

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

**10 to 30 June, 2024**



**Organized by**

Department of Water Resources and Ocean  
Engineering, National Institute of Technology  
Karnataka, Surathkal, Mangaluru,  
Karnataka, India



Department of Science & Technology  
Govt. of India

**Supported by**

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

## **Principal Investigator**

Dr. Ramesh H., Professor, Department of Water Resources and Ocean Engineering,  
National Institute of Technology Karnataka, Surathkal, Karnataka

## **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 National Institute of Technology Karnataka, Surathkal is one of the selected institutions for conducting the Level 1 Program.

## **National Institute of Technology Karnataka**

National Institute of Technology Karnataka, Surathkal is located in Mangalore City, Karnataka State, India. The Institute was established as Karnataka Regional Engineering College (KREC) in 1960, and upgraded to the National Institute of Technology Karnataka (NITK) in 2002 by the NIT Act, Govt. of India. NITK is recognized as an Institute of National Importance. NITK is located on the sea shore of the Arabian sea and has a beach of more than 3 km. Team NITK has an Amalgamation of: 13 Departments, 01 School, 10 Supporting Centres, more than 300 highly qualified and dedicated faculty, 496 committed supporting staff, 7000 talented and motivated students 35000+ distinguished alumni. [Visit us at: https://www.nitk.ac.in/](https://www.nitk.ac.in/)

## **Department of Water Resources and Ocean Engineering**

The Department of Water Resources & Ocean Engineering (Formerly Applied Mechanics and Hydraulics) established in 1960, the Department has earned a good reputation as a centre for academic, research and industrial consulting activities. Academic programme leading to M.Tech Degree in (i) Marine Structures (MS) (ii) Water Resources Engineering and Management (WREM) and (iii) Remote Sensing and Geographical Information System (RS & GIS) and Ph.D. Degree in the broad areas of Hydraulics and Water Resources Engineering, Coastal Engineering and Remote Sensing and GIS Applications are offered. In addition to regular students, candidates sponsored under the Quality Improvement Program (QIP) are admitted to these programs. The Department also contributes significantly to the academic content of the B.Tech. program in Civil Engineering and offers basic Engineering Science & Elective courses to all undergraduate programs. Laboratories with state-of-art equipment, highly qualified faculty and dedicated staff provide an ideal environment for academic and research pursuits. Visit us on : <https://appmech.nitk.ac.in/>



*National Institute of Technology Karnataka, Surathkal, Mangaluru, Karnataka*

## 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](mailto:dst.iget@bharativedyapeeth.edu) or call on +91- 7559288803
- Address all queries regarding the program **once selected** to the *PI, Dr. Ramesh H., ramesh.hgowda@gmail.com; hramesh@nitk.edu.in, 9113518697/9880173290*

## Important Information

**Last date for application:** 15/05/2024

**Date of intimation of selection:** 18 May 2024

**Dates of the program:** **10 to 30 June, 2024**

**Mode of conduct:** Offline

**No. of seats:** 25

**Registration Fees:** Nil

**Principal Investigator:** Dr. Ramesh H., Professor, Department of Water Resources and Ocean Engineering, National Institute of Technology Karnataka, Surathkal, Mangaluru, Karnataka

**Email:** ramesh.hgowda@gmail.com; hramesh@nitk.edu.in ,

**Phone:** 9113518697/9880173290

### For any queries contact

Dr. Ramesh H., (Principal Investigator) ramesh.hgowda@gmail.com; hramesh@nitk.edu.in

### Address

Department of Water Resources & Ocean Engg, National Institute of Technology Karnataka - Surathkal, NH66, Srinivasnagar, Surathkal, Mangalore - 575 025 Karnataka

### 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 Department has a full-fledged common Computer Laboratory, Library and high speed internet & wi-fi connection. In addition it has the following well equipped laboratories:

- **Water Resources Engineering:** Hydraulic Measurement Laboratory, Hydraulics Laboratory, Ecosounder, etc.
- **Remote Sensing & GIS Laboratory:** Computer systems, Printer, scanner, Procom –II, Stereoscopes, Ground truth Radiometer, Digital Planimeters, Spectro Radiometer, Total station, aerial and satellite photographs, ARCPAD GPS, with software such as ERDAS Imagine, ARC GIS 10.2, ENVI, QGIS, etc. along with Handheld GPS, UAV, etc.,
- **Marine Structures:** Geotechnical Laboratory, Wave Mechanics Laboratory etc.

### Lodging and Boarding

The institute has three guesthouses which can accommodate more than 50 people in both AC and Non-AC rooms. In addition to this, and international hostel which provides accommodation for more than 40 people.



*Class Room*



*Remote sensing and GIS*



*Guest House*



*Seminar Hall*

**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: Standard Program)**

**Conducted by: National Institute of Technology Karnataka, Surathkal, Mangaluru, Karnataka**

**10-30, JUNE 2024**

Date and Day	Session	Time	Topics	Instructor	
Day 1, 10 <sup>th</sup> June 2024	Morning Session	0800-0900 hrs	Registration		
		0930-1100 hrs	Inauguration		
		1100-1130 hrs	Hi tea		
		1130-13.00 hrs	Introduction and expectations from participants/ video on Geospatial technologies	<i>Dr. Ramesh, NITK</i>	
			1300-1400 hrs	Lunch Break	
	Afternoon Session	1400-1530 hrs	Introduction of the group (trainers and trainees) Expectations from the training program, Making groups for reporting, grading of the course.		<i>Dr. Ramesh H, NITK</i>
			Overview of spatial and non-spatial data types (aerial photos, remote sensing, toposheets, databases, etc.)		<i>Dr. Ramesh, NITK</i>
			Overview of data sources		
		1500-1530 hrs	Tea break		
		1530-1700 hrs	Exercise 1: Acquiring data (capture) (Downloading of ASTER, MODIS, Bhuvan, acquiring toposheets from SOI, ordering of IRS data, acquiring secondary data)		NITK Team
1800-1815 hrs		Filling in feedback forms			
Day 2, 11 <sup>th</sup> June 2024	Morning Session	0900-0930 hrs	Feedback (analysis to be done by participants and presented– quantitative and qualitative) –		

Day-3, 12 <sup>th</sup> June 2024			led by Coordinator	
		0930-1300 hrs	Understanding scales and projections Scales	Prof. Ramesh H, NITK
			Projections	Prof. Ramesh H, NITK
		1300-1400 hrs	Lunch Break	
	Afternoon Session	1400-1600 hrs	Ex-1. Overview of QGIS (Use IGET_GIS_001)	Ahalya
		1600-1630 hrs	Tea Break	
		1630-1800 hrs	Ex-2. Working with projections using QGIS ( use IGET_GIS_002) Using existing projection Making a new projection Importing a projection	Ahalya
			1800-1815 hrs	Fill in feedback forms
		Morning Session	0900-0930 hrs	Feedback (analysis to be done by participants and presented – quantitative and qualitative)
	0930-1100 hrs		Understanding data quality Elements of data quality Sources and types of errors in geospatial data building Importance of metadata	Dr. Pruthviraj U
1100-1130 hrs			Tea Break	
1130-1300 hrs			Extracting data - georeferencing and extraction of data	Dr. Ramesh H
	1300-1400 hrs		Lunch Break	
Afternoon Session	1400-1600 hrs		Types of remote sensing	Prof. G.S. Dwarakish
	1600-1630 hrs		Tea Break	
	1630-1800 hrs	Applications of RS-Case studies	Prof. G.S. Dwarakish	
	1800-1830 hrs	Fill in feedback forms		

Day-4, 13 <sup>th</sup> June 2024	Morning Session	0900-0930 hrs	presented – quantitative and qualitative) led by Coordinator	
		0930-1100 hrs	Understanding map making Cartographic evolution Map classification Map elements Principles of map design	Dr. Shwetha HR
		1000-1130 hrs	Tea break	
		1130-1300 hrs	Group exercise on analysis of good and bad maps with reasons (to be based on map design principles)	Dr. Pruthviraj U
			Group work and presentation	
		1300-1400 hrs	Lunch Break	
	Afternoon Session	1400-1600 hrs	Lidar Survey and analysis	Dr. Pruthviraj U
		1600-1630 hrs	Tea	
1630-1800 hrs		UAV survey	Dr. Pruthviraj U	
1800-1815 hrs		Fill in Feedback Forms		
Day-5, 14 <sup>th</sup> June 2024	Morning Session	0900-0930 hrs	Feedback (analysis to be done by participants and presented – quantitative and qualitative)-	led by coordinator
		0930-1300 hrs With Tea Break	Drone survey and data analysis	Dr. Pruthviraj U
		1300-1400 hrs	Lunch Break	
	Afternoon Session	1400-1600 hrs	Ex:3 Georeferencing and Map preparation (Use IGET_GIS_006) Ex:4Data exploration (Use IGET_GIS_007)	NITK Team
		1600-1630 hrs	Tea break	
		1630-1800 hrs	Working with tables (use IGET_GIS_008)	NITK Team
1800-1815 hrs		Fill in Feedback Forms		
Day 6, 15 <sup>th</sup> June 2024	Morning Session	0900-0930 hrs	Feedback (analysis to be done by participants and presented – quantitative and qualitative) –	led by coordinator

		0930-1300 hrs with Tea break	Visualizing data through queries	Prof. Madhusudhan
		1300-1400 hrs	Lunch Break	
	Afternoon Session	1400-1600 hrs	Ex-5: Working with queries (use IGET_GIS_009)	NITK Team
		1600-1630 hrs	Tea Break	
		1630-1800 hrs	Ex-6: Working with queries (IGET_GIS_010)	NITK Team
		1800-18.15 hrs	Feedback	
Day 7, 16 <sup>th</sup> June 2024	Morning Session	0900-0930 hrs	Feedback (analysis to be done by participants and presented –quantitative And qualitative)	led by coordinator
		0930-1100 hrs	Visualizing data through queries	Dr. Ramesh H
		1100-1130 hrs	Tea Break	
		1130-1300 hrs	WebGIS	NITK Team
		1300-1400 hrs	Lunch Break	
	Afternoon Session	1400-1600 hrs	Ex-7Importing GPS data into QGIS (Use IGET_GIS_011)	NITK Team
		1600-1630 hrs	Tea Break	
		1630-1800 hrs	Ex-8: Using Google Earth / Bhuvan (Use IGET_GIS_012)	NITK Team
1800-1815 hrs		Fill in Feedback Forms		
Day 8, 17 <sup>th</sup> June 2024	Morning Session	0900-0930 hrs	Feedback (analysis to be done by participants and presented – quantitative and qualitative)	led by coordinator
		0930-1100 hrs	Introduction to GPS	C J Jagadeesha
		1100-1130 hrs	Tea Break	
		1130-1300 hrs	Ex-9 : Field exercise for collecting points using GPS	NITK Team
		1300-1400 hrs	Lunch Break	
	Afternoon Session	1400-1800 hrs with Tea Break	Intro to SAGA (Use IGET_RS_001	NITK Team
		1800-1815 hrs	Fill in Feedback Forms	
Day 9, 18 <sup>th</sup> June 2024	Morning Session	0900-0930 hrs	Feedback (analysis to be done by participants and presented – quantitative and qualitative)	led by coordinator

		0930-1100 hrs	Understanding the image – elements of visual interpretation	C J Jagadisha
		1100-1130 hrs	Tea Break	
		1130-1300 hrs	Understanding the image -understanding image statistics	C J Jagadisha
		1300-1400 hrs	Lunch Break	
	Afternoon Session	1400-1600 hrs	Ex- 10: Image interpretation (Use IGET_RS_002)	NITK Team
		1600-1630 hrs	Tea break	
		1630-1800 hrs	Ex-11: Understanding the image (histogram) (Use IGET_RS_003)	NITK Team
		1800-1815 hrs	Fill in Feedback	
Day 10, 19 <sup>th</sup> June 2024		0900-0930 hrs	Feedback (analysis to be done by participants and presented – quantitative and qualitative)	led by coordinator
		0930-1100 hrs	Geometric correction	C.J. Jagadisha
		1100-1130 hrs	Tea break	
		1130-1300 hrs	Atmospheric and Radiometric corrections	C.J. Jagadisha
		1300-1400 hrs	Lunch Break	
		1400-1800 hrs With Tea break	Ex:12Image registration (use IGET_RS_0004)	NITK Team
	1800-1815 hrs	Fill in Feedback Form		
Day 11, 20 <sup>th</sup> June 2024	Morning Session	0900-0930 hrs	Feedback (analysis to be done by participants and presented – quantitative and qualitative)	led by coordinator
		0930-1300 hrs With tea break	Introduction to GPS	
		1300-1400 hrs	Lunch Break	
	Afternoon Session	1400-1600 hrs	Ex. 15 Hands of GPS	NITK Team
		1600-1630 hrs	Tea Break	
		1630-1800 hrs	Data collection using handheld GPS	NITK Team
	1800-1815 hrs	Fill in Feedback Forms		
Day 12, 21st June 2024		0900-0930 hrs	Feedback (analysis to be done by participants and presented – quantitative and qualitative)	led by coordinator
		0930-1300 hrs		



		With tea break	<ul style="list-style-type: none"> <li>• Introduction to image enhancements</li> <li>• Contrast enhancements</li> <li>• Band rationing</li> <li>• Spatial filtering</li> <li>• Principal Components Analysis</li> <li>• Vegetation Indices</li> </ul>	Dr. Shyam Lal
		1300-1400 hrs	Lunch Break	
		1400-1600 hrs	Ex-13: Working with images – sub-setting and mosaicking (Use IGET_RS_005)	NITK Team
		1600-1630 hrs	Tea Break	
		1630-1800 hrs	Ex-14: Using enhancements (use IGET_RS_006)	NITK Team
Day 13, 22nd June 2024	<b>Morning Session</b>	1800-1815 hrs	Fill in Feedback Forms	
		0900-0930 hrs	Feedback (analysis to be done by participants and presented – quantitative and qualitative)	led by coordinator
		0930-1100 hrs	Introduction to image classification: Unsupervised	Dr. Ramesh
		1100-1130 hrs	Tea break	
		1130-1300 hrs	Introduction to image classification: Supervised	Dr. Ramesh
		1300-1400 hrs	Lunch Break	
<b>Afternoon Session</b>	1400-1800 hrs	Ex-15: Extracting information for satellite image using unsupervised classification (Use IGET_RS_007)	NITK Team	
	1800-1815 hrs	Fill in Feedback Forms		
Day 14, 23rd June 2024			Field Visit	
Day 15, 24th June 2024	<b>Morning Session</b>	0900-0930 hrs	Feedback (analysis to be done by participants and presented – quantitative and qualitative)	led by coordinator
		0930-1100 hrs	Accuracy assessment of classified data	Dr. Ramesh H
		1100-1130 hrs	Tea break	
		1130-1300 hrs	Change detection	Dr. Ramesh H
		1300 -1400 hrs	Lunch Break	

	<b>Afternoon Session</b>	1400-1600 hrs	Ex-16: Extracting information for satellite image using supervised classification (Use IGET_RS_008 )	NITK Team
		1600-1630 hrs	Tea Break	
		1630-1800 hrs	Ex-17: Accuracy assessment (Use IGET_RS_009)	NITK Team
		1800-1815 hrs	Fill in Feedback Forms	
Day 16, 25th June 2024	<b>Morning Session</b>	0900-0930 hrs	Feedback (analysis to be done by participants and presented – quantitative and qualitative)	led by coordinator
		0930-1100 hrs	Understanding terrain data	Dr. Shwetha HR
		1100-1130 hrs	Tea Break	
		1130-1300 hrs	Ex-18: DEM creation	NITK Team
		1300-1400 hrs	Lunch Break	
	<b>Afternoon Session</b>	1400-1600 hrs	Ex-19: Terrain analysis (Use IGET_RS_010)	NITK Team
		1600-1630 hrs	Tea break	
		1630-1800 hrs	Ex-20: Change detection with SAGA (use IGET_RS_011)	NITK Team
1800-1815 hrs		Fill in Feedback forms		
Day 17, 26th June 2024	<b>Morning Session</b>	0900-0930 hrs	Feedback (analysis to be done by participants and presented – quantitative and qualitative)	led by coordinator
		0930-1100 hrs	Case study -1: Remote sensing and GIS application in Hydrology	Prof. Lakshman Nandagiri
		1100-1130hrs	Tea Break	
		1130-1300 hrs	Case study-2: Land use land cover mapping	Dr. Shwetha H R
		1300-1400 hrs	Lunch Break	
		1400-1800 hrs	Case study 3	Prof. Madhu B
			Case study 4	Prof. Madhu B
	1800-1815 hrs	Feedback		
Day 18, 27th June 2024	<b>Morning Session</b>	0900-0930 hrs	Feedback (analysis to be done by participants and presented – quantitative and qualitative)	led by coordinator
		0930-1100 hrs	Project work	Dr. Ramesh and Team
		1100-1130 hrs	Tea Break	
		1130-1300 hrs	Project work	

		1300-1400 hrs	Lunch Break	
	<b>Afternoon Session</b>	1400-1600 hrs	Project work	
		1600-1630 hrs	Tea Break	
		1630-1800 hrs	Exercise Using Post-GRE/ Post-GIS (use IGET)	NITK Team
		1800-1815 hrs	Feedback	
Day 19, 28th June 2024	<b>Morning Session</b>	0900-0930 hrs	Feedback (analysis to be done by participants and presented – quantitative and qualitative)	
		0930-1100 hrs	Project work	Dr. Ramesh H
		1100-1130 hrs	Tea Break	
		1130-1300 hrs	Project work	
		1300-1400 hrs	Lunch Break	
	<b>Afternoon Session</b>	1400-1600 hrs	Project work	Dr. Ramesh H
		1600-1630 hrs	Tea Break	
		1630-1800 hrs	Project work	
1800-1815 hrs		Feedback		
Day 20, 29th June 2024			working on projects and preparation of report	
Day 21, 30th June 2024	<b>Morning Session</b>	0900-1300 hrs	Final project presentation by participants (group-wise) including tea	led by coordinator
		1300-1400 hrs	Lunch Break	
	<b>Afternoon Session</b>	1400-1530 hrs	Feedback and Valedictory	