ICAR-Sponsored Winter School on

Advanced Statistical and Machine Learning Approaches for Data-Driven Research

03 - 23
December 2026

Organized by

ICAR-Central Marine Fisheries Research Institute
Post Box. No. 1603, Ernakulam North P.O., Kochi-682 018
Kerala, India

भाकृअनुप
ICAR

80 Years of ICAR-CMFRI

Introduction

The rapid growth of research data generated through agricultural, fisheries, environmental, socio-economic and allied research programmes has created a growing need for advanced statistical and computational approaches for effective data-driven research. Contemporary research increasingly involves large, complex, multidimensional and heterogeneous datasets, requiring appropriate methods for data management, visualization, statistical modelling, prediction, classification and interpretation. The availability of advanced analytical software and computational tools has substantially enhanced the ability of researchers to analyse such datasets; however, effective application of these tools requires a sound understanding of statistical concepts, model assumptions, analytical procedures and interpretation of results.

Recent advances in machine learning, artificial intelligence, big data analytics, spatial analysis, time-series modelling and Bayesian approaches have further expanded the scope of quantitative research. Researchers need to be familiar with both conventional statistical methods and emerging computational approaches to identify appropriate analytical techniques for specific research problems and to derive meaningful and scientifically valid conclusions from data.

Therefore, this Winter School aims to provide faculty members and researchers under the National Agricultural Research and Education System (NARES) an opportunity to update and strengthen their knowledge and practical skills in advanced statistical and machine learning approaches for data-driven research. The programme will cover a wide range of analytical methods, including descriptive and inferential statistics, regression analysis, experimental designs, multivariate techniques, time-series analysis, machine learning, artificial neural networks, Bayesian modelling, deep learning, GIS and spatial analysis, data mining and big data analytics.

The programme will have a strong emphasis on practical applications, with particular attention to data visualization, hands-on analysis and interpretation of analytical outputs. Participants will be exposed to statistical and computational platforms such as R/RStudio, Python, SPSS and QGIS, along with contemporary artificial intelligence tools and approaches. The Winter School will use a combination of classroom lectures, software demonstrations, practical exercises and application-oriented sessions.

Objectives

- To familiarize participants with advanced statistical, analytical and machine learning approaches for data-driven research.
- To develop practical skills in modern data analysis and visualization tools with applications in exploratory data analysis, GIS, spatial analysis and research data interpretation.
- To enhance participants' ability to apply, evaluate and interpret appropriate analytical methods and explore emerging analytical techniques for scientific research.

Main Themes

Descriptive and inferential statistics

- Data collection methods and tools
- Data visualization and exploratory data analysis
- Data diagnostics and transformation

Statistical software and programming

- Introduction to Python
- R and RStudio

Regression and statistical modelling

- Correlation and regression analysis
- Qualitative regression models
- Panel data regression techniques
- Non-parametric regression
- Generalized Additive Models (GAM)

Multivariate and classification techniques

- Data classificatory techniques
- Data dimensionality reduction techniques
- Multidimensional scaling
- Multivariate analysis of variance and covariance
- Correspondence analysis

Experimental designs and optimization

- Basic experimental designs and data analysis
- Statistical designs for optimization trials

Time-series analysis and forecasting

- Application of linear time-series analysis
- Nonlinear time-series models for forecasting
- Technology forecasting and predictive analytics
- Hybrid time-series models
- Deep learning models for forecasting

Machine learning and artificial intelligence

- Introduction to machine learning for research applications
- Artificial neural networks
- Data mining and big data analytics
- Deep learning for image/data analysis
- Emerging trends in AI and data analytics for scientific research

GIS and spatial analytics

- Introduction to GIS
- GIS for spatial mapping
- Hands-on applications using QGIS
- Spatial regression

Climate and environmental data analytics

- Statistical approaches for climate change research
- Climatic impact drivers and data sources
- Species distribution modelling and applications

Advanced computational approaches

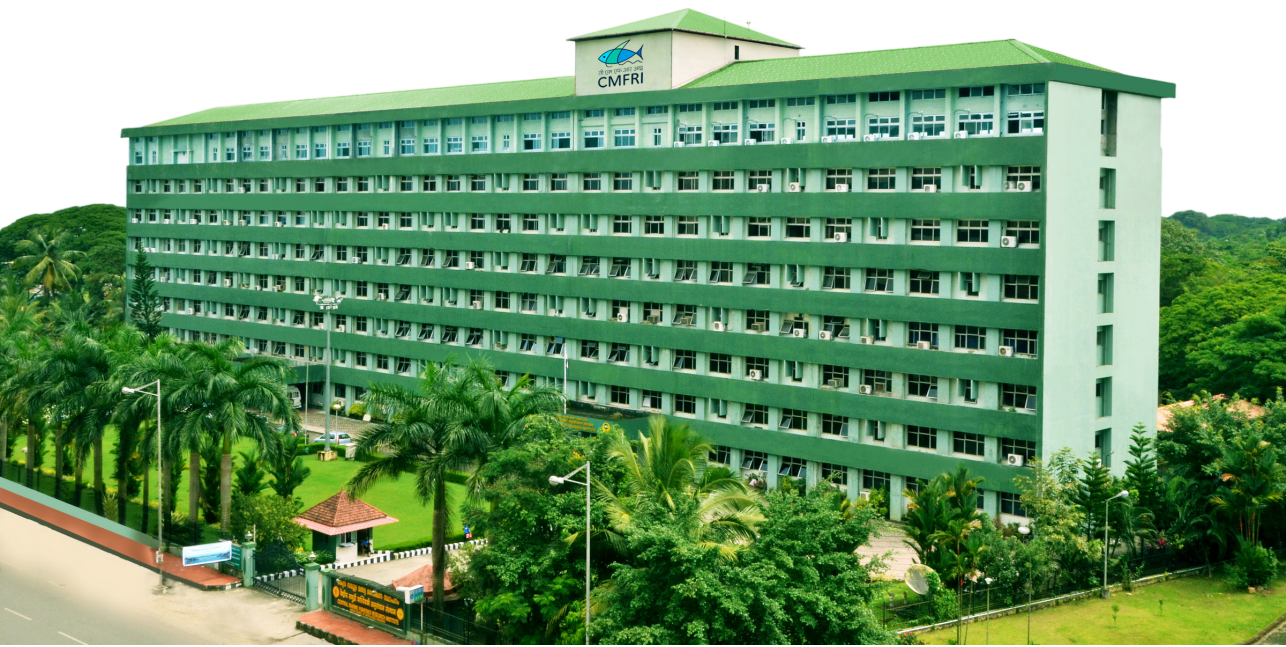
- Cloud computing for analytics
- High-performance computing for analytics
- Large Language Models in statistical analysis and interpretation
- More on ChatGPT, Google Gemini, Claude and similar tools

The Winter School will be organized through a combination of classroom lectures, demonstrations and hands-on practical exercises using statistical and computational software. The focus will be on the application of advanced analytical methods to research datasets, interpretation of analytical outputs and understanding the relevance of different techniques to research problems. The detailed schedule includes dedicated practical sessions in inferential statistics, regression analysis, experimental designs, species distribution models, QGIS and LLM-based analytical applications.

The participants will be provided with instructional materials and training resources forming part of the course. Participants are encouraged to bring one or two datasets from their own research work, which may be used during appropriate practical sessions for applying analytical procedures and discussing the interpretation of results.

About ICAR-CMFRI

Established in 1947, the ICAR-Central Marine Fisheries Research Institute (CMFRI) is a premier national and internationally recognized institution for research on tropical marine fisheries. The Institute is mandated to assess and monitor marine fisheries resources, understand the impacts of climate change and human activities, and support sustainable fisheries management and mariculture development. CMFRI houses the National Marine Fisheries Data Centre (NMFDC), one of India's most extensive fisheries databases, with over 9 million catch and effort records covering more than 1,000 species across the maritime states of India. Its multidisciplinary expertise encompasses statistics, data analytics, statistical modelling, artificial intelligence, machine learning, computer applications, GIS, economics and climate science. With its rich research datasets, advanced infrastructure and experienced scientific community, CMFRI offers an ideal ecosystem for advancing data-driven research and strengthening the application of modern statistical and machine learning approaches in agriculture and allied sciences.



Eligibility

Faculty and researchers in agricultural sciences and related disciplines from State Agricultural Universities/ICAR Institutes/Central/State fisheries and veterinary universities/ KVKs under NARES, not below the rank of Assistant Professor/Scientist or equivalent in the concerned subject are eligible to apply.

Selection of Participants

Twenty-five participants will be selected for the programme. Candidates with experience in fields pertaining to training will be given preference. Participants' nomination from the respective heads of organizations does not entail confirmed participation in the programme. The ICAR-CMFRI will provide an official confirmation letter outlining the candidates' selection.

How to Apply

Eligible candidates are required to register and submit their application online through the Google Form: https://forms.gle/7um17auqqLPzHxr5A

Applicants should:

- Submit the advance copy of the application through the online form.
- Obtain approval from the competent authority of their organization and upload the scanned copy of the approved application through the link provided via response mail.
- Pay the ₹50/- registration fee using the QR code provided below and enter the payment details in the application form.
- Send the original approved application by post to:

Dr. Eldho Varghese
Course Director
ICAR-Central Marine Fisheries Research Institute (ICAR-CMFRI)
Post Box No. 1603, Ernakulam North P.O.
Kochi – 682 018, Kerala, India

Pay here

Important:

The application will be considered for final selection only after receipt of the approved original application before the prescribed last date.

For clarifications:
wstp2026.icarcmfri@gmail.com

Dates to Remember

Last date for receipt of applications: October 26th 2026

Intimation to selected candidates: October 30th 2026

Boarding and Lodging

Free boarding and lodging will be provided to the participants during the training programme as per the approved ICAR norms for Winter School. The candidates are eligible for Travelling Allowance only for travelling by train to the maximum of AC II-tier (AC III-tier for Rajdhani/Duronto train/Vande Bharat) fare by the shortest route. Please note that, strictly, no accommodation in the guest house will be provided to the family members or guests of the participants.

For more information, contact:

- **Dr. Grinson George**
  Director
  ICAR-Central Marine Fisheries Research Institute
  Post Box No. 1603, Ernakulam North P.O.,
  Kochi-682 018, Kerala, India
  Ph. No.: 0484 2394357
  Fax No: 0484 2394909
  Email: director.cmfri@icar.org.in

- **Dr. Eldho Varghese**
  ICAR-National Fellow & Course Director
  ICAR-Central Marine Fisheries Research Institute
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  Kochi-682 018.
  Tel: +91 484 2394357 /202 (Extn)
  Mob: +91 9968401427
  Email: wstp2026.icarcmfri@gmail.com

Course Co-Directors:

- **Dr. J. Jayasankar**
  Principal Scientist & Head
  Fishery Resources Assessment, Economics & Extension Division
  ICAR-Central Marine Fisheries Research Institute
  Post Box No. 1603, Ernakulam North P.O.,
  Kochi-682 018.

- **Dr. Mini K. G.**
  Principal Scientist
  Fishery Resources Assessment, Economics & Extension Division
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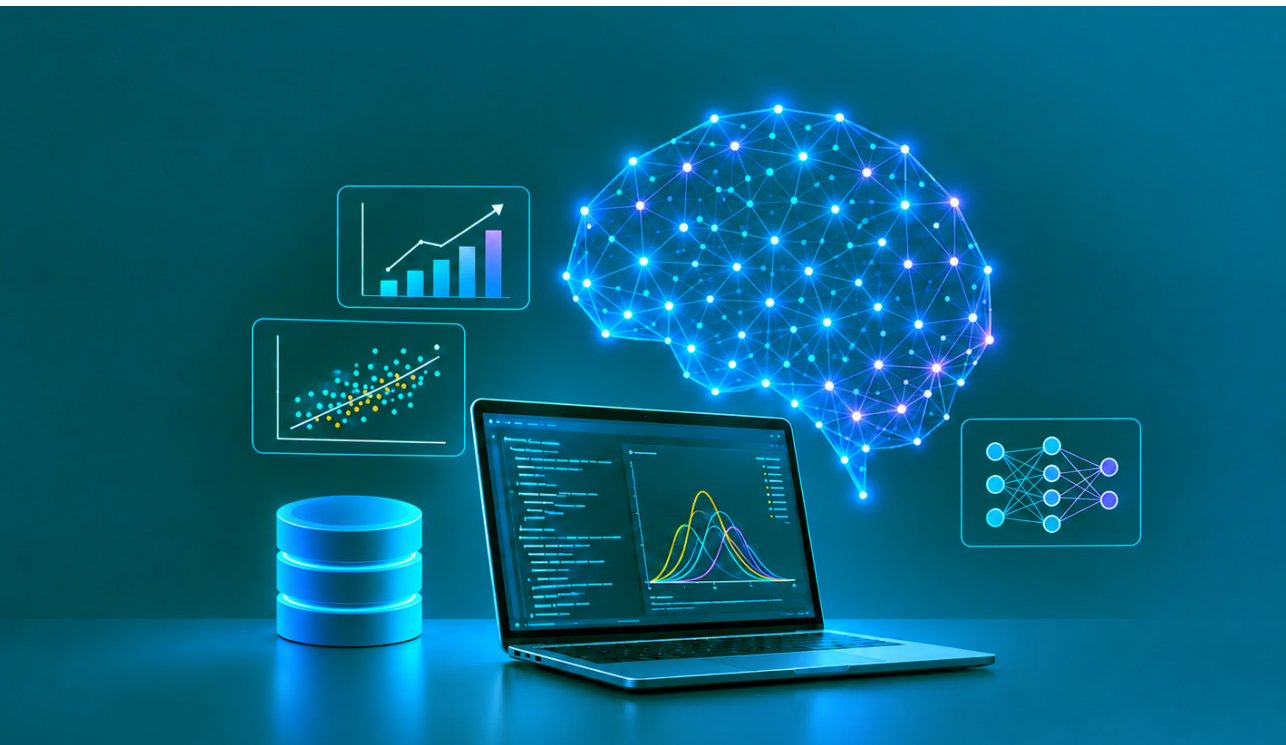

Application Form

ICAR-Sponsored Winter School on
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(03 - 23 December 2026)

Full Name (in block letters):.....
Designation:.....
Present employer and address:.....
.....
Address to which reply should be sent (in block letters):.....
Permanent Address:.....
.....
Telephone No. (off.): (Res.):.....(Mob):.....
Fax No.:.....E-mail:.....
Date of Birth:.....Sex (Male/Female/Other):.....
Marital Status: Married/Unmarried:.....
Teaching/Research/Professional Experience (mention the post(s) held during the last 5 years and the number of publications):.....
Have you participated in any training (Summer/Winter School/Short Course, etc.) during the last 5 years under ICAR/other organizations: Yes/No
(Name of the Institute, Title of the training):.....
Details of fee payment (Rs. 50/-):.....
Date:.....Transaction Details:.....
Academic Record:.....

Exam. passed	Subjects Main/ Subsidiary	Year of Passing	Class rank/ Distinction etc.	University/ Institution
Ph.D.				
Master's degree				
Other (specify)				

Discipline:

Level of knowledge of Statistics and Computer usage: Excellent/Good/Average

Signature of the Applicant with Date

Recommendations of the forwarding Institute

Signature of the Forwarding Authority
with Seal and Date

CERTIFICATE

It is certified that the information furnished above is correct. Travelling allowances will/will not be paid by this office.

Signature of the Sponsoring Authority
with Seal and Date