a solid understanding of the principles of remote sensing, including the electromagnetic spectrum, sensor types, data acquisition techniques, and image interpretation. They will be able to interpret remotely sensed imagery and understand the limitations and potential applications of different sensors.

3. Data Acquisition and Processing Skills: Students will acquire skills in acquiring and processing remotely sensed imagery. They will be able to preprocess imagery, enhance image quality, perform image classification, and detect changes in imagery over time.

4. Spatial Analysis and Modeling: Students will develop skills in spatial analysis using GIS and remote sensing data. They will be able to perform spatial queries, overlay analyses, proximity analysis, and develop spatial models to solve complex spatial problems.

5. Application of GIS and Remote Sensing: Students will gain an understanding of the diverse application areas of GIS and remote sensing. They will be able to apply these technologies to address real-world problems in fields such as environmental management, urban planning, agriculture, natural resource management, disaster management, and transportation planning.

6. Critical Thinking and Problem-Solving: Students will develop critical thinking and problem-solving skills necessary for analyzing spatial data, interpreting imagery, and applying appropriate GIS and remote sensing techniques to solve complex spatial problems.

7. Data Integration and Decision-Making: Students will learn how to integrate GIS and remote sensing data from different sources to support decision-making processes. They will understand data formats, data conversion techniques, and how to effectively use spatial data for decision-making and planning.

8. Effective Communication: Students will be able to effectively communicate the results of their GIS and remote sensing analyses through maps, reports, and presentations. They will be able to convey complex spatial information to both technical and non-technical audiences.

9. Ethical and Legal Considerations: Students will understand the ethical and legal considerations associated with GIS and remote sensing data. They will be aware of data privacy issues, intellectual property rights, and the responsible use of geospatial technologies.

10. Project Experience: Through practical projects and assignments, students will have hands-on experience applying GIS and remote sensing techniques to solve real-world problems. They will develop the ability to plan, execute, and present a GIS and remote sensing project from start to finish.

Overall, completing a GIS and remote sensing course will equip students with a strong foundation in these fields, enabling them to pursue careers in GIS analysis, remote sensing, spatial data management, or related disciplines. They will be prepared to contribute to various industries that rely on geospatial information and technology.**Duration:** 01 (One day)

Faculties: 1. Dr. Niladri Das 2. Mr. Biswajit Mondal

No. of Students: 45

Examination: Theory: 2 credit

Practical: 1 credit

Assignment: 1 credit

Total : 4 credit

Duration: 3 months

Total time: 90 hours

Certification: All participants have received certificates after submitting assignments.

ONLINE CERTIFICATE COURSE ON
REMOTE SENSING AND GIS (OCC-RSG)
SESSION: OCT-DEC'2021

Evaluation Statement

Name of the Candidate: BARUN GHOSH
Student ID Number: **OCCRSG/OCT/0023/2021**

MARKS OF ASSIGNMENT

Sl. No.	Assignment	Actual marks obtained out of 50 (with best of five)	Truncated to 25% marks of Assignments
1.	Assignment 1	**30**	**15**
2.	Assignment 2	**38**	**19**
3.	Assignment 3	**36**	**18**
4.	Assignment 4	20	--
5.	Assignment 5	**46**	**23**
6.	Assignment 6	**48**	**24**
Full Marks	**250**	**Total Marks obtained = 198**	**Total= 99 (avg. 19.8)**

Best of Five assignments are taken into consideration.

MARKS OF ASSESSMENT

CLARIFICATION OF RESULTS

Pass Marks: The average pass marks in 5 assignments and 3 assessments would be 35%, separately. The candidates who fail to secure average 35% marks separately in assignment and assessment will be declared as Failed.

Grading of the course to be declared as per following table:

Marks in %	Letter Grade	Remarks
96 to 100	O	Outstanding
90 to below 96	E	Excellent
80 to below 90	A++	Distinction
70 to below 80	A+	Very Good
60 to below 70	A	Good
50 to below 60	B+	Satisfactory
40 to below 50	B	Average
35 to below 40	C	Below average
Below 35	F	Failed

Out of the six assignments, best of five have been taken into consideration.
Truncated to 25% marks from the average of total marks obtained in five best assignments and truncated to 75% marks from the average of total marks obtained in three assessments.
The final score is calculated as full marks 100.

Credit point:
Total earned credit points during 90 hour's course = 4

Online Course Certification
on
REMOTE SENSING AND GIS

The Department of Geography, Hiralal Bhakat College
A Govt. AidedDegree College
Affilated to the University of Burdwan
Nalhati, Birbhum, West Bengal - 731220, India

Centre for Environmental Research
Education and Development (CERED)
Hariharpur Friends of Environment
Arambagh, Hooghly, West Bengal - 712601, India
Regn No. : S0000799 of 2018-19

Reference No. : hfoe/2021-22/00225 **Date : 10.03.2022**

This is to certify that ***Barun Ghosh*** *has participated in an Online Certificate Course on Remote Sensing and GIS (OCC-RSG), jointly conducted by Hiralal Bhakat College and Centre for Environmental Research Education and Development (CERED) of Hariharpur Friends of Environment from 17.10.2021 to 16.01.2022. The grade is awarded* **[A++]**.

Principal	**Director**	***Secretary***	***Course Coordinator***
Hiralal Bhakat College	*Centre for Environmental Research Education and Development (CERED)*	*Hariharpur Friends of Environment (HFOE)*	*Centre for Environmental Research Education and Development (CERED), HFOE*