ONLINE SUMMER TRAINING PROGRAMME
(JUNE 2024)

Introduction:

In this highly competitive era, skill-based knowledge is the need of the hour. Often, in the study curriculum, the emphasis on theoretical aspect supersedes and in the quest of fetching marks, students restrict themselves to gain critical thinking and problem solving. We at Enviro Informatics and Solutions, sincerely feel that hands on training is highly required in most of the streams and curriculum, as it allows students to develop these skills by actually performing tasks, experiments and/or projects, which enhances their understanding and retention of concepts.

Therefore, this training programme is being conducted to supplement their theoretical knowledge and prepare the students for their prospective journey, during and after the completion of their degree. Gear yourself up, for a lot of information, interaction and brainstorming to upskill your potential.

Pre-requisites/Eligibility

Candidates pursuing Bachelor's/Post Graduate/ M. Phil. Or Ph.D degree in any of following domain:
(a) Environmental Science, Life Science, Earth Science/Geology, Geography and allied subjects.
(b) Natural Science, Engineering and allied subjects.
(c) Basic and Interdisciplinary subjects related with Environmental Sciences.

The training programme is also open for Research scholars, faculties and other interested candidates

Teaching -Learning methods

- Theoretical as well as practical
- Hands on training
- creating an engaging and inclusive learning environment
- Each day includes a mix of theoretical concepts, practical exercises, and hands-on sessions to ensure participants have a comprehensive understanding and practical skills.

GIS AND REMOTE SENSING

1. About the course:

This course will develop the skills of students in the field of GIS and remote sensing by empowering them with hands on exercises. It will also give the basic concepts of remote sensing and principles associated with image acquisition and image processing. The role of GIS as a tool in environmental management and knowledge of GPS will be facilitated. This course will also look into the application of remote sensing/GIS in database generation and environmental management.

2. Learning Outcomes

On completion of this course, the students are expected to:

i. Identify and explain various principles and mechanism of remote sensing and develop technical skills and competence in data and information acquisition.

ii. Differentiate between GIS and Remote Sensing and describe how geographical information is used, managed, and marketed globally.

iii. Apply the techniques of Remote sensing and GIS which can directly enhance service delivery on land use management, ground water management/prospects, agriculture, forestry, food and water security, disaster management, etc.

3. Course Content and Schedule

Day /Week	Topic
Week One	
Day 1	An overview of application and relevance of Geoinformatics
	Satellite images: Sensors and characteristics
Day 2	Elements of visual image interpretation and
	Laboratory: Digital image processing
Day 3	Geographic Information System: Introduction, definition and terminology
	Map: Definition, types, scale and projections
Day 4	Components and fundamental operations of GIS
	Simple exercise on ArcGIS Interfaces
Day 5	Data structure, raster and vector data
	Data input & Georeferencing (Lab)
Week-Two	
Day 6	Global positioning systems (GPS)
	GIS Case Studies: Outline Of Research Projects
Day 7	Cartography
	Digital Cartography (Lab) and Assignment I

Day 8	3D analysis
	Geostatistical analysis
Day 9	Assignment II (ppt on project identified)
	Presentation of project outline
Day 10	Evaluation of theoretical concepts
	Laboratory Assessment
Week-Three	
Day 11-15	Project work
Week-Four	
Day 16-17	Presentation and Progress of project
Day 18	Review of final draft report by allocated supervisor
Day 19	Finalization of project report and submission
Day 20	Project presentation and viva voce

ADVANCED STATISTICS FOR ENVIRONMENTAL POLLUTION STUDIES WITH R

1. Introduction:

This training/workshop aims to empower participants with the necessary knowledge and skills to address complex environmental challenges through rigorous statistical analysis and informed decision-making.

2. Expected Outcome:

By the end of this two-week training program, participants are expected to:

i. Gain a comprehensive understanding of advanced statistical techniques commonly used in environmental pollution studies.

ii. Acquire proficiency in using R programming language for statistical analysis and data visualization.

iii. Develop skills in exploratory data analysis, hypothesis testing, regression analysis, time series analysis, spatial analysis, multivariate analysis, and Bayesian statistics.

iv. Apply learned techniques to analyze and interpret environmental datasets effectively.

v. Demonstrate the ability to work collaboratively on group projects and communicate findings through presentations.

3. Course Content and Schedule

Week-One	**Introduction to Advanced Statistical Techniques**
Day 1	Introduction to Environmental Pollution Studies
Day 2	Exploratory Data Analysis (EDA)
Day 3	Probability Distributions
Day 4	Hypothesis Testing
Day 5	Regression Analysis
Week-Two	**Advanced Techniques in Environmental Statistics**
Day 5	Time Series Analysis
Day 6	Spatial Analysis
Day 7	Multivariate Statistical Analysis
Day 8	Bayesian Statistics
Day 9	Bayesian Statistics
Day 10	Case Studies and Project Work

ENVIRONMENTAL MANAGEMENT

1. Introduction:

This training/workshop aims to provide essential knowledge about the ISO 14001:2015 Environmental Management System (EMS) to a wide range of professionals, environmentalists, business enthusiasts and engineering students. An understanding of the nuances of ISO 14001 is critical to undertake the procedures and compliances of Environmental Management.

2. Expected Outcome:

On completion of this course, the students are expected to

i. Elucidate the fundamental principles, methodologies, and strategies employed in evaluating and overseeing environmental factors and their effects, emphasizing their relevance to auditors of Environmental Management Systems (EMS).

ii. Clarify the objectives and substance of ISO 14001, in addition to delineating the legal context pertinent to an EMS.

iii. Define the duties and accountabilities of auditors and lead auditors within the EMS framework.

3. Course Content and Schedule

Week-One	**Introduction to Environment and EMS**
Day 1	Introduction to Environmental Management, its need, How do Standards Help
Day 2	Environment: Basic issues and challenges (Part I: Pollution (Air, Water, Soil)
Day 3	Environment: Basic issues and challenges (Part II; Waste Management)
Day 4	Environmental Impact Assessment Human Habitats (buildings) and LCA
Day 5	ISO 14001 Standard and Integration with other Management Systems
Week-Two	Environmental Legislations and Audit
Day 6	ISO 14001:2015 Structural Hierarchy for implication of EMS
Day 7	Legislation
Day 8	Environmental Audit: Types, Purpose and requirements, Role of Lead Auditor
Day 9	Presentations on case studies
Day 10	Assignment and Group Discussion Quiz/ Assessment
Day 11-20	Case Studies and Project Work

SATELLITE IMAGE PROCESSING WITH PYTHON

1. Introduction:

The objective of this course is to equip the students/researchers to use PYTHON programming language for Satellite Image Processing with machine learning techniques, which are essentially used nowadays in research/industrial-projects concerned with mathematical modelling. In today's digital age, satellite imagery has become an invaluable tool for various industries, including agriculture, environmental monitoring, urban planning, and disaster management. Leveraging Python, a powerful programming language with rich libraries and tools for scientific computing, enables professionals to analyze, manipulate, and extract meaningful insights from satellite imagery efficiently. This comprehensive training program aims to equip participants with the knowledge and practical skills needed to harness the potential of satellite image processing using Python. The primary objective of this training program is to provide participants with a solid understanding of satellite image processing techniques and how to implement them using Python programming language.

2. Expected Outcome:

On completion of this course, the students are expected to

i. Access, pre-process, and visualize satellite image data using Python.
ii. Apply the acquired knowledge and skills to real-world projects in satellite image analysis.
iii. Acquire proficiency in using Python libraries and tools for satellite image analysis.
iv. Develop the ability to apply various image processing and classification algorithms to extract valuable information from satellite imagery.

4. Course Content and Schedule:

Week-One	
Day 1	Application of Satellite Imagery and its Processing
	Introduction to Python programming language for image processing
Day 2	Basics of Remote Sensing: electromagnetic spectrum and satellite sensors
	Introduction to different types of satellite data (optical, SAR, thermal, etc.)
Day 3	Working with Image Data: using APIs (e.g., NASA EarthData, Sentinel Hub)
	Pre-processing techniques
Day 4	Image enhancement techniques (contrast stretching, histogram equalization)
	Visualization methods using Python libraries (Matplotlib, OpenCV)
Day 5	Introduction to supervised classification algorithms (e.g., Maximum Likelihood, Support Vector Machines)
	Hands-on exercise: classifying land cover types from satellite images
Week-Two	
Day 6	Introduction to unsupervised classification algorithms (e.g., K-means clustering, Hierarchical clustering)

	Clustering satellite images for land cover mapping
Day 7	Concept of object-based image analysis
	Hands-on exercise: segmenting and classifying satellite images using OBIA techniques
Day 8	Understanding change detection concepts
	Techniques for change detection in satellite imagery (e.g., image differencing, principal component analysis)
Day 9	Introduction to deep learning for image classification
	Integration of Python libraries like TensorFlow and Keras for satellite image analysis
Day 10	Assignment and Group Discussion
	Quiz/ Assessment
Day 11-20	Case Studies and Project Work