Winter School in Geospatial Science And Technology (Level 2)

Theme: Spatio-temporal mapping and monitoring of crops and soil health using geospatial technology for estimation of food security under SDG2

08th – 28th Jan 2025

ZERO
HUNGER

Organized by

Punjab Remote Sensing Centre, Ludhiana, Punjab 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

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Punjab Remote Sensing Centre, PAU Campus, Ludhiana, Punjab

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 2 Summer / Winter School In Geospatial Science and Technology

This three week program is a theme specific advanced training being implemented by eight institutions across the country. A one week online refresher session will be held prior to the commencement of the three week program. The 21-day summer/winter school in Geospatial Science and Technology (Level 2) 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 geospatial software.

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 Punjab Remote Sensing Centre, Ludhiana, Punjab, India is one of the selected institutions for conducting the Level 2 Program.

Punjab Remote Sensing Centre (PRSC), Ludhiana

Punjab Remote Sensing Centre (PRSC) an autonomous organisation under the Department of Agriculture, Government of Punjab, is the apex body in the state for all Remote Sensing (RS), Geographic Information System (GIS) and Global Positioning System (GPS) and related works. It is designated as a Nodal Agency by the Govt. of Punjab for geospatial needs of the state and also acts as the centralized hub for the geo-spatial data to all the user depart- ments. PRSC has been setup under the umbrella of National Natural Resources Information System (NNRMS) under the technical of ISRO NNRMS. Erstwhile Natural Resource Management System (NNRMS) established in 1985 is now Space Applications Management System (SAMS) from March 2021.

The broad objectives of the Centre as given in the Memorandum and Rules of the association are: • To undertake, promote, guide, co-ordinate and aid research and development in the field of remote sensing. • To act as a nodal organization in respect of formulation and execution of projects on natural resource mapping and monitoring using remote sensing technology. • To provide research and developmental support to the teaching and research organizations of the state in specified areas of remote sensing technology. • To provide capacity building such as: organising training, lectures, seminars and symposia for advanced study and research in remote sensing technology and its appli-cations.

Punjab Remote Sensing Centre, Ludhiana, Punjab, India

Who can apply?

- Faculty members, scientists, technologists, researchers from academia, national institutions of research, smart city cells, municipal corporations and other government departments are eligible to apply.

- Personnel from non government organizations (NGO)

- School Teachers

- Only 2-3 seats are reserved for research scholars. Only candidates who have a high degree of experience with geospatial technologies should apply for these advanced programs.

No basics will be covered in the Level 2 program. Candidates who have no knowledge of geospatial technologies should apply for the Level 1 program.

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.

- For any further queries write to dst.iget@bharatividyapeeth.edu or call on 7559288803

- Address all queries regarding the program **once selected** to the PI, *Dr. R. K. Setia at rksetia@prsc.gov.in or on 9877684581*

Important Information
Last date for registration: 10 November 2024
Date of intimation of selection: 13 November 2024
Date of online orientation: 10 December 2024
Dates of the program: 08 to 28 January, 2025

Mode of conduct: Offline
No. of seats: 25
Registration Fees: Nil

Principal Investigator: Dr. R K. Setia, Group Leader, Geodata Analytics, Research and Modeling Group, Punjab Remote Sensing Centre, PAU Campus, Ludhiana, Punjab, India
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Phone Number: +91-9877684581 (M), +91-161 2303484 (O)

For any queries contact
Dr. R. K. Setia, at rksetia@prsc.gov.in or on 9877684581

Address
Punjab Remote Sensing Centre, PAU Campus, Ludhiana-141004, India.

Certificate
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 and Facilities

Punjab Remote Sensing Centre, located in Punjab Agricultural University (PAU) Campus at Ludhiana, Punjab cover an area of four and half acre, and has its own office building. Looking at future expansion of facilities five storey building has been planned. Presently two floors with 32000 sq. ft. total covered area have been completed.

Laboratory

The institute is having 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, ENVI, eCognition and Hand- held GPS. PRSC has well equipped satellite image processing and GIS laboratory and Server room apart from visual interpretation, Cartographic, Photographic instruments and the laboratory for soil and water testing.

Lodging and Boarding

The Institute has a well-equipped 10 bedded Hostel cum Guest house with canteen facility in its campus for the training delegates and government officials. Participants can also use the serene environments of Punjab Agricultural University for a relaxing walk or run during their free time. Besides this, the institute has also the access to book the accommodation for the course participants at nearby guest houses of Punjab Agricultural University and CIPHET, Ludhiana. All the participants will be provided with shared accommodation in the guest house

Computer lab

Training Room -cum- Lab

Conference Room

Hostel AC Room

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 Winter School in Geospatial Science and Technology
(Level 2)
Conducted by Punjab Remote Sensing Centre, Ludhiana, India
Date 08 to 27 January 2025

Day and Date	Session – I 09:30 to 11:00 am	Tea Break	Session – II 11:30 am to 1:00 pm	Lunch Break	Lab Session 2.00 - 5.00 pm
08 January 2025 Wednesday	**Inaugural Program :** • Welcome and Program Overview • Introduction to the Training Program • **Theory: 1** Plenary talk by DST Representative/Guest	11:00 to 11:30 am	**Theory: 2** Revision on basics of Remote Sensing and GIS with emphasis on application of Remote Sensing and GIS in agriculture	1:00 to 2:00 pm	**Hands on session/Lab: 1** Use of basic tools on Image Processing and interpretation with open source software's
09 January 2025 Thursday	**Theory: 3** Recent advances in the use of multispectral data for agriculture applications		**Theory: 4** • Revision on basics of hyperspectral remote sensing • Use of hyperspectral remote sensing in agriculture		**Hands on session/Lab: 2** • Use of Landsat-8/9 and Sentinel- 2 for calculating various spectral indices using QGIS • Google Erath Engine for downloading and analysing the satellite data
10 January 2025 Friday	**Theory: 5** Revision on basics of microwave remote sensing		**Theory: 6** • Use of microwave remote sensing in agriculture • Recent approaches for crop mapping		**Hands on session/Lab: 3** Downloading and Processing of Sentinel 1 SAR satellite datasets using SNAP tool
11 January 2025 Saturday	**Theory: 7** Crop signatures and discrimination using time series multispectral images		**Theory: 8** • Crop discrimination using time series microwaves images • Monitoring of crop health using satellite remote sensing		**Hands on session/Lab: 4** Use of Landsat-8/9, Sentinel-1/2 for extracting crop acreage and assessing crop health (Digital Image Processing) using QGIS
12 January 2025 Sunday	Self study		Self study		Self study

Day and Date	Session – I 09:30 to 11:00 am	Tea Break	Session – II 11:30 am to 1:00 pm	Lunch Break	Lab Session 2.00 - 5.00 pm
13 January 2025 Monday	**Theory: 9** Time series mapping of wheat using satellite remote sensing	11:00 to 11:30 am	**Theory: 10** • Time series mapping of paddy using satellite remote sensing • Retrieval of biophysical parameters of major crops using various data sets	1:00 to 2:00 pm	**Hands on session/Lab: 5** Time series mapping of paddy and wheat using Google Earth Engine
14 January 2025 Tuesday	**Theory: 11** Agrometeorological models for crop yield estimation		**Theory: 12** • Machine learning techniques to assess crop yield using remote sensing and climate data • Paddy and wheat yield assessment using semi-physical model		**Hands on session/Lab: 6** Estimation of paddy and wheat yield by integrating spectral indices, climate data and crop cutting experiments
15 January 2025 Wednesday	**Theory: 13** Simulation of crop yield using different models		**Theory: 14** • Integration crop growth models with satellite remote sensing data products • Available remote sensing products, and data to improve crop production forecasts		**Hands on session/Lab: 7** Estimation of rice and wheat yield by integrating CERES-Rice and CERES-Wheat with satellite derived products
16 January 2025 Thursday	**Theory: 15** Assessment of crop diseases using remote sensing techniques		**Theory: 16** • Forecasting of disease assessment using spectral indices and climate data • Crop damage assessment due to pest		**Hands on session/Lab: 8** Assessment of crop diseases using satellite remote sensing and ancillary data using Imaging Software
17 January 2025 Friday	**Theory: 17** UAV for crop and soil fertility mapping		**Theory: 18** • Use of remote sensing for assessment of crop lodging • Assessing the impact of disaster on crop loss		**Hands on session/Lab: 9** Assessment of crop loss due to natural disaster
18 January 2025 Saturday	**Theory: 19** Estimation of soil moisture using optical remote sensing		**Theory: 20** • Estimation of soil moisture using microwave remote sensing • Estimation of soil moisture over bare and vegetation covered soils		**Hands on session/Lab: 10** Assessment of soil moisture from SAR satellite data using SNAP
19 January 2025 Sunday	**Field Visit**				

Day and Date	Session – I 09:30 to 11:00 am	Tea Break	Session – II 11:30 am to 1:00 pm	Lunch Break	Lab Session 2.00 - 5.00 pm
20 January 2025 Monday	**Theory: 21** Use of remote sensing in mapping and monitoring of functional soil properties, such as soil organic carbon (SOC)	11:00 to 11:30 am	**Theory: 22** • Interpolation techniques for mapping of soil properties • Simulation of soil organic carbon by integrating models and spatial data	1:00 to 2:00 pm	**Hands on session/Lab: 11** Mapping of soil properties using QGIS
21 January 2025 Tuesday	**Theory: 23** Machine learning techniques for estimation of soil properties from remote sensing data		**Theory: 24** • Estimation of soil properties from multispectral data) • Estimation of soil properties from hyperspectral data		**Hands on session/Lab: 12** Developing relationship between soil properties and satellite data using machine learning techniques
22 January 2025 Wednesday	**Theory: 25** Determination of soil quality using geospatial technology		**Theory: 26** • Mapping of degraded soils using geospatial technology • Mapping of salt-affected soils using remote sensing and GIS		**Hands on session/Lab: 13** Mapping of salt-affected soils using satellite remote sensing
23 January 2025 Thursday	**Theory: 27** UNGGIM geospatial framework for SDG estimation		**Theory: 28** • The role of geospatial technology in ensuring food security in India • Geospatial technology for doubling the crop productivity by 2030 under SDG Target 2.3		**Hands on session/Lab: 14** Linking earth observation data for ensuring food security in India
24 January 2025 Friday	**Theory: 29** Geospatial data to transform agri-lending to enhance the income of famers under SDG Target 2.3		**Theory: 30** • Geospatial technology for agro-climate risk assessment and climate-resilient agriculture under SDG Target 2.4 • The use of geospatial technology to evaluate the local indicators for food security among farm households under SDG2		**Hands on session/Lab: 15** Mapping the spatial dimension of food insecurity at village/block/district level
25 January 2025 Saturday	**Theory: 31** Water, food security and Indian transition: Spatial data for food availability issues		**Theory: 32** • Geospatial technology for regulating supply chain and post-harvest management • Panel Discussion involving the participants		**Hands on session/Lab: 16** Geospatial technology for regulating supply chain and post-harvest management
26 January 2025 Sunday	**Project Work**		**Project Work**		**Project Work**

Day and Date	Session – I 09:30 to 11:00 am	Tea Break	Session – II 11:30 am to 1:00 pm	Lunch Break	Lab Session 2.00 - 5.00 pm
27 January 2025 Monday	Project Work	11:00 to 11:30 am	Project Work	1:00 to 2:00 pm	Project Work
28 January 2025 Tuesday	Project Presentation		• Project Presentation • Concluding Discussion		Valediction Function