Twenty-One Day Online Training Program
on
Advanced Statistical and Machine Learning Techniques for Data Analysis Using Open-Source Software for Abiotic Stress Management in Agriculture
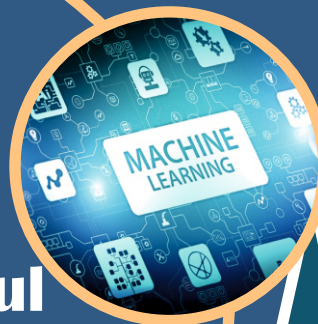## 16 July – 5 August 2025

Chief Patron
Dr. K Sammi Reddy, Director, ICAR–NIASM

Patron
Dr. Nitin P Kurade, Head, SSSPS, ICAR–NIASM

Course Directors

Dr. Santosha Rathod
Dr. Nobin Chandra Paul
Ms. Ponnaganti Navyasree
Mr. K Ravi Kumar

Organised by:

School of Social Science and Policy Support
ICAR-National Institute of Abiotic Stress Management Baramati, Maharashtra - 413115

About ICAR-NIASM

ICAR-NIASM is the premier institute of ICAR established in 2009 at Baramati. The institute aims at exploring the avenues for the management of abiotic stresses affecting the very sustainability of national food production systems. Besides focusing on developing climate resilient solutions through cutting-edge technologies for managing abiotic stresses, NIASM also aims to enhance scientific capacity through multidisciplinary research and capacity building programs.

About the Training Program

This 21-day online training program offers hands-on experience in advanced statistical, machine learning, and deep learning techniques for analyzing agricultural data. The training is not limited to abiotic stress management; it is applicable across all research disciplines where data analysis plays a critical role. Participants will work with large datasets using open-source tools such as R, Python, QGIS, VassarStats, and BlueSky Statistics through practical, application-oriented sessions.

Key Objectives

The training program aims to:

- Train the participants in multivariate statistics, AI- ML, and deep learning, agroecological modeling tools, remote sensing &GIS
- Provide hands-on experience with open-source software
- Enable independent application of these techniques in research work

Course Content

The program combines theoretical foundations with hands-on practical sessions, enabling participants to apply these techniques to their own datasets efficiently.

Module 1: Software Tools for Data Analysis

- ✦ Pre-training session on Installation guide to R/Python/other tools
- ✦ Introduction to R
- ✦ Introduction to Python
- ✦ Introduction to Bluesky Statistics & VassarStats
- ✦ Data Visualization in R
- ✦ R Shiny and R packages

Module 2: Regression & Multivariate Statistical Methods

- Regression Analysis
- Regression for Categorical Data
- Nonlinear Growth Models
- Regularization Techniques in Regression Models
- Panel Data Regression
- Non-Parametric Analysis
- Data Classificatory Techniques (CA, DA)
- Data Reduction Techniques (FA, PCA)

Module 3: Design of Experiments & Statistical Genetics

- Analysis of Complete and Incomplete Block Designs
- Analysis of Incomplete Block Designs
- Analysis of Groups of Experiments (GOE)
- Response Surface Methodology
- Generation Mean Analysis
- Mating Designs
- Path Analysis
- Stability Analysis
- QTL Analysis
- Transcriptomic Analysis
- Genome Wide Association Studies (GWAS)
- Genomic Selection
- Selection Index
- Meta-QTL Analysis
- Meta-Genomics

Module 4: Machine Learning & Deep Learning Techniques

- Introduction to Machine Learning
- k-nearest neighbor (KNN)
- Artificial Neural Network
- Support Vector Machine
- CART and Decision Tree
- Random Forest Regression
- Extreme Learning Machine
- XGBoost
- Deep Learning: RNN, GRU, CNN, LSTM, Transformer DL
- ML Optimization Techniques
- Yield Forecasting using AI

Module 5: Time Series & Forecasting Methods

- Trend Analysis
- Time Series Analysis
- ARCH Family of Models
- Bayesian Forecasting Models
- Count Time Series Models
- Spatiotemporal Time Series Modelling
- Hybrid Modelling
- Ensemble Modelling
- VAR and Cointegration Analysis

Module 6: Spatial & Environmental Data Analysis

- Introduction to RS & GIS
- Introduction to QGIS
- Introduction to Google Earth Engine
- Spatial Interpolation Techniques
- Introduction to Sampling & Spatial Sampling Strategy
- Application of ML in RS & GIS (ASIS portal)
- Application of UAVs in agricultural data modelling

Module 7: Agro-Ecological Modelling

- Biomass Modelling &Carbon Sequestration using Allometric Models
- CMIP6 GCM Models
- Crop Simulation Modelling (DSSAT and APSIM)
- High-throughput Plant Phenotyping
- Assessment of Extreme Weathers

Module 8: Emerging & Interdisciplinary Topics

- Importance of Data Science in Agricultural Research
- Meta Analysis
- AHP and Grey Model: Technology Forecasting
- Markov Chain Analysis
- Social Network Analysis
- Bibliometric Analysis
- Economic Index Development
- Impact Assessment Modelling, Trend Impact Analysis
- Statistical Modelling in Disease Epidemiology
- Fuzzy Regression Analysis

Expected Learning Outcomes

- By completing this program, participants will master in advanced statistical, machine learning, and deep learning techniques to analyze complex agricultural and environmental datasets.
- They will gain hands-on experience with open-source tools (R, Python, QGIS and others) for data analysis, image processing, and designing efficient workflows to address real-world abiotic stress challenges.

Who Can Apply?

- Researchers and scientists from agriculture, climate science, environmental studies, and allied fields
- Data analysts looking for transition from classical statistics to ML/DL approaches
- Academicians and students seeking proficiency in open-source statistical and geospatial tools

Registration Fee

- ₹ 1000/- for students and research scholars
- ₹ 2000/- for scientists, researchers, faculty members, and working professionals from public organizations
- ₹ 5000/- for participants from private industries

Bank Account Details

Account Holder Name: ICAR UNIT-NIASM, Baramati
Account Number: 30862846914
Name of the Bank: State Bank of India
Branch Address: Afzalpurkar Building, Bhigwan Road, Baramati, Maharashtra-413102
IFSC: SBIN0000321
UPI Code : icarniasmbmt@sbi

ICAR UNIT NIASM BARAMATI

SCAN & PAY

UPI ID: icarniasmbmt@sbi

Important Dates

- Last Date for Receipt of Applications: 30th June 2025
- Information to Selected Candidate: 2nd July 2025

Registration Link: https://forms.gle/5cMmTxnS19DvWoc48

Contact for Registration Related Queries

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भाक्अनुप
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किसानों का हमसफर
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Application Form

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on

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16 July to 5 August 2025

1.	Full Name (in BLOCK letters)				
2.	Highest degree with specialization				
3.	Present Institute Name				
4.	Address for Correspondence				
5.	E-mail address: *Telephone Number Mob/O/R:*				
6.	Date of Birth				
7.	Sex (Male/Female/other)				
8.	Education Qualification:				

	Degree	Subject	Year of passing	Class / Division / Equivalent	University / Institute
	Bachelors Masters Ph.D. Any Other				

9.	Level of Knowledge in Statistics	Beginner / Intermediate / Expert
10.	Level of Knowledge in R/ Python/ other software	Beginner/Expert
11.	Area of ongoing research work	
13	Expectations from the training	

*Candidate must fill in all the details .

Signature of the Applicant with date

CERTIFICATE
It is certified that information furnished above is correct.

Signature of the Recommending Authority
/ Head of the Department/ Institute along with Seal