

Summer School in Geospatial Science And Technology (Level 1: Standard Program)

1 - 21 July, 2024



Organized by

Dr Kiran C Patel Centre for
Sustainable Development,
Indian Institute of Technology Gandhinagar
Gujarat, India



सत्यमेव जयते
Department of Science & Technology
Govt. of India

Supported by

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

Principal Investigator

Prof Vimal Mishra, Vikram Sarabhai Chair Professor, Civil Engineering and Earth Sciences ,
Dr Kiran C Patel Centre for Sustainable Development,
Indian Institute of Technology Gandhinagar
Gujarat, India

Summer/Winter School 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. The three week program is being conducted at three levels, Level 1 (Standard), Level 1 (Spatial thinking) and Level 2. In addition there is a three day Geo Innovation Challenge Program. The objective of the program is to build knowledge and various levels of governance in collaboration with academia and user agencies and foster innovation.

Level 1 Summer / Winter School In Geospatial Science and Technology

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. It uses a standardized curriculum focusing on basics of GIS, remote sensing, digital image processing and includes hands on lab sessions, field work and a mini project.

About the National Geospatial Program of the Department of Science and Technology, Government of India

In the heart of India's technological advancement lies the National Geospatial Programme (NGP) of the Department of Science and Technology, Government of India. The Geospatial Capacity Building Program initiated in 2010 has over the years flourished, fostering capacities in geospatial science, technology, solutions, and entrepreneurship. Its transformative journey initiated with a modest ambition has evolved into a robust program, igniting minds and expanding horizons.

For a decade, the Geospatial Capacity Building Program under DST has been a cornerstone, conducting 166 comprehensive three-week programs conducted as Summer and Winter Schools in Geospatial Technologies at a basic (Level 1) and advanced level (Level 2). The 2024 cycle includes a 11 three week Level 1-(Standard) programs, 4 three week Level 1-(Spatial Thinking) programs, 8 Level 2-(Advanced) three week programs and 7 Geo Innovation Challenge Programs being conducted by various Universities across India selected through a stringent process by the DST.

The sessions at these programs comprise classroom, lab, fieldwork, and mini-projects. Central to this success is a structured curriculum and the advocacy of open-source software. The dedicated portal, <https://dst-iget.in>, is a reservoir of learning materials, connecting educators, professionals, and scientists, and catalyzing India's geospatial domain. The NGP-DST's geospatial capacity building program is coordinated nationally by the Bharati Vidyapeeth Deemed University, Department of Geoinformatics, Institute of Environment Education and Research, Pune.

The Indian Institute of Technology Gandhinagar, Gujarat, India is one of the selected institutions for conducting the Level 1 Program.

Indian Institute of Technology Gandhinagar

Indian Institute of Technology Gandhinagar (IITGN) is committed to a holistic approach to education in engineering disciplines and beyond; cutting-edge research addressing global challenges; and giving back. IITGN offers a unique undergraduate and graduate education experience in India with unmatched innovations in curriculum. The institute promotes critical thinking and an appreciation of the interdisciplinary character of knowledge, with an emphasis on the liberal arts, project oriented learning, compulsory courses in design and the life sciences, diversity and globalisation. IITGN encourages interdisciplinarity in its research activities. We have interdisciplinary centres where people from all disciplines work together to produce research and solve real-world problems that have a high impact on society. IIT Gandhinagar was founded in 2008 and is located in Palaj, Gandhinagar, Gujarat on the banks of river Sabarmati. The Institute is rated India's first 5-star GRIHA LD (Green) campus for minimising the negative impact on the environment. The campus has been declared India's first 5-star campus for ensuring food safety and promoting healthy eating. The Institute has a number of research laboratories related to sustainability with focus on Safe Drinking Water Production, Water Resources, Water Networks and Distribution, Machine Intelligence and Climate Change among others. Visit us on: <https://iitgn.ac.in/>

Dr Kiran C Patel Centre for Sustainable Development

The Dr Kiran C Patel Centre for Sustainable Development (KPCSD) at IIT Gandhinagar undertakes cutting-edge research on sustainability and related challenges of high societal importance transfer programmes. KPCSD strengthens and complements sustainability research and development activities underway at IITGN across diverse Engineering, Science, and Humanities and Social Science disciplines.

The Centre strives to identify, prioritise and lead sustainability-related thrust areas and promote research on sustainability. The Centre enables our faculty and students to develop practical solutions through the integration of advanced research, traditional knowledge and field understanding. It addresses major sustainability challenges and translates them into prototypes, patents, and publications through supporting various research activities of the faculty and students of IITGN. The Centre aims to promote networking and collaboration among scholars, policymakers, industry, non-profit organisations and other stakeholders on sustainability. Visit us on: <https://csd.iitgn.ac.in/>



Indian Institute of Technology Gandhinagar, Gujarat, India

Who can apply?

- Faculty of colleges and universities, state and central government officials,
- Personnel from research institutions
- School teachers
- Research Scholars* (max 3 persons),
- NGOs registered with the DARPAN portal* (max 3 persons).

How to apply?

- Interested candidates should fill the online application form through the web link available on <http://dst-iget.in>. Kindly keep a digital copy of your photograph, LinkedIn Id / ORCID Id / Researchgate Id / Google Scholar Id (atleast one is needed) and deputation letter (format available on <http://dst-iget.in> website) handy while filling in the form.
- Selected candidates will be informed by mail.
- For any further queries after application write to dst.iget@bharativedyapeeth.edu or call on +91- 7559288803
- Address all queries regarding the program **once selected** to the *PI, Prof Vimal Mishra, at vmishra@iitgn.ac.in, 079-2395 2436*

Important Information

Last date for application: 31 May 2024

Date of intimation of selection: 3 June 2024

Dates of the program: 1 - 21 July 2024

Mode of conduct: Offline

No. of seats: 25

Registration Fees: Nil

Principal Investigator: Prof Vimal Mishra, Vikram Sarabhai Chair Professor, Civil Engineering and Earth Sciences, and Co-Coordinator, Dr Kiran C Patel Centre for Sustainable Development, IIT Gandhinagar, Gujarat, India

Email: vmishra@iitgn.ac.in; csd@iitgn.ac.in

Phone: 079-2395 2436

For any queries contact

Prof Vimal Mishra, (PI) vmishra@iitgn.ac.in, 079-2395 2436

Address

Indian Institute of Technology Gandhinagar, Palaj, Gujarat 382355

Grading and Certification

Certificate of participation will be awarded to each participant only after attending the full course.

Travel and Lodging

Each participant will be reimbursed with 3 AC train fare. Lodging and boarding on a double sharing basis will be provided by the host institution.

Infrastructure Facilities

Laboratory

The Institute has air conditioned Smart Class Rooms and computer laboratories equipped with projectors, wifi, and sophisticated audio-visual facilities.

Lodging and Boarding

The Institute has adequate infrastructure facilities including guest house, meeting rooms and auditoriums, dining facilities, library, and central arcade (medical centre, sports facilities and utility shops) which will be helpful in facilitating the course and provide comfort and convenience for the stay of participants. Guest house rooms and hostel rooms will be booked in advance. Participants will be allotted hostel rooms and experts/ resource persons will be provided accommodation at the Institute guest house.



Campus



Classroom



Lecture theatre



Guest House

Deputation Letter (Format) for DST Summer/Winter School/ Geoinnovation Program 2024-25 (Prospective participant must submit this on the letterhead of the respective institution where they are working)

This is to state that Dr./Mr./Ms. _____working at _____(name of the institute) as _____ (Designation), since _____ (year) is being deputed/nominated to _____(program name in detail) from -----(date, month, year) to----- (date, month, year) . He/she will be relieved from his/her duties during this period.

Signature and Seal (Head of the Institute)

Program Schedule for 21 Days Summer School in Geospatial Science and Technology (Level 1: Level 1 Standard)

Conducted by: Indian Institute of Technology Gandhinagar, Gujarat

1 – 21 July 2024

Date	Morning Session (10 am - 12:30 pm) (Expert lectures and basic introduction)	Lunch Break	Afternoon Session (2:00 - 2:45 pm)	Tea Break	Afternoon Session 2 (3:00 pm - 5:00 pm) (Hands-on and Fieldwork)	Tea Break
July 1, 2024	Registration Introduction to Geospatial Data Science <i>(Prof Vimal Mishra, Professor, Civil Engineering/ Earth Sciences, and Co-Coordinator, KPCSD, IITGN)</i>	Lunch Break (12:30 pm - 2:00 pm)	Introduction to Google Earth Pro (demonstration)	Tea Break Interaction break (2:45 pm - 3:00 pm)	Google Earth Pro (Hands-on) <ol style="list-style-type: none"> 1. Creating vector data 2. Importing different datasets 3. Map Making 	Tea and snacks (5:00 pm - 5:30 pm)
July 2, 2024	Introduction to Space and Geo-spatial Technology Applications by the BISAG-N team <i>Shri T. P. Singh, Director General; Shri Vijay Singh, Deputy Director and Shri Khalid Mehmood, Deputy Director</i> <i>Bhaskaracharya National Institute for Space Applications and Geo-informatics</i>		Introduction to QGIS and Map Making (demonstration)		QGIS and Map Making (Hands-on) <ol style="list-style-type: none"> 1. Walking through the Interface 2. Importing Data: Adding various map components 3. Publishing the first map 4. Application: Understanding Human-wildlife conflicts using GIS 	
July 3, 2024	Applications of GIS in Biodiversity Conservation <i>(Prof C N Pandey, Professor of Practice, Earth Sciences/ Civil Engineering, and</i>		Georeferencing (demonstration)		Georeferencing (Hands-on) <ol style="list-style-type: none"> 1. Georeferencing of Old maps and toposheet 2. Creation of point, line, and polygon data 3. Application: Georeferencing the ancient 	

	<p>Coordinator, KPCSD, IITGN)</p> <p>Applications of GIS in Archaeological Conservation</p> <p>(Prof V N Prabhakar, Associate Professor, Humanities and Social Sciences, IITGN)</p>			<p>city of Dholavira</p>	
July 4, 2024	<p>Remote Sensing Applications in Coastal and Marine Areas</p> <p>(Dr Anjali Bahuguna, Scientist (Retd.), SAC ISRO, Ahmedabad, India)</p> <p>Monitoring Snow and Glaciers of the Himalayan region</p> <p>(Dr Ishmohan Bahuguna, Deputy Director (Rtd.), SAC ISRO, Ahmedabad, India)</p>	<p>Geoprocessing-I (demonstration)</p>	<p>Geoprocessing - I (Hands-on)</p> <ol style="list-style-type: none"> 1. Data extraction 2. Proximity analysis 3. Application: Creating Risk assessment maps 		
July 5, 2024	<p>Vector Analysis</p> <p>(Scholar from Water and Climate Lab, IITGN)</p>	<p>Classification (demonstration)</p>	<p>Classification (Hands-on)</p> <ol style="list-style-type: none"> 1. Unsupervised classification 2. Supervised classification 3. Application: Change detection studies 		
July 6, 2024	<p>Basics of Remote Sensing</p> <p>(Prof Vimal Mishra)</p>	<p>Geoprocessing - II (demonstration)</p>	<p>Geoprocessing - II (Hands-on)</p> <ol style="list-style-type: none"> 1. Overlay analysis 2. Vector statistics 3. Application: Finding suitable residential properties 		
July 7, 2024	<p>Holiday</p>				

<p>July 8, 2024</p>	<p>Geospatial Data Analysis <i>(Prof Udit Bhatia, Assistant Professor, Civil Engineering)</i></p>		<p>Raster Analysis <i>(demonstration)</i></p>	<p>Raster Analysis (Hands on)</p> <ol style="list-style-type: none"> 1. Download DEM data 2. Terrain analysis 3. Zonal statistics 4. Raster calculator 5. Raster extraction 6. Raster to vector conversion 7. Application: Mapping land and water using satellite data 	
<p>July 9, 2024</p>	<p>Xarray and Climate Data: A bond made in Heaven <i>(Prof Udit Bhatia)</i></p>	<p>Lunch Break (12:30 pm - 2:00 pm)</p>	<p>Interpolation <i>(demonstration)</i></p>	<p>Interpolation (Hands on)</p> <ol style="list-style-type: none"> 1. Types of interpolation methods 2. Point to raster generation 3. TIN data generation 4. Introduction to Xarray 5. Application: Observing climate over the Narmada basin 	<p>Tea and snacks (5:00 pm- 5:30 pm)</p>
<p>July 10, 2024</p>	<p>Modeling Spatial Networks <i>(Prof Udit Bhatia)</i></p>		<p>Network Analysis <i>(demonstration)</i></p>	<p>Network Analysis (Hands-on)</p> <ol style="list-style-type: none"> 1. Cost path analysis 2. Gephi and Networks 3. Application: Finding optimal route for waste collection 4. Optimal location for food delivery 	
<p>July 11, 2024</p>	<p>DEM data and its applications for watershed analysis <i>(Prof Vikrant Jain, Professor, Earth Sciences)</i></p>		<p>Watershed Delineation <i>(demonstration)</i></p>	<p>Watershed Delineation (Hands-on)</p> <ol style="list-style-type: none"> 1. Catchment area analysis 2. Geomorphological analysis of watershed 3. Application: Finding suitable site for a bridge 	

July 12, 2024	GPS data, accuracy, and its applications <i>(Prof Vikrant Jain)</i>	Data collection using handheld GPS (Fieldwork)	Data collection using handheld GPS (Fieldwork)
July 13, 2024	Preparing Topographic Map <i>(Scholar from Water and Climate Lab, IITGN)</i>	Topographic Survey using Total Station (demonstration)	Topographic Survey using Total Station (Fieldwork)
July 14, 2024	Holiday		
July 15, 2024	Drone Data Acquisition <i>(Prof Pankaj Khanna, Assistant Professor, Earth Sciences)</i>	Drone Data Acquisition (Practical)	Drone Data Acquisition (Practical)
July 16, 2024	Drone Data Processing and Interpretation <i>(Prof Pankaj Khanna)</i>	Drone Survey (Fieldwork)	Drone Survey (Fieldwork)
July 17, 2024	Institute Holiday: Project work (independently)		
July 18, 2024	Basics of Surveying and Field Data Collection <i>(Scholar from Water and Climate Lab, IITGN)</i>	Topographic Survey using Auto Level and Digital Level (demonstration)	Topographic Survey using Auto Level and Digital Level (Fieldwork)
July 19, 2024	Project Discussion	Project Discussion	Topographic Survey using Robotic Total Station (Fieldwork)
July 20, 2024	Project Discussion	Project Discussion	Project Presentation

July 21, 2024	Guest Lecture and Certificate Distribution <i>Dr Abha Chhabra, Head, RRMD & Coordinator RESPOND, SAC ISRO, Ahmedabad</i>		Conclusion and Feedback		Conclusion and Feedback	
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