SR UNIVERSITY

10-day Online Workshop
on
"Empowering STEM with Python & R"

April 14, 2024-April 25, 2024

Session 1: 4.00 PM-6.00 PM (IST)
Session 2: 6.00 PM-8.00 PM (IST)
Total Hours: 40

Organized by

School of Agriculture (SoA), SR University, Warangal, Telangana-506371

: Overview of the STTP:

This Short-Term Training Program on “Empowering STEM with Python & R " is designed to provide participants with essential Python and R programming skills and their applications in Science, Technology, Engineering, and Mathematics (STEM) domains. The program bridges the gap between theory and practice, enabling participants to leverage Python’s powerful tools for computational problem-solving and R’s capabilities for data analysis, statistical computing, and visualization. By integrating these two versatile languages, participants will gain a well-rounded skill set to tackle real-world STEM challenges effectively.

✅ **Python for STEM**

- Introduction to Python fundamentals and syntax
- Data handling with **NumPy** and **pandas**
- Scientific computing and simulations with **SciPy**
- Data visualization with **Matplotlib**
- Introduction to machine learning with **scikit-learn**
- Real-world applications: automating tasks, analyzing scientific data, and modeling trends

✅ **R for STEM**

- Fundamentals of R programming and syntax
- Data wrangling using **dplyr** and **tidyr**
- Statistical computing and machine learning with **caret**
- Advanced data visualization with **ggplot2**
- STEM-specific case studies in statistical analysis and predictive modeling

Objectives of the STTP:

- To introduce Python and R as versatile tools for solving STEM-related challenges.
- To equip participants with essential programming, data analysis, and problem-solving skills using both languages.
- To Develop proficiency in data manipulation, statistical computing, and visualization through **Python** and **R libraries**.
- To demonstrate applications of Python and R in STEM fields, including scientific computing, simulations, hypothesis testing, and predictive modeling.
- To provide hands-on experience through interactive coding exercises, real-world case studies, and a capstone project integrating both programming languages.
- To empower participants to develop data-driven solutions for academic research, industry innovation, and technological advancements in STEM.

Learning approach:

1. **Hands-on coding exercises**
2. **Domain-specific case studies**
3. **Capstone project**
4. **Interactive online format**

About SR University

SR University (SRU) is a autonomous private University spread over in 150 acres lush green campus. It has 9000+ students, 900+ faculty and 140+ Programs on board across various schools viz., School of Engineering, School of Agriculture, Schools of Computer Science and Artificial Intelligence, School of Businesses, School of Allied Health Sciences and basic Sciences, etc.

SRU is the one of the top private universities in India and only university in Telangana State, which has been consistently getting top 100 NIRF ranking in Engineering category (98 in 2024) and below 150 ranking in University category among all Universities of India for the past 4 years.

The goal of SRU is to create an innovative teaching-learning ecosystem to make all its graduates' experts in their fields to deal with growing challenges of the nation in all spheres. SRU is committed to transform the educational system by its unique initiatives of engaging creative faculty, creating technology-enabled infrastructure and adapting collaborative entrepreneurial ecosystem

www.sru.edu.in

About School of Agriculture (SoA)

The School of Agriculture (SOA) which started 3 years back in 2020 has made rapid strides in student admissions (500+), creating academic infrastructure (both Lab and Land) and starting PG, Ph.D. programs in the current academic year.

Adaption of ICAR Syllabus, presence of well qualified faculty from reputed institutions across the nation, state of the art infrastructure, excellent teaching-learning atmosphere etc. are the few specialities to the credit of SoA to mention about.

A well-developed instructional farm, horticulture garden, modern protected cultivation structures with all crops and technologies round the year, is a unique and rare opportunity to its students to learn and become industry competent experts at the end.

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Session Plan for Week 1

Empowering STEM with Python

	Afternoon Session (Session 1)	Evening Session (Session 2)
Day 1: April 14, 2025	• **Introduction to Python Environment & Basics** Installing Python & IDE options (Anaconda, VS Code, etc.)- Overview of Python interpreter and Jupyter Notebooks- Basic syntax, printing, and arithmetic- Variables and data types	• **Python Data Types & Data Structures** Basic data types (int, float, string, bool)- Lists, tuples, sets, dictionaries- Indexing and slicing- Built-in functions for data structures- Hands-on exercises
Day 2: April 15, 2025	• **Control Structures & Flow Control in Python** If-else statements- For loops, while loops- range() function and looping patterns- Break, continue statements- Practice exercises	• **Functions & Modules in Python** Defining and calling functions- Function arguments and return values- Scope of variables (local vs. global)- Creating and importing modules- Hands-on coding exercises
Day 3: April 16, 2025	• **Introduction to NumPy & Pandas** NumPy arrays: creation, indexing, slicing- Pandas Series and Data Frames- Loading data (CSV, Excel)- Basic data inspection (head, tail, info)- Hands-on exercises	• **Data Wrangling & Cleaning with Pandas** Handling missing values- Filtering, sorting, grouping, merging- Applying functions across rows/columns- Real-world dataset exercises
Day 4: April 17, 2025	• **Data Visualization in Python (matplotlib & seaborn)** Basic plotting with matplotlib (line, scatter, bar)- Customizing plots (titles, labels, legends)- Introduction to seaborn (distplot, boxplot, etc.)- Creating subplots	• **Introduction to Object-Oriented Programming (OOP)** Classes and objects- Attributes, methods, and constructors- Inheritance basics- Hands-on exercises creating simple classes
Day 5: April 18, 2025	• **Basic Machine Learning with Python (scikit-learn)** Introduction to machine learning concepts- Simple linear regression example- Classification example (e.g., Logistic Regression)- Model evaluation	• **Advanced Python Topics** Small end-to-end data analysis/ML project in Python- Notebooks vs. scripts, virtual environments- Discussion on best practices and Python ecosystem resources-

Session Plan for Week 2 **Empowering STEM with R**

	Afternoon Session (Session 1)	Evening Session (Session 2)
Day 6: April 21, 2025	• **Introduction to R Environment & Basics** Installing and setting up R & RStudio- Overview of RStudio interface (Console, Editor, Environment)- Basic arithmetic operations- Writing a simple script and running it- Understanding variables and assignments	• **R Data Types & Data Structures** Basic data types (numeric, character, logical)- Vectors, matrices, arrays- Lists and data frames- Basic subsetting and indexing- Hands-on exercises
Day 7: April 22, 2025	• **Data Import/Export & Basic Manipulation** Reading data from CSV, Excel, text- Writing data to files- Basic data cleaning and manipulation (built-in R functions)- Dealing with missing data- Intro to tidyverse (overview)	• **Exploratory Data Analysis (EDA) with R** Summaries and descriptive statistics (mean, median, etc.)- Data inspection (head, tail, str)- Detecting outliers and data inconsistencies- Hands-on EDA with a sample dataset
Day 8: April 23, 2025	• **Data Visualization in R** Base R plotting (plot, hist, boxplot)- Introduction to ggplot2- Creating basic plots (bar, line, scatter) with ggplot2- Customizing plots (themes, labels, legends)- Hands-on exercises	• **Advanced Data Manipulation with dplyr** Select, filter, arrange, mutate, summarize- Group_by operations- Joins and merges- Hands-on exercises with real-world datasets
Day 9: April 24, 2025	• **Control Structures & Functions in R** If-else, for loops, while loops- Vectorized operations vs. loops- Writing your own functions- Best practices in writing R functions	• **Statistical Analysis in R** Basic statistical tests (t-test, chi-square test)- Correlation and basic regression- ANOVA overview- Interpretation of results- Hands-on examples
Day 10: April 25, 2025	• **Introduction to Modelling in R** Linear Regression modeling (lm function)- Model interpretation and evaluation (R^2, residual plots)- Simple classification examples (optional)- Best practices in model building	• **Advanced R Topics** Building a small data analysis project in R- Overview of Shiny for interactive apps (demo)- Discussion on best practices and R ecosystem resources-

Resource Persons:

Academicians in the concerned field from IITs/NITs/IIITs/SR University are invited to deliver lectures in the program.Speakers from industries are also expected to deliver as part of the course.

Who can attend??

Faculty members, Research scholars, PG/UG students, and Industry practitioners dealing with agricultural research, and any other doing research/or having interest in the stated field.

: Certificate of Participation:

At least 80% attendance and submission of assignments/responses to quizzes are mandatory for getting the certificate. The participants will be encouraged to solve their own problems using the techniques to be discussed in the session.

Registration Fees

UG/PG Students	₹ 500.00
Research Scholars	₹ 750.00
Faculty Members	₹ 1000.00
Industry Persons	₹ 2000.00
International Participants	$ 25

How to Apply??

Participants need to pay the **Registration Fees** online using the following details:

Account details for registration

Account Name: SR UNIVERSITY	
Account Number: 120001993795	
Bank Name: Canara Bank	SR UNIVERSITY RESEARCH AND DEVELOPMENT 312845788993795@cnrb
IFSC Code: CNRB0002450	
Foreign Exchange/ SWIFT Code: CNRBINBBBFD	
MICR Code: 506015003	**SCAN TO PAY**
Bank address: Balasamudram Branch, Hanumakonda, Warangal, Telangana, India-506001	

Please pay before you register yourself and uploaded the payment receipt at the time of registration.

Participants are required to fill the online registration form by clicking on the following link:

Link:
https://forms.gle/uAEJinrkQtEduanQ6

SCAN TO REGISTER

Selection Criteria:

Selection will be done based on first-come-first-serve to a maximum number of 100 (hundred). Additionally, 10 participants from industry are allowed to participate. The list of selected participants will be intimated through email/WhatsApp. In case the candidate is not selected, the registration amount will be refunded.

Candidates will be issued certificate on successful completion of the already mentioned criteria (80% attendance and submission of assignments/ response to quizzes).

IMPORTANT DATES & TIMINGS:

STTP Schedule:	April 14, 2025-April 25, 2024
Timings:	Session 1: 4.00 PM-6.00 PM (IST) Session 2: 6.00 PM-8.00 PM (IST)
Total duration:	40 Hours
Last Date of Registration:	April 07, 2025
Selection list by e-mail/WhatsApp:	April 10, 2024

:Platform:

- **Google meet/Zoom/Microsoft Team**

The link will be provided after confirmtaion of your registartion through e-mail/WhatsApp (One day prior to the program).

For any queries and support, Please contact:
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