



Department of Science & Technology  
Govt. of India

# Summer School In Geospatial Science and Technology (Level 1)

6 June to 26 June, 2022

## Organized by

Department of Geography,  
Mohanlal Sukhadia University,  
Udaipur, Rajasthan , India

## Supported by

National Geospatial Program,  
Department of Science and  
Technology, Government of  
India, New Delhi

At

Department of Geography,  
Mohanlal Sukhadia University,  
Udaipur, Rajasthan  
India

# **Principal Investigator**

Dr. Seema Jalan, Head of Department, Department of Geography ,  
Mohanlal Sukhadia University, Udaipur, Rajasthan

## **Mohanlal Sukhadia University, Udaipur**

Mohanlal Sukhadia University (erstwhile Udaipur University) located amidst the vivid and spectacular Aravali Hills at Udaipur is a State University established in the year 1962. It is one of the most prestigious Universities in Rajasthan, providing academic leadership to the tribal belt of southern part of the state, with strong infrastructure and state of the art facilities for teaching and research. The University has more than 180 affiliated colleges spread across the districts of Udaipur, Sirohi, Rajasamand, Chittorgarh and Pratapgarh with an enrolment of over 2,00,000 students. It is a multi-faculty University imparting higher education in all streams of Science, Earth Science, Social Science, Humanities, Law, Commerce, Management and Education. Recently Faculty of Engineering and Technology has also been approved by AICTE and establishment of Institute of Engineering and Technology is under way. UGC Women's Study Centre and Ministry of Health and Family Welfare, Govt. of India supported Population Research Centre established in the University have also contributed significantly in the areas of women empowerment, gender equality and child development. The University has been accredited with 'A' Grade by the National Assessment and Accreditation Council (NAAC) in 2014. Besides prestigious programs like DST-FIST, UGC-SAP etc. the University has received financial assistance of approx. Rs. 70 Crores from the Ministry of Human Resource Development (MHRD) under the two phases of Rashtriya Ucchar Shiksha Abhiyan (RUSA). Presently there are approx. 60 ongoing major research projects and 10 Skill Development Centres and Entrepreneurship Cells being established under RUSA 2.0. Visit us on: [www.mlsu.ac.in](http://www.mlsu.ac.in)

## **Department of Geography**

Department of Geography, Mohanlal Sukhadia University has the proud distinction of being the first post graduate department of Geography in the State of Rajasthan. As a constituent department of Faculty of Earth Science, presently the department is running undergraduate (UG), post graduate (PG) and Ph.D programme in Geography with 400 UG students, 80 PG students and 50 research scholars excluding the research scholars enrolled under faculty in affiliated colleges.

The department presently has 06 young and dynamic faculty members actively engaged in research mainly in the areas of study of socio-cultural and development dynamics of Tribal Sub Plan Area (TSP) region; socio- geographical implications of electoral processes and their relationship with welfare/ development patterns; demographic, welfare and development patterns and disparities; natural resource management; urban studies; industrial development and environmental issues with major focus on mining industry; wetland and wasteland development; and geo-ecological balance in the southern Aravalis. The department has been one of the pioneer centres in the State to integrate geospatial technology in its curriculum.

Under the Entrepreneurship, Innovation and Career Hub component of RUSA 2.0 department has received Rs. 1.4 Crores sanction to establish a Geospatial Skill Development and Entrepreneurship Cell to deliver capacity building in the field of geospatial technology. The department has been actively conducting several academic activities for its students, scholars and faculty from time to time in collaboration with Department of Science and Technology (DST), Indian Space Research Organization (ISRO) and eminent higher education institutions. It has successfully conducted the 21 Day Winter School in Geospatial Technologies (L-1) in years 2016 and 2019. Visit us on: [www.dogeography.mlsu.ac.in](http://www.dogeography.mlsu.ac.in)



**Fig 1. Mohanlal Sukhadia University, Udaipur**

## **What is the Summer/Winter Schools (Level 1)Capacity Building Program in Geospatial Science and Technology**

Recently knowledge has been identified as the most important driving factor for India's sustainable economic growth. India has adopted a new information regime for sustainable economic growth through its 'Digital India' program to support good governance, sustainable development goals and empowerment of its citizens. Over the last three decades, the widespread adoption of geospatial technologies into various sectors have proven to be an effective enabler to meet these challenges. The capacity building program initiatives of the National Geospatial Program (NGP) erstwhile Natural Resource Data Management System (NRDMS) Department of Science and Technology, Government of India to develop national capacity for geospatial science and technology development through diverse programs in collaboration with various partner organizations adaptation capacity of geospatial science and technology at across the country. The objective of the program is to build knowledge and various levels of governance in collaboration with academia and user agencies. The three week Summer/ Winter School in Geospatial technology is being conducted at two levels– Level 1 and Level 2. The 21-day summer/winter school in Geospatial Science and Technology (Level 1) supported by the National Geospatial Program (NGP) of the Department of Science and Technology, Government of India focuses on developing knowledge and capacity building in geospatial technologies through the use of open source geospatial software.

### **Who can apply?**

Faculty members, scientists, technologists, researchers from academia, national institutions of research, smart city cells, municipal corporations and other government departments, personnel from non government organizations are eligible to apply. Only 2-3 seats are reserved for research scholars.

### **How to apply?**

- Interested candidates should fill the online application form through the weblink available on <http://dst-iget.in>.
- Selected candidates will be informed by mail.
- For any further queries write to [dst-iget@bvier.edu.in](mailto:dst-iget@bvier.edu.in) or call on +91-20-24375684/24362155.
- Address all queries regarding the program to PI through email.

## Important Information

**Last date for registration :** 15 May, 2022

**Dates of the program:** 6 June to 26 June, 2022

**Mode of conduct:** Offline (According to the situation of Pandemic the mode of conducting the program will be changed to ONLINE) **No. of seats:** 25

**Registration Fees:** Nil

**Principal Investigator:** Dr. Seema Jalan, Head of Department, Department of Geography, Mohanlal Sukhadia University, Udaipur, Rajasthan

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### For any queries contact:

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**Grading and Certification :** Grading and Certification Participants will be assessed based on assignments completed during the course, a mini project that they are expected to complete, active participation during the training program as well as attendance.

**Note:** In case the program is conducted online due to COVID 19 restrictions, participants must ensure that they have a laptop and a strong internet connection.

## Infrastructural facilities:

### Laboratory

The Department has a rich infrastructure with a well-equipped GIS laboratory having a network of 20 computer systems and state of the art statistical and geo-spatial data analysis softwares viz. ArcGIS, SPSS etc., an air conditioned Smart Class Room equipped with sophisticated audio-visual facilities, departmental library, and a cartography laboratory. One more fully equipped geospatial laboratory with 20 systems and one lecture theatre with video-conferencing facilities is under establishment and will be completed very soon.

### Accommodation

The University has a comfortable guest house with 23 double occupancy rooms, meeting room, conference hall and cafeteria. Boarding and lodging for the programme will be arranged in University guest house on sharing basis.



**Fig 2. GIS Lab**



**Fig 3. Smart room**



**Fig 4. Guest House room**



**Fig 5. Guest House Dining**

**Program schedule for Summer School in Geospatial Science and Technology  
(Level 1)  
(6 - 26 June, 2022)**

Date	Time (hrs)	Topic	Resource Person (Tentative)
06.06.2022 Monday	<b>Day 1</b>		
	08:30 – 09:00	<b>REGISTRATION</b>	
	09:00-10:30	1.1 Inaugural session Plenary Talk on 'Geospatial Road to Sustainable Development Goals: The UNGGIM Framework'	Key Speaker of Inaugural Session
	<b>10:30-11:00</b>	<b>Tea Break</b>	
	11:00-11:30	Introduction of the trainees & trainers	Dr. Sandeep Goyal, OIC-GIS, Head MP-SSDI, MapIT, State IT Centre, Bhopal
	11:30-13:00	1.2 Geospatial Sciences: What, Why and How??	
	<b>13:00-14:00</b>	<b>LUNCH</b>	
	14:00-15:30	1.3 Introduction to data types in geospatial sciences (Aerial Photos, Remote Sensing, Toposheets, databases, drones, etc.; spatial and non- spatial secondary data acquisition; data quality )	Dr, Deepak Maheshwari (IF)
	15:30-16:30	1.4 National Geospatial Policy of India : Past and Present	Dr. Prithvish Nag, Former Surveyor General of India & Former Director, NATMO
	16:30-18:00	1.5 Acquiring free satellite data (Bhuvan. USGS, ESA, toposheets from SOI, Ordering of IRS data)	Dr. Deepak Maheshwari (IF)
18:00 – 18:15	Filling in feedback forms		
07.06.2022	<b>Day 2</b>		



<b>Tuesday</b>	90:00-09:30	<b>Participants' Feedback Presentation &amp; Discussion</b>	
	09:30-11:00	2.1 Understanding basic geodesy - concept of spheroid, datum and coordinate systems	Prof. Seema Jalan (GT)
	<b>11:00-11:30</b>	<b>Tea Break</b>	
	11:30 – 13:00	2.2 Scales and projections	Dr. D.S. Chouhan (IF)
	<b>13:00-14:00</b>	<b>LUNCH</b>	
	14:00-15:30	2.3 Data Models - Raster and Vector	Prof. Seema Jalan (GT)
	15:30-17:00 (including tea break)	2.4 Ex. Familiarization with QGIS	GEOTECH team
	17:00-18:30	2.5 Ex. Working with projections using QGIS & filling in feedback forms	GEOTECH team
<b>08.06.2022 Wednesday</b>	<b>Day 3</b>		
09:30-11:00	3.1 Georeferencing	Prof. Seema Jalan (GT)	
<b>11:00-11:30</b>	<b>Tea Break</b>		
11:30-13:00	3.2 Understanding data quality Elements of data quality ; Sources and types of error in geospatial data building; Importance of metadata	Ms. Urmi Sharma (GT)	
<b>13:00-14:00</b>	<b>LUNCH</b>		
14:00-15:30	3.3 Ex: Georeferencing	GEOTECH team	

	15:30-17:00 (including tea break)	3.4 Ex: Image Registration	GEOTECH team
	17:00-17:30	Feedback	GEOTECH team
<b>09.06.2022</b> <b>Thursday</b>	<b>Day 4</b>		
	09:30-11:00	4.1 Cartographic Evolution and Map Classification	Prof. R.D. Gurjar , Former Head, Department of Geography, University of Rajasthan, Jaipur
	<b>11:00-11:30</b>	<b>Tea Break</b>	
	11:30-13:00	4.2 Understanding Map Making: Map elements and map composition, principles of map design	Prof. R.D. Gurjar
	<b>13:00-14:00</b>	<b>LUNCH</b>	
	14:00-15:30	4.3 Creation of vector data: fundamentals & demo	Prof. Seema Jalan (GT)
	15:30-17:00 (including tea break)	4.4 Ex. Digitization	GEOTECH team
	17:00-18:30	4 .5 Map Preparation & feedback	GEOTECH team
<b>10.06.2022</b> <b>Friday</b>	<b>Day 5</b>		
	09:30-11:00	5.1 Data Base Structure and Database Management System	Dr. D. Giribabu, Scientist - S'G', RRSC-W, ISRO, Jodhpur
	<b>11:00-11:30</b>	<b>Tea Break</b>	
	11:30-13:00	5.2 Spatial Database Creation & Attribute Data Handling	Dr. D. Giribabu
	<b>13:00-14:00</b>	<b>LUNCH</b>	

	14:00-15:30	5.3 Data Exploration, Visualization and Analysis in GIS	Prof. Seema Jalan (GT)
	15:30-17:00 (including tea break)	5.4 Ex: Data exploration	GEOTECH team
	17:00-18:30	5.5 Ex: Working with tables & feedback	GEOTECH team
<b>11.06.2022 Saturday</b>	<b>Day 6</b>		
	09:30-11:00	6.1 Spatial data analysis - Concepts and Basic Operations - Measurement, query, buffering, map overlay	Dr. Shailesh Chaure, Renowned GIS Expert, Govt. Holkar Science College, Indore
	<b>11:00-11:30</b>	<b>Tea Break</b>	
	11:30-13:00	6.2 Spatial data analysis in QGIS - Multi-criteria analysis, spatial pattern analysis & network analysis	Dr. Shailesh Chaure
	<b>13:00-14:00</b>	<b>LUNCH</b>	
	14:00-15:30	6.3 Ex. Hands on exercise on querying, buffering etc. in QGIS	GEOTECH Team
	15:30-17:00 (including tea break)	6.4 Ex. Exercise on spatial data analysis - multi-criteria analysis	Dr. Shailesh Chaure
	17:00 -17:30	Feedback	GEOTECH Team
<b>12.06.2022 Sunday</b>	<b>Day 7 (FIELD)</b>		
	09:30-11:00	7.1 Introduction to Global Navigation Satellite Systems (GNSS )	Prof. Harsh Bhu (IF)
	<b>11:00-11:30</b>	<b>Tea Break</b>	
	11:30-15:00	7.2 Ex. Training on hand held system & field exercise for collecting points	Industry experts & GEOTECH Team

	<b>15:00-15:30</b>	<b>LUNCH</b>	
	15:30-17:00 (including tea break)	7.3 Ex : Importing GPS data into QGIS	GEOTECH team
	17:00-18:00	7.4 Discussion on project topic selection & Feedback	GEOTECH team
<b>13.06.2022 Monday</b>	<b>Day 8</b>		
	09:30-11:00	8.1: Definition, concept and process of remote sensing  Principles and physics of remote sensing, the remote sensing process, atmospheric window, spectral signatures, active and passive remote sensing, sensors and platforms, resolutions	Ms. Urmi Sharma
	<b>11:00-11:30</b>	<b>Tea Break</b>	
	11:30-13:00	8.2 Types and Applications of remote sensing Multispectral, thermal, microwave, hyperspectral, LIDAR (approx. 20 min. each) with differences. Applications in forestry, mining, urban planning, agriculture, water management etc. with case studies using different types of remote sensing	Faculty from IIRS, Dehradun/ NRSC, Hyderabad
	<b>13:00-14:00</b>	<b>LUNCH</b>	
	14:00-15:30	8.3 Introduction to Earth Resource Satellites - Landsat and IRS Series, Meteorological satellites and Oceanographic satellites	Ms. Urmi Sharma
	15:30-17:00 (including tea break)	8.4 Ex: Intro to SAGA	GEOTECH team
	17:00-17:30	Feedback	GEOTECH team
<b>14.06.2022 Tuesday</b>	<b>Day 9</b>		
	09:30-11:00	9.1 Understanding the image – elements of visual interpretation	Ms. Urmi Sharma (GT)

	<b>11:00-11:30</b>	<b>Tea Break</b>	
	11:30-13:00	9.2 Understanding the image -Image quality assessment and image statistics Image histogram, univariate and multi-variate image statistics	Prof. Seema Jalan (GT)
	<b>13:00-14:00</b>	<b>LUNCH</b>	
	14:00-15:30	9.3 Ex: Image interpretation	GEOTECH team
	15:30-17:00 (including tea break)	9.4 Understanding the Image (histogram)	GEOTECH team
	17:00-17:30	Feedback	
<b>15.06.2022</b> Wednesday	<b>Day 10</b>		
	09:30-11:00	10.1 Geometric correction	Prof. Seema Jalan (GT)
	<b>11:00-11:30</b>	<b>Tea Break</b>	
	11:30-13:00	10.2 Atmospheric and Radiometric corrections	Ms. Urmi Sharma (GT)
	<b>13:00-14:00</b>	<b>LUNCH</b>	
	14:00-15:30	10.3 Ex: Georeferencing a toposheet: Map rectification & Image Registration	GEOTECH team
	15:30-17:00 (including tea break)	10.4. Ex: Working with images - subsetting and mosaicking	GEOTECH team
	17:00 – 18:30	10.5 . Ex. Radiometric Corrections (DOS) & Feedback	GEOTECH team
<b>16.06.2022</b> Thursday	<b>Day 11</b>		
	09:30-11:30	11.1 : Introduction to image enhancements : Contrast Enhancements, Band Ratioing & Spatial Filtering	Dr. Ronak Jain (IF)

	11:00-11:30	<b>Tea Break</b>	
	11:30-13:00	11.2: Introduction to image enhancements :Principal Component Analysis & Vegetation Indices	Dr. Ronak Jain (IF)
	<b>13:00-14:00</b>	<b>LUNCH</b>	
	14:00-15:30	11.3: Ex. Working with Images - Subsetting & Mosaicking	GEOTECH team
	15:30-17:00 (including tea break)	11.4 Ex: Using Enhancements	GEOTECH team
	17:00 – 17:30	Feedback	
<b>17.06.2022</b> Friday	<b>Day 12</b>		
	09:30-11:00	12.1 Introduction to image classification: Unsupervised classification	Prof. Seema Jalan (GT)
	11:00-11:30	<b>Tea Break</b>	
	11:30-13:00	12.2 Introduction to image classification: Supervised classification	Prof. Seema Jalan (GT)
	<b>13:00-14:00</b>	<b>LUNCH</b>	
	14:00-15:30	12.3 Image classification: Hybrid and knowledge based classification	Faculty from ISRO (IIRS, Dehradun/ NRSC, Hyderabad)
	15:30-17:00 (including tea break)	12.4 Ex: Extracting information from satellite image using unsupervised classification	GEOTECH team
	17:00 – 17:30	Feedback	
<b>18.06.2022</b> Saturday	<b>Day 13</b>		
	09:30-11:00	13.1 Accuracy assessment : why and how	Ms. Urmi Sharma

	11:00-11:30	<b>Tea Break</b>	
	11:30-18:30	13.2, 13.3, 13.4 Ex: Extracting information from satellite image using supervised classification & Accuracy Assessment	GEOTECH team
19.06.2022 Sunday	<b>Day 14</b>		
	09:30-11:00	14.1 Digital Change detection	Mr. Anoop Patel, MAPIT, Bhopal
	11:00-11:30	<b>Tea Break</b>	
	11:30-13:00	14.2 Understanding terrain data - DEM, DSM, DTM, TIN, Terrain Mapping and Analysis	Mr. Anoop Patel, MAPIT, Bhopal
	<b>13:00-14:00</b>	<b>LUNCH</b>	
	14:00-15:30	14.3 Ex: Change detection with SAGA	GEOTECH team
	15:30-17:00	14.4 Ex: Terrain Analysis	GEOTECH team
	17:00 – 17:30	Feedback	
	20.06.2022 Monday	<b>Day 15</b>	
09:30-11:00		6.1 Introduction to Google Earth Engine - Code Editor, Accessing EO datasets, Visualization and analysis of remote sensing images	Faculty from SAC-ISRO, Ahmedabad/ Expert from Google
11:00-11:30		<b>Tea Break</b>	
11:30-13:00		6.2 Google Earth Engine - Analysis of remote sensing images	Faculty from SAC-ISRO, Ahmedabad/ Expert from Google

	<b>13:00-14:00</b>	<b>LUNCH</b>	
	14:00-15:30	6.3 Introduction to Web-geo-portals - Bhuvan, Giovanni, MOSDAC, VEDAS (20 Min. each) DEMO	Dr. Shashikant Sharma & Team, SAC-ISRO, Ahmedabad
	15:30-17:00 (including tea break)	6.4 Ex: Working with Google Earth Engine - Hands on	Faculty from SAC-ISRO, Ahmedabad/ Expert from Google
	17:00-17:30	Feedback	
<b>21.06.2022</b> Tuesday	<b>Day 16</b>		
	09:30-11:00	16.1 Introduction to Web-GIS : Technical basics  Web GIS basic architecture and components; Thin vs thick client architecture; Introduction to GML, geoRSS, XML, WKT (Well Known text) and preferred coordinate systems (GCS84) for web GIS apps; Use of APIs in creating web enabled GIS websites (open layers API and google map API)	Dr. Shailesh Chaure
	11:00-11:30	<b>Tea Break</b>	
	11:30-13:00	16.2 Geospatial Web Services  From websites to web services; WMS, WFS and WCS; their roles in web GIS; Introduction to Interoperability and geospatial web service standards; Geospatial Mashups	Dr. Shailesh Chaure
	<b>1300-1400</b>	<b>LUNCH</b>	
	14:00-15:30	16.3 Ex. Hands on - Using QGIS to create a webGIS	Dr. Shailesh Chaure & GEOTECH Team



	15:30-17:00 (including tea break)	16.4 Ex. Hands on - Understanding Geoserver	Dr. Shailesh Chaure & GEOTECH Team
	17:00 -17:30	Feedback	
22.06.2022 Wednesday	<b>Day 17</b>		
	09:30-11:00	17.1 Applications of RS/GIS in Rural/ Urban Planning	Faculty from ISRO ( IIRS, Dehradun/ NRSC, Hyderabad/ SAC, Ahmedabad )
	11:00-11:30	<b>Tea Break</b>	
	11:30-13:00	17.1 Applications of RS/GIS in natural resource management (forest/ wildlife/agriculture/ watershed)	Faculty from ISRO ( IIRS, Dehradun/ NRSC, Hyderabad/ SAC, Ahmedabad )
	<b>13:00-14:00</b>	<b>LUNCH</b>	
	14:00-15:30	17.3 Applications of RS/GIS in climate / atmospheric studies	Faculty from ISRO ( IIRS, Dehradun/ NRSC, Hyderabad/ SAC, Ahmedabad )
	16:00 – 17:00	Evaluation (Test Paper)	GEOTECH Team
	17:00-17:30	Feedback	
	23.06.2022 Thursday	<b>Day 18</b>	
09:30-11:00		18.1 Application of RSGIS in social sectors : Geospatial Indicators for SDGs	Dr. Prakash Chouhan Director, IIRS
11:00-11:30		<b>Tea Break</b>	

	11:30-13:00	Group exercise: Participants to make a methodology flow chart for projects & discussion	Dr. Prakash Chouhan & Prof. Seema Jalan
	<b>13:00-14:00</b>	<b>LUNCH</b>	
	14:00-15:30	Project Synopsis presentation	Dr. Prakash Chouhan & Prof. Seema Jalan
	15:30 – 18:30 (including tea break)	Project Work	
<b>24.06.2022</b> Friday	<b>Day 19</b>		
	0930-1830	Project work	
<b>25.06.2022</b> Saturday	<b>Day 20</b>		
	0930-1830	Project Work	
<b>26.06.2022</b> Sunday	<b>Day 21</b>		
	0930-1130	Project work	
	1130 - 1300	Introduction to the work of UNGGIM	DST, GoI Representative
	1400-1530	Evaluation & Final project presentation by participants	Dr. B.S. Sokhi, Retd. Scientist S'G', IIRS-ISRO, Dehradun & DST Observer
	1530-1630	<b>Interaction and feedback with DST Observer</b>	
	1630 - 1730	<b>Valedictory session</b>	

Note: IF - Internal faculty. Faculty associated with Mohanlal Sukhadia University, Udaipur

GEOTECH Team : Coordinator (PI) & members of organizing team