

SHRI MATHURADAS MOHOTA COLLEGE OF SCIENCE, NAGPUR

Department of Geology

A Report of

Certificate Course on Basics of Remote Sensing and GIS

A certificate course on “Basics of Remote Sensing and GIS” was organized by Department of Geology from 26th October 2020 to 23rd November-2020 (total: 30 hours) for Sem-I students in which Ms. Sanjeevani Jawadand converses the basics of Remote sensing and GIS and reinforces the geospatial skills using different exercises. Due to covid-19 pandemic, only the online platforms were used to facilitate teaching-learning process. This course was intended to develop basic understanding of Remote Sensing and GIS enabled the students to understand the concept of Remote Sensing and GIS.

The use of Geographic Information System (GIS) and Remote Sensing (RS) is ubiquitous in our lives, where we use it for making better decisions. So, this course focused on the fundamental of emerging technologies and their diverse applications. Social media and group forum (google meet, google classroom, whatsapp) had been used to communicate with students. Related study material (ppts, videos) and the exercises on the topics had been provided to enable students for practice and also hone their skills. Students performance and response to the course had been evaluated through online tests.



Head
Department of Geology

DEPARTMENT OF GEOLOGY
NOTICE

All B.Sc Sem I students should note that a certificate course on Basics of Remote Sensing and GIS is organised from 26th October 2020 to 23rd November-2020. Interested students should give their names on or before 15th October 2020 to the undersigned.

Date: 05/10/2020



Head

Department of Geology

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Certificate Course on Basics of remote Sensing and GIS

Syllabus:

Topics	Sub-topics	Objectives
INTRODUCTION TO REMOTE SENSING	<ul style="list-style-type: none">• Definition and Concepts of Remote Sensing• History of Remote Sensing and GIS	<ul style="list-style-type: none">✓ define remote sensing;✓ discuss the concepts of remote sensing;✓ list out major landmarks in the history of remote sensing.
PHYSICS OF REMOTE SENSING	<ul style="list-style-type: none">• Electromagnetic Radiation, Terms and Definitions, Laws of Radiation, EM Spectrum, Sources of EMR• Interaction between EM Radiation and matter, Reflection, Absorption and Transmission• Interactions between EM Radiation and Atmosphere, Atmospheric windows	<ul style="list-style-type: none">✓ explain the interaction of EMR with atmosphere;✓ describe how absorption and scattering together attenuate the electromagnetic radiation through different mechanisms;✓ discuss atmospheric windows and their importance; and✓ describe how the radiation interacts with the Earth's surface.
PLATFORMS & SENSORS	<ul style="list-style-type: none">• Remote Sensing Systems - Active and Passive Systems, Imaging and Non-Imaging Systems, Concept of Resolutions in RS - Spatial, Spectral, Radiometric and Temporal• Orbits and Platforms for Earth Observation• Earth Observation Satellites for land, ocean & atmosphere (global and Indian) (e.g., Resourcesat, Oceansat, INSAT, Sentinel, MODIS etc.), high resolution sensors and sensors for Stereo Data (Worldview, CARTOSAT, etc.) and their characteristics.	<ul style="list-style-type: none">✓ discuss about different types of platforms used for remote sensing;✓ discuss the types and importance of image resolution in remote sensing;✓ explain satellite orbits and their types; and✓ describe sensor systems and types of satellites used for different purposes.

<p>MAJOR SPACE PROGRAMMES</p>	<ul style="list-style-type: none"> ● Indian Space Programme <ul style="list-style-type: none"> ○ Indian Remote Sensing Satellite Series ○ Radar Imaging Satellite Series ● Global Space Programmes <ul style="list-style-type: none"> ○ Landsat ○ SPOT ○ RADARSAT ● Commercial Remote Sensing Satellites <ul style="list-style-type: none"> ○ QuickBird ○ IKONOS ○ OrbView 	<ul style="list-style-type: none"> ✓ outline the initiatives taken by various countries for space exploration; ✓ discuss the achievements of Indian space programme; and ✓ explain the importance of various types of satellites launched by different countries.
<p>SCOPE AND APPLICATIONS OF REMOTE SENSING</p>	<ul style="list-style-type: none"> ● Remote Sensing in Natural resources studies and management ● Remote Sensing in Landuse and urban planning ● Applications in Climate, agriculture, health, archaeology, business, environment and disaster related studies. 	<ul style="list-style-type: none"> ✓ describe scope and applications of remote sensing in different fields such as natural resources studies and management, landuse and urban planning, e-governance, climate, agriculture, health, archaeology, business, environment and disaster related studies.
<p>UNDERSTANDING MAPS</p>	<ul style="list-style-type: none"> ● What is a Map? ● Types of Maps ● Map Scale ● Map Elements (Exercises on Map reading, Toposheet reading and Numbering of toposheets) 	<ul style="list-style-type: none"> ✓ define a map; ✓ classify maps and outline their elements; ✓ discuss significance of maps having different scales; ✓ compare various maps; select an appropriate map for a specific purpose
<p>AERIAL PHOTOGRAPHY</p>	<ul style="list-style-type: none"> ● Basics of aerial Photography ● Basic Geometry of Aerial Photograph, Difference between map and aerial photograph, ● Types of Aerial photographs- wide angle, narrow angle, Horizontal, Vertical, Oblique ● Scale and Ground coverage of aerial photographs 	<ul style="list-style-type: none"> ✓ discuss aerial photography; ✓ explain the importance of image scale; ✓ describe geometry and types of aerial photography
<p>VISUAL INTERPRETATION</p>	<ul style="list-style-type: none"> ● Image Interpretation Tasks ● Prerequisites for Image Interpretation ● Elements of Visual Image Interpretation 	<ul style="list-style-type: none"> ✓ define image interpretation; ✓ discuss aerial photo interpretation;

	<ul style="list-style-type: none"> ○ Tone ○ Size ○ Shape ○ Texture ○ Association ○ Shadow ○ Site ○ Pattern ● Exercises on interpretation of Photographs 	<ul style="list-style-type: none"> ✓ describe elements and keys of visual image interpretation
SATELLITE IMAGERY	<ul style="list-style-type: none"> ● Concept of True and False Colour Composite ● Satellite Image Interpretation ● Exercises on FCC interpretation 	<ul style="list-style-type: none"> ✓ describe the concept of true and false colour composites
DIGITAL IMAGE PROCESSING	<ul style="list-style-type: none"> ● Digital Image Processing ● What is an Image? ● What is a Digital Image? ● What is Digital Image Processing? ● Advantages of Digital Image Processing ● Components of an Image Processing System ● Steps in Digital Image Processing 	<ul style="list-style-type: none"> ✓ define a digital image and discuss its characteristics; ✓ list the components of an image processing system; ✓ discuss advantages of digital image processing
GEOGRAPHICAL INFORMATION SYSTEM	<ul style="list-style-type: none"> ● What is GIS? ● Components of GIS ● GIS as a Multidisciplinary System 	<ul style="list-style-type: none"> ✓ define GIS; ✓ identify various components of GIS; ✓ develop a concept of its advantages discuss the multidisciplinary nature of GIS
CONCEPTS OF GEOSPATIAL DATA	<ul style="list-style-type: none"> ● Data and Information ○ What is Data? ○ What is Information? ○ Data versus Information ○ Precision versus Accuracy ● Kinds of Data ○ Spatial Data ○ Non-spatial /Attribute Data ○ Temporal Data ○ Metadata 	<ul style="list-style-type: none"> ✓ differentiate between data and information; ✓ define geospatial data and information; ✓ discuss about different kinds of data
DATA TYPES AND SOURCES	<ul style="list-style-type: none"> ● Types of Spatial Data ● Raster Data 	<ul style="list-style-type: none"> ✓ describe the various types of spatial data;

	<ul style="list-style-type: none"> • Vector Data • Comparison of Raster and Vector Data • Sources of Geospatial Data (Exercises on Vector to Raster conversion) 	✓ discuss about sources of spatial data
REMOTE SENSING DATA PRODUCTS AND FORMATS	<ul style="list-style-type: none"> • What is a Data Product? • Index Numbers for Data Products • Types of Data Products • What is Data Format? (Exercises on Data Format) 	<ul style="list-style-type: none"> ✓ define what is a data product; ✓ list out the types of data products; ✓ discuss about different types of data formats
GEOSPATIAL TOOLS	<ul style="list-style-type: none"> • Commercial Off-the-Shelf (COTS) Software (ERDAS Imagine, ENVI, ArcGIS, MapInfo, IDRISI, etc.) • Free and Open Source Software (FOSS) (ILWIS, GRASS - GIS, Quantum-GIS, SAGA, gvSIG, etc.) 	✓ list out various data analysis tools and software
SCOPE AND APPLICATIONS OF GIS	<ul style="list-style-type: none"> • Geoinformatics in Ecosystem Studies and Management • Geoinformatics in Natural Resources Studies and Management • Land Use Planning, Infrastructure And E-Governance 	✓ describe scope and applications of GIS in different fields
GLOBAL POSITIONING SYSTEM	<ul style="list-style-type: none"> • What is GPS? • History of GPS • Functions of GPS • How GPS works? 	<ul style="list-style-type: none"> ✓ define GPS; ✓ discuss the history and functions of GPS ✓ describe the working of GPS
GOOGLE EARTH	<ul style="list-style-type: none"> • What is Google Earth? • Use of Google Earth. (Exercises on using Google earth) 	<ul style="list-style-type: none"> ✓ describe Google earth ✓ develop the skill of using Google earth

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Timetable

Date	Time	Duration	Topic	Online mode	Link
26-10-2020	8:30-9:30 am	1 hour	Introduction to Remote Sensing	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
27-10-2020	8:30-9:30 am	1 hour	Electromagnetic spectrum and Interaction of EM	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
28-10-2020	8:30-9:30 am	1 hour	Platforms & Sensors	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
29-10-2020	8:30-9:30 am	1 hour	Earth Observation Satellites	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
30-10-2020	8:30-9:30 am	1 hour	Major Space Programmes	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
31-10-2020	8:30-9:30 am	1 hour	Scope and Applications of Remote Sensing	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
01-11-2020	8:30-9:30 am	1 hour	Map reading, Toposheet reading and Numbering of toposheets	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
01-11-2020	9:45-10:45 am	1 hour	Test	Google Classroom	https://forms.gle/xnrqY3A3aQ73Rb6V6
02-11-2020	8:30-9:30 am	1 hour	Exercises on Map reading, Toposheet reading and Numbering of toposheets	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
03-11-2020	8:30-9:30 am	1 hour	Aerial Photography	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
04-11-2020	8:30-9:30 am	1 hour	Exercises on Photogrammetry (Photographic Scale, Photo Distance, map Distance)	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
05-11-2020	8:30-9:30 am	1 hour	Elements of Visual Image Interpretation And Exercises on interpretation of Photographs	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0

06-11-2020	8:30-9:30 am	1 hour	Concept of True and False Colour Composite	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
07-11-2020	8:30-9:30 am	1 hour	Satellite Image Interpretation	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
08-11-2020	8:30-9:30 am	1 hour	Aerial Photography Versus Satellite Imagery	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
08-11-2020	9:45-10:45 am	1 hour	Test	Google Classroom	https://forms.gle/5GS9UuszPR9ykF2c28
09-11-2020	8:30-9:30 am	1 hour	Exercises on FCC interpretation	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
10-11-2020	8:30-9:30 am	1 hour	Digital Image Processing	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
11-11-2020	8:30-9:30 am	1 hour	Geographical Information System	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
11-11-2020	9:45-10:45 am	1 hour	GIS as a Multidisciplinary System	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
18-11-2020	8:30-9:30 am	1 hour	Concepts of Geospatial Data	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
18-11-2020	9:45-10:45 am	1 hour	Data Types and Sources	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
19-11-2020	8:30-9:30 am	1 hour	Comparison of Raster and Vector Data	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
19-11-2020	9:45-10:45 am	1 hour	GIS: Exercises on Vector to Raster conversion	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
20-11-2020	8:30-9:30 am	1 hour	Remote Sensing Data Products and Formats	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
20-11-2020	9:45-10:45 am	1 hour	Exercises on Data Format	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
21-11-2020	8:30-9:30 am	1 hour	Geospatial Tools	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
21-11-2020	9:45-10:45 am	1 hour	Applications of GIS in Ecosystem Studies and Management and Natural Resources Studies and Management,	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0

			Land Use Planning, Infrastructure And E-Governance		
22-11-2020	8:30-9:30 am	1 hour	Global Positioning System	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
22-11-2020	9:45-10:45 am	1 hour	Google Earth	Google meet	https://meet.google.com/aiw-xxtk-bzm?hs=122&authuser=0
23-11-2020	8:30-9:30 am	1 hour	Test	Google Classroom	https://forms.gle/BDg5EYtU4t5zHN6a6



**Head
Department of Geology**

INVITATION LETTER

To,

Mrs. Sanjeevani A. Jawadand,

Research Scholar of PG dept. of Geology ,

RTMNU Nagpur,

Subject: Invitation as a Resource Person

Dear Sir/Madam,

Our College is organizing a short term course for the students of B.Sc. Sem. I. on -Basics of remote sensing and GIS therefore you are requested to conduct the course as a resource person from 26 October 2020 -23 November 2020.

With warm regards.

Yours ,

Divan

Principal

S.M.M. College of Science
Nagpur

*Date: 20/10/2020

