

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

2nd to 22nd December 2024



Organized by

Banasthali Vidyapith, Rajasthan, 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

Dr. Chilka Sharma, Associate Professor (Remote Sensing), School of Earth Sciences,
Banasthali Vidyapith, Rajasthan, India

Co-Principal Investigator

- Dr. Ronak Jain, Assistant Professor (Remote Sensing), School of Earth Sciences,
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- Dr. Kanak Narayan Moharir, Assistant Professor (Remote Sensing), School of Earth
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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: Standard Program) 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 Banasthali Vidyapith, Rajasthan, India is one of the selected institutions for conducting the Level 1 Program.

Banasthali Vidyapith

Banasthali established in 1935, is the world's largest residential university for women, doing pioneer work in its field for more than eight decades. Banasthali has featured in the THE World University Rankings 2020. It is all the more heartening that Banasthali Vidyapith is the 2nd highest ranked women's university in the world!!! It is the world's largest fully residential women's university having 15000 students on its 931.25-acre campus situated amidst rural settings in Rajasthan and having a distinct educational ideology and offering a variety of programmes from nursery up to doctoral level across a wide spectrum of disciplines to prepare enlightened citizens with a strong value-base. Campus has state-of-the-art infrastructure facilities which offer numerous opportunities under one-roof. The Vidyapith is a green and a clean campus and approximately 42 % of the area is covered by plants. 3000+ computer systems are available in university and dedicated centers for development programs.

School of Earth Sciences

School of Earth Sciences building was established in 2013 comprising of four disciplines namely Geography, Remote Sensing, Geology and Environmental Science with high-quality infrastructure for classroom education and field studies in Earth Sciences. School focuses on understanding fundamental earth processes through field observations, survey, laboratory experiments and computational simulations. We aim to develop new dimensions in research and teaching through multidisciplinary interactions. School offers programmes at the under-graduate, post-graduate and doctoral level. Our academic programmes lead to B.A./B.Sc., M.A./M.Sc. and M.Phil. in Geography, B.Sc. and M.Sc. in Geology, M.Tech. in Remote Sensing and M.Sc. in Environmental Science. Ph.D. is also offered.

Currently school is strengthened by 18 Faculty Members, 72+ Research Scholars (including interdepartmental research) contributing to over 100+ Research Publications, Patents, copyrights, Sponsored Research Projects.



Banasthali Vidyapith, Rajasthan, 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, *Dr. Chilka Sharma*, drchilkasharma@gmail.com, 9828539026

Important Information

Last date for application: 25 November 2024

Date of intimation of selection: 26 November 2024

Dates of the program: 2nd to 22nd December 2024

Mode of conduct: Offline

No. of seats: 25

Registration Fees: Nil

Principal Investigator: Dr. Chilka Sharma, Associate Professor (Remote Sensing), School of Earth Sciences, Banasthali Vidyapith, Rajasthan, India

Email: drchilkasharma@gmail.com

Phone: 9828539026

Co-Principal Investigator: Dr. Ronak Jain, Assistant Professor (Remote Sensing), School of Earth Sciences, Banasthali Vidyapith, Rajasthan, India; **Email:** jainronak75@yahoo.in; **Phone:** 9468713726

Co-Principal Investigator: Dr. Kanak Narayan Moharir, Assistant Professor (Remote Sensing), School of Earth Sciences, Banasthali Vidyapith, Rajasthan; **Email:** kanakmoharir@banasthali.in; **Phone:** 9730238693

For any queries contact

- *Dr. Chilka Sharma, drchilkasharma@gmail.com, 9828539026(PI)*
- *Dr. Ronak Jain, jainronak75@yahoo.in, 9468713726(Co-PI)*
- *Dr. Kanak Narayan Moharir, kanakmoharir@banasthali.in, 9730238693(Co-PI)*

Venue

School of Earth Sciences, Banasthali Vidyapith, Banasthali PIN 304022, Rajasthan, India

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 School of Earth Sciences building was established in 2013 with 7 laboratories, 1 library, 1 research lab, 7 classrooms, and 1 conference hall. The School has well equipped Geospatial Technology labs with advanced instruments such as high end workstations with all open source remote sensing and GIS softwares and professional softwares such as: ArcGIS, ERDAS, and Hand- held GPS,s. It has well equipped satellite image processing and GIS laboratory and Server room apart from visual interpretation, Cartographic, Photographic instruments and laboratory for soil & water testing and analysis.

Lodging and Boarding

The University has a comfortable guest house with 38 double occupancy AC rooms, meeting room, conference hall and cafeteria. Boarding and lodging for the programme will be arranged in University.



Lab at school of earth sciences



Conference Hall



Computer Lab



Guest House

Deputation Letter (Format) for DST Summer/Winter School/ Geoinnovation Program 2024-25

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: Banasthali Vidyapith, Rajasthan, India

2nd to 22nd December 2024

Date	Time	Topic
02/12/2024 (Monday)		Topic
	0800-0900 hrs	Registration
	0900-1030 hrs	Inauguration (with plenary talk by well known expert) (External Expert, ISRO)
	1030-1100 hrs	Hi tea
	1100-1200 hrs	1.1 Introduction of the group (trainers and trainees) Expectations from the training program (Get expectations from the audience) Making groups for reporting, grading of the course (PI, SES)
	1200-1300 hrs	1.2 Geospatial Sciences: What, why and how?? Moving from data to information (External Expert, ISRO)
	1300-1400 hrs	Lunch
	1400-1600 hrs	1.3 Introduction to data types in geospatial information (GI): · Overview of spatial and non spatial data types (aerial photos, remote sensing, toposheets, databases, etc.) · Overview of data sources (Internal Faculty, Banasthali)
	1600-1630 hrs	Tea break

	1630-1800 hrs	1.4 Exercise 1: Acquiring data (capture) (Downloading of ASTER, MODIS, Bhuvan, acquiring toposheets from SOI, ordering of IRS data, acquiring secondary data) (Internal Faculty, SES Team)
	1800-1815 hrs	1.5 Filling in feedback forms
03/12/2024 (Tuesday)		Topic
	0800-0900 hrs	
	0900-0930 hrs	2.1 Feedback (analysis to be done by participants and presented – quantitative and qualitative) – led by Coordinator
	0930-1100 hrs	2.2 Understanding scales and projections a. Scales b. Projections (Internal Faculty, Banasthali)
	1100-1200 hrs	Tea break
	1200-1300 hrs	Continue with topic (Internal Faculty, Banasthali)
	1300-1400 hrs	Lunch
	1400-1600 hrs	2.3 Ex. Overview of QGIS (Internal Faculty, SES Team)
	1600-1630 hrs	Tea break
	1630-1800 hrs	2.4 Ex. Working with projections using QGIS · Using existing projection · Making a new projection · Importing a projection (Internal Faculty, SES Team)
	1800-1815 hrs	2.5 Fill in feedback forms

04/12/2024 (Wednesday)		Topic
	0800-0900 hrs	
	0900-0930 hrs	3.1 Feedback (analysis to be done by participants and presented – quantitative and qualitative) led by Coordinator
	0930-1100 hrs	3.2 Understanding data quality <ul style="list-style-type: none"> · Elements of data quality · Sources and types of errors in geospatial data building · Importance of metadata (Internal Faculty, Banasthali)
	1100-1130 hrs	Tea break
	1130-1300 hrs	3.3 Extracting data - georeferencing and extraction of data (Internal Faculty, Banasthali)
	1300-1400 hrs	Lunch
	1400-1600 hrs	3.4 Ex: Georeferencing (Internal Faculty, SES Team)
	1600-1630 hrs	Tea break
	1630-1800 hrs	3.5 Ex: Extracting data (Internal Faculty, SES Team)
	1800-1830 hrs	3.6 Fill in feedback forms
05/12/2024 (Thursday)		Topic
	0800-0900 hrs	
	0900-0930 hrs	4.1 Feedback (analysis to be done by participants and presented – quantitative and qualitative) led by Coordinator

	0930-1100 hrs	4.2 Understanding map making <ul style="list-style-type: none"> · Cartographic evolution · Map classification · Map elements · Principles of map design (Internal Faculty, Banasthali)
	1100-1130 hrs	Tea break
	1130-1300 hrs	4.3 Group exercise on analysis of good and bad maps with reasons (to be based on map design principles) Group work and presentation (Internal Faculty, Banasthali)
	1300-1400 hrs	Lunch
	1400-1600 hrs	4.4 Ex: Map preparation (Internal Faculty, SES Team)
	1600-1630 hrs	Tea break
	1630-1800 hrs	Continue with ex. (Internal Faculty, SES Team)
	1800-1815 hrs	Fill in Feedback Forms
06/12/2024 (Friday)	0800-0900 hrs	
	0900-0930 hrs	5.1 Feedback (analysis to be done by participants and presented – quantitative and qualitative)- led by coordinator

	0930-1100 hrs	5.2 Understanding attribute data <ul style="list-style-type: none"> · Importance of database · Database management systems · Building attribute data (Internal Faculty, Banasthali)
	1100-1130 hrs	Tea break
	1130-1300 hrs	Continue with topic (Internal Faculty, Banasthali)
	1300-1400 hrs	Lunch
	1400-1600 hrs	5.3 Ex: Data exploration (Internal Faculty, SES Team)
	1600-1630 hrs	Tea break
	1630-1800 hrs	5.4 Ex: Working with tables (Internal Faculty, SES Team)
	1800-1815 hrs	5.5 Fill in Feedback Forms
07/12/2024 (Saturday)		Topic
	0800-0900 hrs	
	0900-0930 hrs	6.1 Feedback (analysis to be done by participants and presented – quantitative and qualitative) – led by coordinator
	0930-1100 hrs	6.2 Visualizing data through queries (Internal Faculty, Banasthali)
	1100-1130 hrs	Tea break
	1130-1300 hrs	Continue with topic (Internal Faculty, Banasthali)
	1300-1400 hrs	Lunch
	1400-1600 hrs	6.3 Ex: Working with queries (Internal Faculty, SES Team)

	1600-1630 hrs	Tea break
	1630-1800 hrs	6.4 Ex: Working with queries (Internal Faculty, SES Team)
	1800-1815 hrs	6.5 Feedback
08/12/2024 (Sunday)		Topic
	0800-0900 hrs	
	0900-0930 hrs	7.1 Feedback (analysis to be done by participants and presented – quantitative and qualitative)
	0930-1100 hrs	7.2 Introduction to GPS (Internal Faculty, Banasthali)
	1100-1130 hrs	Tea break
	1130-1300 hrs	7.3 Ex: Field exercise for collecting points using GPS (Internal Faculty, Banasthali)
	1300-1400 hrs	Lunch
	1400-1600 hrs	7.4 Ex : Importing GPS data into QGIS (Internal Faculty, SES Team)
	1600-1630 hrs	Tea break
	1630-1800 hrs	7.5 Ex: Using Google Earth / Bhuvan (Internal Faculty, SES Team)
	1800-1815 hrs	Fill in Feedback Forms
09/12/2024 (Monday)		Topic
	0800-0900 hrs	
	0900-0930 hrs	8.1 Feedback (analysis to be done by participants and presented – quantitative and qualitative)
	0930-1100 hrs	8.2: Types of remote sensing (Internal Faculty, Banasthali)
	1100-1130 hrs	Tea break

	1130-1300 hrs	8.3 Applications of remote sensing (Internal Faculty, Banasthali)
	1300-1400 hrs	Lunch
	1400-1600 hrs	8.4 Ex: Intro to SAGA including tea break (Internal Faculty, SES Team)
	1600-1630 hrs	
	1630-1800 hrs	
	1800-1815 hrs	8.5 Fill in Feedback Forms
10/12/2024 (Tuesday)		Topic
	0800-0900 hrs	
	0900-0930 hrs	9.1 Feedback (analysis to be done by participants and presented – quantitative and qualitative)
	0930-1100 hrs	9.2 Understanding the image – elements of visual interpretation (Internal Faculty, Banasthali)
	1100-1130 hrs	Tea break
	1130-1300 hrs	9.3 Understanding the image -understanding image statistics (Internal Faculty, Banasthali)
	1300-1400 hrs	Lunch
	1400-1600 hrs	9.4 Ex: Image interpretation (Internal Faculty, SES Team)
	1600-1630 hrs	Tea break
	1630-1800 hrs	9.5 Ex: Understanding the image (histogram) (Internal Faculty, SES Team)
	1800-1815 hrs	9.6 Fill in Feedback
11/12/2024 (Wednesday)		Topic
	0800-0900 hrs	
	0900-0930 hrs	10.1 Feedback (analysis to be done by participants and presented – quantitative and qualitative)

	0930-1100 hrs	10.2 Geometric correction (Internal Faculty, Banasthali)
	1100-1130 hrs	Tea break
	1130-1300 hrs	10.3 Atmospheric and Radiometric corrections (Internal Faculty, Banasthali)
	1300-1400 hrs	Lunch
	1400-1600 hrs	10.4 Ex: Image registration (Internal Faculty, SES Team)
	1600-1630 hrs	Tea break
	1630-1800 hrs	Continue with ex. (Internal Faculty, SES Team)
	1800-1815 hrs	Fill in Feedback Form
12/12/2024 (Thursday)		Topic
	0800-0900 hrs	
	0900-0930 hrs	11.1 Feedback (analysis to be done by participants and presented – quantitative and qualitative)
	0930-1100 hrs with tea break	11.2: Introduction to image enhancements <ul style="list-style-type: none"> · Contrast enhancements · Band rationing · Spatial filtering · Principal Components Analysis · Vegetation Indices (Internal Faculty, Banasthali)
	1100-1130 hrs	Tea break
	1130-1300 hrs	Continue with topic (Internal Faculty, Banasthali)
	1300-1400 hrs	Lunch

	1400-1600 hrs	11.3 Ex: Working with images – subsetting and mosaicking (Internal Faculty, SES Team)
	1600-1630 hrs	Tea break
	1630-1800 hrs	11.4 Ex: Using enhancements (Internal Faculty, SES Team)
	1800-1815 hrs	Fill in Feedback Forms
13/12/2024 (Friday)		Topic
	0900-0930 hrs	12.1 Feedback (analysis to be done by participants and presented – quantitative and qualitative)
	0930-1100 hrs	12.2 Introduction to image classification: Unsupervised (Internal Faculty, Banasthali)
	1100-1130 hrs	Tea break
	1130-1300 hrs	12.3 Introduction to image classification: Supervised (Internal Faculty, Banasthali)
	1300-1400 hrs	Lunch
	1400-1600 hrs	12.4 Ex: Extracting information for satellite image using unsupervised classification (Internal Faculty, SES Team)
	1600-1630 hrs	Tea break
	1630-1800 hrs	Continue with ex. (Internal Faculty, SES Team)
	1800-1815 hrs	12.5 Fill in Feedback Forms
14/12/2024 (Saturday)		Topic
	0900-0930 hrs	13.1 Feedback (analysis to be done by participants and presented – quantitative and qualitative)
	0930-1100 hrs	13.2 Accuracy assessment: why and how (Internal Faculty, Banasthali)

	1100-1130 hrs	Tea break
	1130-1600 hrs	13.3 Ex: Extracting information for satellite image using supervised classification (Internal Faculty, SES Team)
	1300-1400 hrs	Lunch
	1400-1600 hrs	Continue with ex. (Internal Faculty, SES Team)
	1600-1630 hrs	Tea break
	1630-1800 hrs	13.4 Ex: Accuracy assessment (Internal Faculty, SES Team)
	1800-1815 hrs	13.5 Fill in Feedback forms
15/12/2024 (Sunday)		Topic
	0900-0930 hrs	14.1 Feedback (analysis to be done by participants and presented – quantitative and qualitative)
	0930-1100 hrs	14.2 Change detection (Internal Faculty, Banasthali)
	1100-1130 hrs	Tea break
	1130-1300 hrs	14.3 Understanding terrain data (Internal Faculty, Banasthali)
	1300-1400 hrs	Lunch
	1400-1600 hrs	14.4 Ex: Terrain analysis (Internal Faculty, SES Team)
	1600-1630 hrs	Tea break
	1630-1800 hrs	14.5 Ex: Change detection with SAGA (Internal Faculty, SES Team)
	1800-1815 hrs	14.6 Fill in Feedback forms
	Topic	

16/12/2024 (Monday)		
	0900-0930 hrs	15.1 Feedback (analysis to be done by participants and presented – quantitative and qualitative)
	0930-1100 hrs	15.2 Spatial data analysis (Internal Faculty, Banasthali)
	1100-1130 hrs	Tea break
	1130-1300 hrs	Continue with topic (Internal Faculty, Banasthali)
	1300-1400 hrs	Lunch
	1400-1600 hrs	15.3 Exercise on spatial data analysis (Internal Faculty, SES Team)
	1600-1630 hrs	Tea break
	1630-1800 hrs	Continue with ex. (Internal Faculty, SES Team)
	1800-1815 hrs	15.4 Feedback
17/12/2024 (Tuesday)		Topic
	0900-0930 hrs	16.1 Feedback (analysis to be done by participants and presented – quantitative and qualitative)
	0930-1100 hrs	16.2 Introduction to PostGRE/PostGIS and demos (External Expert, ISRO)
	1100-1130 hrs	Tea break
	1130-1300 hrs	16.3 Understanding Geoserver –Open layer, web services and demos (External Expert, ISRO)
	1300-1400 hrs	Lunch
	1400-1600 hrs	16.4 Catalogue Services -Geonetwork (External Expert, ISRO)
1600-1630 hrs	Tea break	

	1630-1800 hrs	16.5 Exercise Using PostGRE/PostGIS (External Expert, ISRO)
	1800-1815 hrs	16.6 Feedback
18/12/2024 (Wednesday)	Time	Topic
	0900-0930	17.1 Feedback (analysis to be done by participants and presented – quantitative and qualitative)
	0930-1100	17.2 Applications on RS/GIS in planning (urban/rural) with specific case studies highlighting detailed methodology (External Expert, ISRO)
	1100-1130 hrs	Tea break
	1130-1300	17.3 Applications of RS/GIS in natural resource management (forest, wildlife/agriculture/watershed) with specific case studies highlighting detailed methodology (External Expert, ISRO)
	1300-1400 hrs	Lunch
	1400-1600 hrs	17.4 Applications of RS/GIS in climate studies with specific case studies highlighting detailed methodology (External Expert, ISRO)
	1600-1630 hrs	Tea break
	1630-1800 hrs	17.5 Group exercise: Participants to make a methodology flow chart for given applications (Internal Faculty, SES Team)
	1800-1815 hrs	17.6 Feedback
	19/12/2024 (Thursday)	Time
0900-0930 hrs		18.1 Feedback (analysis to be done by participants and presented – quantitative and qualitative)

	0930-1300 With tea break	18.2 Discussion of possible minor projects to be done by the participants. Institutions to give projects according to data available with them or using data that can be generated easily.
	1300-1400 hrs	Lunch
	1400-1600 hrs	18.3 Working on projects
	1600-1630 hrs	Tea break
	1630-1800 hrs	
	1800-1815 hrs	18.4 Filling in feedback forms
20/12/2024 (Friday)	Time	Topic
	09.00-18.00	Working on projects
	1300-1400 hrs	Lunch
21/12/2024 (Saturday)	Time	Topic
	09.00-18.00	Working on projects
	1300-1400 hrs	Lunch
22/12/2024 (Sunday)	Time	Topic
	0900-1300 hrs	Final project presentation by participants (groupwise) including tea break
	1300-1400 hrs	Lunch
	1400-1530 hrs	Feedback and Valedictory
		Guest / Invited Speaker
		Banasthali Internal faculty member
	Conducted by School of Earth Sciences (SES) Team	

