

Global Initiative on Academic Network (GIAN)

Short Course on

Sustainable Urban Planning using Remote Sensing and GIS



Overview

Modern urban planning in India is confronted with major challenges such as accelerated growth and land-use change, unplanned expansion and water supply management issues in a warming climate. The rapid pace of these changes in the 21st century has made even basic information gathering on the state of Indian cities a very difficult task. In this context, effective urban management decisions properly supported by transparent evidence that can be transmitted to public stake-holders are critical. This course aims to give participants state-of-the-art remote sensing and GIS skills which will allow them to rise to the challenge of managing the rapidly changing urban environment of Indian cities. After refreshing basic knowledge of GIS and remote sensing, the course will focus on the use of open-source GIS and remote sensing in key areas of urban planning such as land-use change within cities, assessment of unplanned urban growth and the assessment of island heat effects. The course will also include the controlled use of drones in order to assess small scale structures and urban characteristics that cannot be seen from satellites. Furthermore, the course will pay particular attention to issues of water resource management, water pollution and strategic emplacements for water treatment facilities.

This course will contribute significantly to build trained manpower for the Smart Cities Mission launched by the Government of India on 25 June 2015 with an objective to promote sustainable and inclusive cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of 'Smart' Solutions. Urban planning for a smart city needs a complete understanding of physical and digital space with adequate geospatial datasets and analytical capabilities. On the other hand, the planning is also affected by stakeholders via participatory management of resources and policy interventions. This course aims to address both the issues by encouraging the use of modern techniques of remote sensing and GIS.



Objectives

The primary objectives of the course are as follows:

- i. Revise and Strengthen foundation concepts in Remote Sensing and GIS.
- ii. Give participants a set of operational skills enabling them to support urban planning and management with remote sensing and GIS-based assessments.
- iii. Instruct participants in state-of-the-art methods for land-use classification and land-use change detection.
- iv. Teach participants to assess and quantify urban expansion, both planned and un-planned, with advanced remote sensing methods and declassified satellite imagery.

Course schedule and details

January 15-20, 2018

Module 1: Foundations of Open-Source GIS and Remote Sensing

Lecture 1*: Introduction/Revision of Geographic Information systems

Lecture 2: Introduction/Revision of remote sensing

Lecture 3: Introduction/Revision of Land-use classification with a focus on urban environments

Tutorial 1**: Introduction to QGIS with GRASS

Tutorial 2: Basic Land-use classifications with QGIS and GRASS

Module 2: Remote Sensing of Urban Environments with low-cost drones and satellite data

Lecture 4: Overview of drone technology

Lecture 5: Overview of low-cost satellite data suitable for urban landscape inventory

Lecture 6: Use of satellite technology for thermal remote sensing and temperature monitoring in urban environments

Tutorial 3: Creation of 3D urban landscape models from drone surveys

Tutorial 4: Advanced classification of urban landscapes from street-level to district level

Break / Discussion with students

Module 3: Reconstructing urban expansion and land-use change over decadal timescales

Tutorial 5: Monitoring and mitigating island heat effects with remote sensing

Lecture 7: Introduction to Declassified Satellite Imagery

Lecture 8: Working with declassified data: registration and geometric corrections

Lecture 9: Quantifying urban expansion land-use change from 1960 to 2015 with mixed satellite data sources

Tutorial 6: Object-Oriented classification of urban landscapes with Corona data

Break / Discussion with students

Module 4: Urban resilience and disaster management

Lecture 10: Risk and vulnerability assessment to floods and other associated hazards

Lecture 11: Mapping and managing water resources – pollutant sources to rivers

Lecture 12: Learning from international city networks

Lecture 13: Smart city standards

Tutorial 7: Mapping urban flood risk and making effective decisions with Remote Sensing

Tutorial 8: Mapping water pollution areas with remote sensing

Break / Examination for students

Module 5: Field workshop (1 day)

Teaching Faculty

Dr Patrice Carbonneau (PC) is an Associate Professor in the prestigious Geography department of Durham University. Systematically ranked among the world top-10 geography departments, the geography department at Durham University is at the forefront of applications of remote sensing in geography. Dr Carbonneau is a leading expert on remote sensing with notable expertise in drone-based operations, image classification and declassified imagery. He has been teaching GIS and remote sensing for more than a decade.

Dr. Rajiv Sinha (RS) is a professor in the Department of Earth Sciences, IIT Kanpur and he specialises in remote sensing applications in landform analysis, Landuse/landcover mapping and water quality assessment. He has been teach-

ing a regular course on remote sensing application at IIT Kanpur for several years and has also used various remote sensing data for his research. His recent research projects have used drone based applications for LULC mapping and water quality assessment of large water bodies. He has also used remote sensing and GIS techniques for flood risk evaluation in the heavily populated Gangetic basin.

Who can attend?

- Professionals, Researchers and scientists in government departments, academic institutions and research institutions involved in urban planning; senior government officials involved in urban planning or Smart City projects are especially welcome.
- Student at all levels (B. Tech/ MSc/ M. Tech/ PhD) or Faculty from reputed academic institutions and technical institutions. They should clearly indicate on the registration form how this course would be useful for their present and future profession.

Registration Fees

| Category | Registration fee |
|---|------------------|
| Govt. Officials/Industry/Research Organizations | Rs. 15000/- |
| Academic Institutions (Faculty) | Rs. 10,000/- |
| Students | Rs. 6,000/- |

The above fee includes all instructional materials and 24 hr free internet facility. All participants are advised to bring a laptop for tutorials and hand-on exercises and they will be helped by our PhD students. The participants will be provided with accommodation on payment basis – Single occupancy (Rs. 850), Double occupancy (Rs. 1050) including breakfast.

The registration fee can be paid through a bank draft in the name of “Registrar, IIT Kanpur” payable at Kanpur or through bank transfer as per the following details:

Account name: Registrar, IIT Kanpur, SBI A/c No. 10426002126

Branch: IIT Kanpur, IFSC Code: SBIN0001161, MICR code: 208002041

Deadline for application and registration fee is **31st December, 2017** but the participants are encouraged to send their nominations as soon as possible to help in planning the logistics.

Course Venue

IIT Kanpur Outreach Centre, C-20/1A/8 Block C, Sector 62 NOIDA, INDIA

Course Coordinator

For any further information, please contact:

Professor Rajiv Sinha

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January 15 -20, 2018

IIT Kanpur

Registration Form

Name (Dr/Mr/Mrs/Miss):

Father's Name:

Date of Birth (DD/MM/YY):

Gender (Male/ Female):

Nationality:

Present position:

Contact Information:

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Contact Number: (Office / Mobile):

Email:

Areas of research:

Explain how this course would be useful for your research or professional responsibilities:

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Details of payment (Bank draft or bank transfer receipt):

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Bank draft should be in the name of "Registrar, IIT Kanpur".

Bank transfer details: Account name: Registrar, IIT Kanpur, SBI A/c No. 10426002126

Branch: IIT Kanpur, IFSC Code: SBIN0001161, MICR code: 208002041

Date:

Signature

Please send the completed form along with bank draft or bank transfer receipt to:

Professor Rajiv Sinha, Department of Earth Sciences, IIT Kanpur-208016, India (rsinha@iitk.ac.in)