

SHORT-TERM TRAINING PROGRAM
on
**From Data to Insights: Statistical
Analysis with Free and AI-Driven Tools**

25 - 30 May, 2026

Offline Mode

DETAILED REPORT

Inter University Centre for Teacher Education

BHU, Varanasi - 221005

SHORT-TERM TRAINING PROGRAM on

From Data to Insights: Statistical Analysis with Free and AI-Driven Tools

25 - 30 May, 2026

Offline Mode

DETAILED REPORT



Inter University Centre For Teacher Education

BHU, Sundar Bagia, Naria-BLW Road, Varanasi-221005

Inter University Centre for Teacher Education
(An Autonomous Institution of UGC, MoE, Govt. of India)

© IUCTE, May 2026

All rights reserved. No part of this publication may be reproduced, stored or distributed in any form or by any means, electronics or mechanical, magnetic tape, including photocopying, recording or otherwise, without written permission from the publisher.

Published by Senior Administrative Officer,
Inter University Centre for Teacher Education (IUCTE)
Banaras Hindu University, Sundar Bagiya, Nariya-B.L.W. Road, Varanasi-221005
Design & Layout by Shubham Prajapati (Technical Assistant, IUCTE) & Printed at Jembo Photo State & Internet

Foreword

It is a matter of immense pride and privilege to present the program report of our six-day national Short-Term Training Program (STTP), *“From Data to Insights: Statistical Analysis with Free and AI-Driven Tools.”* As an institution dedicated to reshaping teacher education and fostering a culture of rigorous empirical inquiry among the faculty members of Indian universities, the Inter University Centre for Teacher Education (IUCTE), Varanasi, continually strives to remain at the absolute vanguard of contemporary academic development.



In the contemporary era, the boundaries of classical research are expanding at an unprecedented rate. We are living in a data-driven society where the quality of educational planning, policy design, and academic publications depends heavily on our capacity to transform raw data into actionable, evidence-based insights. This specialized program was mindfully conceptualized to address a critical necessity in higher education: bridging the gap between abstract statistical theories and modern, scalable computational execution. Over the course of six days, our participants transcended basic desktop calculations to master robust, non-parametric tests, multivariate regression models, and exploratory routines using state-of-the-art tools such as Jamovi, RStudio, and Python.

Crucially, this training program embraced the inevitable integration of Artificial Intelligence in quantitative and qualitative analysis. As an institution, we firmly believe that AI is not a trend to be feared, but a transformative partner to be embraced with the utmost responsibility, ethical caution, and critical vigilance.

I extend my deepest appreciation to our distinguished resource persons who shared their profound expertise, our dedicated convenors who orchestrated this multi-state initiative seamlessly, and the 37 enthusiastic participants representing 10 states/UTs across the country. I am confident that the skills, competencies, and rigorous statistical habits developed during this program will significantly elevate the standard of research and teaching in their respective home institutions, paving the way for holistic human development.

(Prof. Prem Narayan Singh)

Message

The publication of this Short-Term Training Program report marks a significant milestone in our ongoing mission to democratize advanced data literacy and research craftsmanship among the faculty members of our nation. Quantitative and qualitative research methodologies are frequently hindered by a common pedagogical disconnect where software outputs are treated as mere aesthetic ornaments rather than deep diagnostic conversations with data. This training program was specifically structured to dismantle that limitation.



Throughout the intensive technical modules, our focus remained resolutely fixed on methodological rigour and conceptual truth over superficial execution. Participants were taught that statistical significance or beautifully rendered bibliometric maps mean very little if the underlying parametric assumptions, such as normality, independence, and homoscedasticity are ignored or violated. By navigating the intricate data nuances across different platforms, participants have developed the vital analytical instincts required to see past numerical decorations and extract genuine, real-world contributions to classrooms, policy frameworks, and empirical science.

The integration of R, Python, and AI-assisted tools within this program represents the next logical step in research methodology. By leveraging conversational scripting, we have effectively lowered the barrier to entry for robust programming, allowing researchers to focus their intellectual energy on hypothesis formulation, experimental design, and the qualitative narratives of human experience.

As Dean of Academics and Research, I am deeply heartened by the dedication displayed by our participants. Armed with this modernized, cross-platform toolkit, you are now thoroughly equipped to conduct reproducible, auditable, and globally competitive research. I wish all the participants the very best in their future data-driven discoveries and academic endeavors.

(Prof. Asheesh Srivastava)

INDEX

S.N.	Particulars	Page No.
1.	About the Program	1-2
2.	Program Objectives and Themes	2
3.	Key Data about the program	2
4.	Profile of Resource Persons	3-6
3.	Program Proceedings and Outcome	7-48
4.	Annexures:	
	● Feedback Analysis	49-52
	● List of Resource Persons	53
	● List of Participants	54-55
	● Organising Team	56
	● Media Advocacy & Press Releases	57-60
	● Glimpses of the program	61

About the Program

The pursuit of high-quality research today requires not only intellectual curiosity but also strong methodological rigor and analytical competence. In almost every discipline, from education and social sciences to management and health sciences, the ability to design studies, analyze data, and present results convincingly is what determines the credibility and impact of research. The effective use of statistical and analytical tools is, therefore, no longer optional but a fundamental requirement for researchers and faculty members.

At the same time, the research ecosystem is undergoing a rapid transformation with the emergence of Artificial Intelligence (AI). AI-enabled features are beginning to reshape traditional statistical and research analysis workflows. From automated data cleaning and instant descriptive summaries to AI-assisted coding and advanced bibliometric visualizations, these innovations are opening new pathways for researchers to analyze data faster, more accurately, and with greater interpretive clarity. Against this backdrop, there is a growing need for training programmes that not only strengthen foundational statistical skills but also equip the faculty with the competencies to adopt AI-supported tools.

It is with this vision that the Short-Term Training Programme (STTP) on “From Data to Insights: Statistical Analysis with Free and AI-Driven Tools” has been conceptualized. The programme offers a carefully structured, six-day training experience that blends theory, practical demonstrations, and hands-on sessions. It aims to provide participants with equal exposure to six widely used research tools, ensuring a balanced skill set in both quantitative and qualitative domains.

- Excel 365 with AI Copilot is included because of its accessibility and versatility. Many researchers are already familiar with Excel, but this programme highlights its advanced potential for hypothesis testing, dashboards, and AI-powered features such as automated insights and predictive analysis.
- R has been chosen for its power, flexibility, and global recognition as a leading software for data science and statistical modeling. With AI support, even beginners can learn to generate and interpret R scripts using natural language prompts.
- Jamovi, an open-source, GUI-based software, allows non-coders to perform advanced statistical tests with ease. It generates APA-style outputs and integrates seamlessly with teaching and publishing requirements.
- VOSviewer and Scimago Graphica are included to enable participants to conduct bibliometric mapping and advanced visualizations. These tools are particularly useful for analyzing large sets of academic publications, citations, and research networks, helping scholars to identify research trends and gaps.
- Taguette represents the qualitative dimension of research. It allows researchers to code textual data, identify themes, and conduct rigorous qualitative analysis.

This multi-tool approach ensures that participants are not limited to a single method or software, but become versatile researchers capable of selecting the most appropriate tools for their research questions and data types. By the end of the six days, participants will not only have enhanced their conceptual understanding of statistics but also developed practical skills

in six different software tools, while experiencing how AI can be integrated at every stage of research. This holistic training is intended to empower participants to carry out research that is statistically sound, technologically current, and globally competitive.

Objectives of the Program

- To strengthen participants' conceptual understanding of descriptive and inferential statistics.
- To provide hands-on exposure to Excel 365, R, Jamovi, VOSviewer, Scimago Graphica, and Taguette.
- To demonstrate the role of AI in statistical, bibliometric, and qualitative research analysis.
- To enable participants to manage, analyze, visualize, and interpret diverse datasets.

Key Themes of the Program

- Statistical Foundations
- Excel 365 with AI Copilot
- R for Statistical Computing
- Jamovi
- Visualization tools
- Qualitative Analysis

Key data about the programme

- **Total No. of Participants who attended the programme: 37**
- **Gender-wise participation:**

<i>Gender of Participants</i>	<i>Number</i>
Male	20
Female	17
TOTAL	37

- **Total number of Resource Persons: 8**
- **States/UTs Representation (10):** Bihar, Delhi, Gujarat, Haryana, Kerala, Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh and West Bengal

Profile of Resource Persons

Prof. Gaurav Singh

(Central Institute of Educational Technology (CIET), NCERT, New Delhi)

Prof. Gaurav Singh is a distinguished academician currently serving as Professor (Educational Technology) at the Central Institute of Educational Technology (CIET), NCERT, New Delhi. Prior to this, he contributed significantly as a Professor at the School of Education, Central University of Haryana, and earlier as a faculty member at IGNOU's School of Education, where he coordinated the Bachelor of Education (B.Ed.) programme. An accomplished scholar, Dr. Singh holds an M.Sc. in Chemistry, an M.Ed. (Gold Medallist), UGC-NET qualification in Education, a Ph.D. in Teacher Education, and a PGDDE (Gold Medallist). Beginning his career in 2003, he has amassed over two decades of rich experience in teacher education and educational technology. Dr. Singh was the First Channel Coordinator for SWAYAMPURABHA's Channel 32: Teacher Education (2016 - 2020) and later for Channel 20: SOUs and Teacher Education till 2022. His pioneering contributions to digital education include recording/developing 125 MOOCs modules and coordinating nearly 1,200 lectures for SWAYAM and SWAYAMPURABHA platforms. He has also authored a book on Teacher Education, published 34 research papers in reputed journals, contributed over 40 chapters to ODL study materials, and successfully guided doctoral research in E-learning and ICT. He has developed and offered five MOOCs, benefiting nearly 60,000 learners. His course on Research Ethics and Plagiarism has been widely adopted by around 40 universities and ranked among the top ten SWAYAM courses of all time. Dr. Singh's outstanding contributions have been recognized internationally. He is a recipient of the Commonwealth of Learning-AAOU Fellowship (2018), the Silver Medal for Best Practices by AAOU (2018, Vietnam), the Distinguished Distance Educator Award by NIOS, and a travel grant to attend PCF-10 at Athabasca University, Canada (2022). His SWAYAM course on Learning and Teaching was adjudged the Best SWAYAM Course in 2021. An active academician, Dr. Singh has delivered over 300 invited talks and training sessions across universities and teacher education institutes. His key areas of interest include Research Methodology, ICT in Education/ODL, and Teacher Education.



Prof. Asheesh Srivastava

Dean (Academic & Research), IUCTE, BHU, Varanasi

Prof. Asheesh Srivastava is a distinguished academician in the field of Education, currently serving as Professor of Higher Education Policy and Dean (Academic & Research) at the Inter-University Centre for Teacher Education (IUCTE), Banaras Hindu University, Varanasi. He holds multiple academic degrees, including a Ph.D. in Education, M.Sc. in Mathematics, M.Ed., M.A. in Philosophy, and UGC-NET (Education).



With over two decades of teaching and research experience, Prof. Srivastava has served in reputed institutions such as Mahatma Gandhi Central University, Motihari, Visva-Bharati University, and Amity University. He has also held several academic leadership positions, including Dean, Director of Academic Affairs, Campus Director, and Head of Department. His contributions extend to national educational reforms, policy implementation, and teacher education.

As a prolific scholar, Prof. Srivastava has authored and co-authored numerous books, chapters, and over 50 research papers in reputed journals. His specialization lies in Educational Policies, Programmes, and Research Methods in Education, with research interests in Philosophy of Education and Pedagogy of Mathematics. He has guided several doctoral and postgraduate scholars, making significant contributions to research capacity building.

Prof. Srivastava has been associated with various academic and professional bodies as a board member, external expert, and resource person. His academic excellence has been recognized internationally, including the *Maya Gold Foundation Award for Excellence & Service as a Young Academic Leader* (USA, 2020).

Through his extensive teaching, research, publications, and policy involvement, Prof. Srivastava continues to shape educational discourse, bringing innovative perspectives to higher education and teacher development in India.

Prof. .Gautam Bandyopadhyay

(Retd. Professor National Institute of Technology, Durgapur)

Prof. Gautam Bandyopadhyay is Former Professor in Department of Management Studies, National Institute of Technology, has completed his PhD in Management Studies from Jadavpur University. He is FICWAI and FCMA qualified from ICWAI and also graduated in Operations research from Operational Research Society of India. He completed Post Graduate diploma in Computer application from Regional Computer Centre Jadavpur university, India. His research works are published in numerous Foreign Peer-review Journals & Indian peer-reviewed journals. He has successfully guided 20 numbers of PhD scholars,



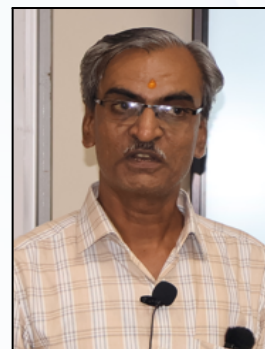
His research mainly involves with Financial Capital market and portfolio optimization using different soft computing techniques such as, fuzzy Goal programming, Fuzzy Time Series, Different Statistical multivariate techniques and Optimization techniques like DEA Mainly used software's like SPSS, Jamovi, for Statistical Analysis , R studio for Statistical as well as Optimization Techniques and Python for Machine learning and Visualisation.

Dr. Raju D. Chaudhari

(Associate Professor, Mafatlal Gagalbhai Science Institute, Ahmedabad)

Dr. Raju is an accomplished Associate Professor of Statistics with over 28 years of teaching experience at the undergraduate level. He has been serving at M.G. Science Institute, Ahmedabad since 2008 and possesses strong expertise in statistical analysis, data science, and

research methodologies. His academic background includes a Ph.D. in Statistics from Sardar Patel University. Dr. Raju has published several research papers and has extensive proficiency in statistical and programming tools such as SPSS, R, Python, Jamovi, Minitab, and MS Excel. He has contributed as a consultant in research projects, including work with INFLIBNET and data analytics projects. As a resource person, he has conducted numerous workshops and expert sessions at reputed institutions across India. He is also the recipient of prestigious academic awards for excellence in research and academic achievements.



Dr. Parag B. Shah

(Associate Professor, H.L. College of Commerce, Ahmedabad)

Dr. Parag is a distinguished academician, consultant, and corporate trainer with over 25 years of combined experience in academia and industry. He specializes in Statistics, Data Science, Digital Transformation, and Business Analytics, with expertise in integrating emerging technologies such as Artificial Intelligence, Machine Learning, IoT, and Blockchain. As a Professor at H.L. College of Commerce, Ahmedabad, he plays a significant role in developing future professionals by combining theoretical knowledge with practical industry applications. Dr. Shah is widely recognized for his contributions as a consultant and trainer, helping organizations adopt data-driven strategies and digital transformation initiatives. His experience enables businesses to improve innovation, operational efficiency, and informed decision-making. An alumnus of reputed institutions including IIT Kharagpur, IIT Hyderabad, Duke University, and CMC Vellore, Dr. Shah continues to contribute toward advancing analytics-driven solutions and empowering organizations in today's rapidly evolving digital environment.



Sh. Hiteshkumar Solanki

(Scientist–D (Computer Science), INFLIBNET Centre)

Sh. Hitesh Kumar Solanki is currently serving as Scientist–C (Computer Science) at the INFLIBNET Centre, Gandhinagar, where he has been contributing since July 2019. He began his tenure at the Centre as Scientist–B (Computer Science) on July 11, 2014. Prior to joining INFLIBNET, he worked as an Assistant Professor at The Maharaja Sayajirao University of Baroda in 2014.



He holds a Master of Computer Applications (MCA) degree from L.D. College of Engineering, Ahmedabad, and a Bachelor of Science (B.Sc.) in Statistics from Sardar Patel University, Vallabh Vidyanagar. He qualified for the UGC-NET (Computer Science) for Lectureship in December 2012 and brings over 15 years of academic and research experience at the undergraduate and postgraduate levels across various institutions.

Mr. Solanki has actively contributed to several prominent national-level initiatives, including One Nation One Subscription (ONOS), National Institutional Ranking Framework (NIRF), Indian Research Information Network System (IRINS), Discovery Services for e-Resources, National Research Data Repository (NRDR), e-Shodh Sindhu: Consortium for Higher Education e-Resources, and InfiStats: Usage Statistics for e-Resources. He has also been involved in major projects such as ARIIA (Atal Ranking of Institutions on Innovation Achievements) and ICSSR Data Service: Indian Social Science Data Repository.

He is an active team member of the ORCID Global Participation Program, where he supports outreach efforts related to the adoption and implementation of ORCID within the Indian research community.

His areas of expertise include statistical analysis using Jamovi, R, and Python, as well as SPSS, research data management and data services, and bibliometric analysis.

Dr. Deepty Gupta

(Assistant Professor, IUCTE, BHU, Varanasi)

Dr. Deepty Gupta is an Assistant Professor (Education) at the Inter University Centre for Teacher Education (IUCTE), BHU, Varanasi, and a passionate advocate for leveraging educational technology to transform learning. With a Ph.D. in Education focused on e-learning in teacher education, Dr. Gupta brings over 16 years of rich experience spanning higher education, school education, and national-level ICT initiatives.



Previously at CIET, NCERT, she played a pivotal role in flagship projects like SWAYAM, PMeVIDYA and SWAYAM Prabha, focusing on e-content development, ICT pedagogy, and teacher training. Her expertise encompasses MOOCs, FOSS, curriculum development, science pedagogy and educational research. Dr. Gupta has contributed significantly to teacher education, published extensively many journal articles and book chapters, and is dedicated to empowering educators with innovative, technology- enhanced pedagogical strategies for the 21st century.

Sh. Chakradhar Rana

(Assistant Librarian, IUCTE, BHU, Varanasi)

Shri Chakradhar Rana is an Assistant Librarian at the Inter University Centre for Teacher Education (IUCTE), Banaras Hindu University (BHU), Varanasi, with over nine years of professional experience in academic and educational libraries. He holds an M.Phil. and Master's degree in Library and Information Science and has qualified UGC-NET. His expertise includes library administration, automation, digital libraries, institutional repositories, bibliometric analysis, and implementation of open-source library technologies. Prior to joining



IUCTE-BHU, he served at Regional Institute of Education (NCERT), Bhubaneswar and Bhopal, and at NIT Rourkela. He is the nodal officer for IRINS, DrillBit, INFED, Grammarly, and NDLI Club initiatives at IUCTE. He has published research papers in reputed journals, contributed to conference proceedings, and has been invited as a resource person for professional training programmes.

Program Proceedings

Day 1: 25 May, 2026

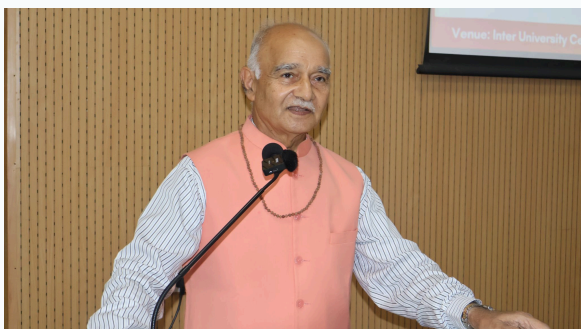
Inaugural session

Speakers:

- **Prof. Rama Shanker Dubey, Chancellor of NIEPA, New Delhi (Chief Guest)**
- **Prof. Gaurav Singh, CIET, NCERT, New Delhi (Guest of Honour)**
- **Prof. Prem Narayan Singh, Director, IUCTE, BHU, Varanasi (Presidential address)**

A six-day Short-Term Training Program (STTP) on the theme “*From Data to Insights: Statistical Analysis with Free and AI-Driven Tools*” was inaugurated at the Inter University Centre for Teacher Education (IUCTE), Varanasi. The program commenced with an invocation (*Mangalacharan*) by Dr. Raja Pathak, Assistant Professor, IUCTE, Varanasi. This was followed by the lighting of the lamp and a floral tribute to the statues of Goddess Saraswati and Mahamana Pandit Madan Mohan Malaviya Ji. In the same sequence, a "Glimpses" presentation was showcased, capturing IUCTE's 12-year journey of development and growth. The Chief Guest of the program was Prof. Rama Shanker Dubey, Chancellor of the National Institute of Educational Planning and Administration (NIEPA), New Delhi, and the Guest of Honour was Prof. Gaurav Singh from CIET, National Council of Educational Research and Training (NCERT), New Delhi. The program was presided over by Prof. Prem Narayan Singh, Director, IUCTE. Prof. Asheesh Srivastava, Dean (Academics & Research), IUCTE, welcomed the guests. In his welcoming address, Prof. Asheesh Srivastava, Dean (Academics & Research), IUCTE, extended a warm and cordial reception to all the distinguished dignitaries, resource persons, and participants. He highlighted the vital importance of data literacy in modern academia and emphasized that the true power of statistics lies in uncovering deep, meaningful insights rather than just analyzing superficial numbers.

In the inaugural address, the Chief Guest, Prof. Rama Shanker Dubey, Chancellor of NIEPA, New Delhi, stated that the education system must always be responsive to the needs of society and changing dynamics. He emphasized that teachers and faculty members must be empowered in a manner that enables them to equip students with global competencies and competitive capabilities. He noted that mathematics has been an integral part of Indian society and its knowledge tradition since ancient times. Over time, the world has witnessed numerous technological transformations, and the contemporary era is driven by artificial intelligence and data-centric technologies. In such a scenario, teachers, researchers, and students must develop the capacity to comprehend, analyze, and extract meaningful conclusions from data by effectively utilizing artificial intelligence and other modern digital tools.



The Guest of Honour, Prof. Gaurav Singh, CIET, NCERT, New Delhi, highlighted the necessity of data literacy and analysis in the field of education. He mentioned that in the current era, data-driven decisions play a crucial role in enhancing the quality and effectiveness of education. Furthermore, he urged teachers and researchers to build



proficiency in the scientific analysis of data through modern digital utilities. In his presidential address, Prof. Prem Narayan Singh, Director, IUCTE, extended a warm welcome to all the guests and participants. He stated that Artificial Intelligence (AI) is a major, highly influential technology of modern times, which must be utilized with the utmost responsibility, ethics, and caution. He

emphasized that the positive and constructive use of AI can contribute significantly to the development of education, research, and society.

Formal vote of thanks was delivered by Sh. Chakradhar Rana, Assistant Librarian, IUCTE. The proceedings of the program were conducted by Dr. Deepty Gupta, Assistant Professor, IUCTE, Varanasi.



Session 1: Role of Data, Statistics & AI in Research: Types of Data & Levels of Measurement

Resource Person: Prof. Gaurav Singh, CIET, NCERT, New Delhi

Objective of the Session:

- Explain how data structures, statistical tools, and Artificial Intelligence (AI) drive modern research paradigms.
- Differentiate among the four levels of measurement (Nominal, Ordinal, Interval, and Ratio) and explain how they dictate parametric versus nonparametric analytical models.

The first technical session titled "Role of Data, Statistics & AI in Research: Types of Data & Levels of Measurement," was delivered by the distinguished resource person, Prof. Gaurav Singh. The session provided a comprehensive, structured exploration of modern research methodologies, guiding participants through the complete lifecycle of data-driven research. The primary focus of the discourse centered on managing the critical transition from formulating abstract, theoretical research questions to building concrete, statistically sound analytical models.

Prof. Singh began the presentation by defining the evolving research paradigm in the digital age, where traditional statistical boundaries are rapidly expanding due to the integration of Artificial Intelligence and Machine Learning algorithms. He emphasized that the foundation of any credible academic or industrial research relies not merely on gathering vast volumes of data, but on deeply understanding the innate nature and properties of the collected data. This initial segment focused heavily on classifying data into Qualitative (Categorical) and Quantitative (Numerical) types, illustrating how this fundamental distinction dictates every subsequent analytical step in a research workflow.

The core of the lecture revolved around the Four Levels of Measurement: Nominal, Ordinal, Interval, and Ratio. Prof. Singh meticulously mapped these levels to demonstrate how they serve as absolute gatekeepers for selecting statistical tests. For Nominal and Ordinal data, he explained how labels, categories, and relative rankings limit researchers to descriptive frequency distributions, percentages, and non-parametric tests such as Chi-Square. Conversely, for Interval and Ratio data, he demonstrated how continuous numerical data unlocks powerful parametric analyses, including T-tests, Analysis of Variance (ANOVA), and advanced structural regression models.

A significant portion of the session was dedicated to a practical framework designed for mapping research questions directly to specific types of data analysis. Participants observed that a poorly defined or misclassified research question leads to a structural mismatch in statistical testing, ultimately invalidating research outcomes and conclusions. Using real-world case studies, Prof. Singh walked the audience through the exact process of translating a conceptual hypothesis into an operational setup consisting of measurable independent and dependent variables.

Furthermore, the session seamlessly integrated the role of Artificial Intelligence in contemporary quantitative research. Prof. Singh discussed how AI algorithms and large-scale data processing tools have revolutionized early-stage data cleaning, automated pattern

recognition, and predictive modeling. He explained that while traditional statistics help researchers understand structural relationships and establish causality under strict mathematical assumptions, AI excels at processing unstructured big data such as text, images, and massive sensor logs to uncover highly complex, non-linear patterns. However, he cautioned against treating AI as a "black box," emphasizing that a strong grasp of foundational statistics remains mandatory to correctly interpret AI-generated insights and mitigate algorithmic bias. The session concluded with an interactive question-and-answer period addressing algorithmic challenges and the ethical boundaries of utilizing generative AI in data synthesis.

Outcomes of the Session:

- **Classify Variables and Data Structures:** Correctly identified and categorized variables into Qualitative or Quantitative types and distinguished between the four levels of measurement (Nominal, Ordinal, Interval, and Ratio).
- **Map Hypotheses to Statistical Models:** Applied a structured framework to map explicit research questions and hypotheses directly to appropriate parametric or non-parametric statistical tests.
- **Integrate AI with Traditional Statistics:** Developed a foundational framework to responsibly combine traditional statistical validation with AI data processing tools for handling complex, large-scale, or unstructured datasets.



Session - 2: Measures of Central Tendency & Dispersion; Graphs & Visualizations

Resource Person: Prof. Gaurav Singh, CIET, NCERT, New Delhi

Objective of the Session:

- Understand how to summarize quantitative datasets effectively using appropriate measures of central tendency and dispersion based on data distribution properties.
- Identify the structural characteristics of a dataset, including volatility, spread, skewness, and the presence of extreme outliers.
- Select, generate, and interpret optimal graphical representations (such as Histograms, Scatter Plots, and Box Plots) to communicate underlying data insights clearly and accurately.

The second technical session titled "Measures of Central Tendency & Dispersion; Graphs & Visualizations," was expertly delivered by Prof. Gaurav Singh. Building directly on previous discussions of data classification, this session transitioned participants from theoretical data types to the practical domains of descriptive statistics and exploratory data analysis (EDA). Prof. Singh emphasized that before rushing into complex inferential statistical modeling, a researcher must first master the art of summarizing, cleaning, and visually inspecting their raw data.

The session was structurally divided into two core thematic halves: numerical data summaries and graphical data interpretations. Prof. Singh initiated the mathematical segment by breaking down the classical Measures of Central Tendency: the Mean, Median, and Mode. Rather than focusing merely on rote formulas, he explained the strategic context governing when to deploy each metric. He demonstrated that while the Mean is highly sensitive to extreme outliers, the Median serves as a much more robust measure of central location for skewed datasets, such as income distributions or real estate pricing. The Mode was discussed as the primary and most effective measure of central tendency for nominal and categorical datasets.

Transitioning smoothly to Measures of Dispersion, Prof. Singh argued that central tendency alone tells an incomplete story about a dataset. He introduced Range, Quartile Deviation, Mean Deviation, Variance, and Standard Deviation as vital metrics for quantifying data volatility and spread. Through practical numerical examples, he illustrated how two entirely different datasets could share the same mean but have vastly different standard deviations, fundamentally altering their empirical interpretations. The concept of Skewness, representing the asymmetry of a distribution, was also highlighted as a critical diagnostic tool used to determine whether a dataset conforms to a symmetrical, normal distribution curve.

The session shifted toward Graphs and Visualizations, which Prof. Singh described as the essential visual language of data science. He walked the participants through a structured taxonomy of charts, explicitly mapping specific data types to their ideal visual counterparts. Categorical data was best represented using Bar Charts and Pie Charts to convey frequencies and structural proportions.

For continuous data, he demonstrated that Histograms are optimal for observing frequency distributions, Line Graphs for tracking time-series trends, and Scatter Plots for spotting underlying correlations between two numerical variables. Furthermore, the utility of Box-and-Whisker Plots was strongly emphasized for their unique ability to visually signal the median, interquartile range, and statistical outliers simultaneously. Prof. Singh concluded the session by displaying how a simple graph can reveal data patterns, data entry errors, or hidden anomalies faster than any raw data table, urging researchers to always prioritize mathematical clarity over mere aesthetic appeal.

Outcomes of the Session:

- Calculated, interpreted, and correctly applied specific measures of central tendency and dispersion, matching them accurately to the skewness and scaling of their data.
- Acquired the technical ability to evaluate structural data distributions, utilizing skewness metrics and box plots to isolate data anomalies and outliers prior to

advanced statistical testing.

- Mastered the core principles of data visualization, learning exactly how to pair diverse data structures with their appropriate chart types (e.g., Histograms, Scatter Plots, Box Plots) for academic reporting.



Session - 3: Data nuances for Insights

Resource Person: Prof. Asheesh Srivastava, Dean (Academics and Research), IUCTE, Varanasi

Objective of the Session:

- Critically examine common pitfalls, biases, and misinterpretations in empirical research, moving beyond superficial software-driven outputs to genuine data insights.
- Differentiate between statistical significance and real-world practical contributions, while recognizing how violated statistical assumptions invalidate analytical models.
- Maintain strict conceptual and logical control over data levels, descriptive metrics, qualitative themes, and Artificial Intelligence tools during the research process.

The third technical session titled "Data Nuances for Insights," was delivered by Prof. Asheesh Srivastava. The session provided a highly structured, reality-check critique of modern quantitative and qualitative research practices. Utilizing a systematic 12-panel framework, Prof. Srivastava exposed the critical operational pitfalls and conceptual errors that scholars frequently encounter when managing and interpreting empirical data.

The discourse began by addressing the trend where researchers generate complex software outputs without engaging in a true diagnostic dialogue with their data. Under Panel 1 (From Data to Insight-or From Data to Decoration?), the presentation emphasized that while advanced statistical software is now readily available, meaningful research questions are often severely lacking. In Panel 2 (Correlation आया... अब क्या करें?), Prof. Srivastava warned against confusing sheer numerical coincidence with actual substance. Using the humorous

example of correlating a camel's milk production with a goat's grass consumption, he demonstrated that a statistically visible relationship does not automatically imply a logical or causal connection.

1 From Data to Insight— or From Data to Decoration?
हम data analysis कर रहे हैं, पर data से dialogue नहीं कर रहे।
Output आ रहा है, insight नहीं।
Reality Check:
• Correlation मिल गया। Regression चल गया।
• p-value significant आ गई। लेकिन समझ को क्या समझ आया? 'सिने' को क्या मिला? जलन समझ में क्या योगदान हुआ?
Punchline: Software available है, लेकिन सवाल unavailable है।

2 Correlation आया... अब क्या करें?
सर, correlation आ गया है।
किसके बीच?
राजस्थान की डेढ़नी किसान दूध देती है और राजस्थान की बकरी किलना घास खाती है।
Correlation तो आ गया... लेकिन राजस्थान को क्या मिला? डेढ़नी खुश हुई? बकरी दुखी हुई? या खान समझ समुद्र हुआ?
Punchline: हर relationship meaningful नहीं होता; कई बार statistics सिर्फ coincidence को sophisticated बना देता है।

3 Research Question vs Statistical Test
Research Question पूछता है—
समझ को क्या जानना है?
Researcher पूछता है—
कौन-सा test लगेगा?
MEANING TEST
धीरे-धीरे research question गायब हो गया, test selection बच गया।
Punchline: जब test question से बढ़ा हो जाए, तो research ritual बन जाती है।

4 Hypothesis क्या है? Assumption क्या है?
Hypothesis (तोफ का संघर्षित उतर)
What do you expect?
उदाहरण: "Teaching method A improves learning."
Assumption (statistical test की राई)
What must hold true?
• Data approximately normal
• Independence
• Equal variance
• Random sampling
Problem: Hypothesis fail हो जाए तो science आगे बढ़ती है। Assumption fail हो जाए तो analysis questionable हो जाता है।
Punchline: जहाँ बार hypothesis researcher लिखता है, assumptions statistics quietly ignore कर देती है।

5 Variables समझे बिना Regression?
मुझे driving नहीं आती, लेकिन cruise control on कर देता है।
HIGHWAY OF REGRESSION
सूने सूने:
• Variable dependent है या independent?
• Nominal, ordinal, interval या ratio?
• Relationship meaningful थी है?
Punchline: Model sophisticated हो सकता है, logic नहीं।

6 Significance किसकी हुई?
p-value = 0.000
Result: There is significant difference.
But... Difference किसके जीवन में आया?
Policy बदली? Classroom बदली? Learning बदली?
Punchline: p-value छोटी हो सकती है; contribution भी छोटा हो सकता है।

7 Assumptions टूट रही हैं, Researcher खुश है
Normality ✗
Outliers ✗
Sample weak ✗
Independence unclear ✗
Result: SIGNIFICANT
यह बेस ही है जैसे—
मरीज की रिपोर्ट मलन हो, लेकिन printout बहुत सुंदर निकले।
Punchline: Beautiful output does not guarantee valid inference.

8 Likert Scale और Decimal का प्रेम
1 Strongly Disagree 2 Disagree 3 Neutral 4 Agree 5 Strongly Agree
हमारा finding: Attitude = 3.76
मानो attitude thermometer से मापा गया हो।
Punchline: कई बार decimal precision, conceptual confusion को elegant बना देती है।

9 Descriptive Statistics: सजावट या Insight?
Mean Median SD Range Outlier
लेकिन कई बार सबसे बड़ी कहानी mean नहीं, outlier बता रहा होता है।
Mean high, Median low.
Question:
• Distribution skewed है?
• Inequality मौजूद है?
Punchline: कभी-कभी सबसे बड़ी कहानी mean नहीं, outlier बता रहा होता है।

10 Bibliometric Analysis या दीपावली की झालर?
VOSviewer Map
वाह! कितने सुंदर circles हैं।
Question:
• Research gap किसका?
• Knowledge structure समझ आया?
• Emerging themes किन्हीं?
Punchline: Visualization insight का substitute नहीं है।

11 Qualitative Research: Theme बची, ईसान गायब
Interviews (Participant की बात) Coding Themes Report
मेरी आवाज कहाँ गई?
मेरा context कहाँ गया?
मेरा अनुभव कहाँ गया?
Punchline: Theme बची, ईसान गायब—
यह qualitative rigor नहीं है।

12 AI Researcher या Prompt Operator?
R code ready!
Jamovi output ready!
Interpretation ready!
Summary ready!
सैकड़...
AI ने यह test क्यों चुना?
Assumptions check हुई?
Model appropriate था?
AI powerful assistant है, लेकिन concept understanding outsource नहीं की जा सके।
Final Punchline:
Tool researcher का assistant है, replacement नहीं।
Good research output नहीं, insight पैदा करती है।

A major focus was Panel 3 (Research Question vs Statistical Test), which highlighted the dangerous shift in which researchers become so obsessed with selecting specific statistical tests that the underlying societal or scientific meaning of the research question completely disappears. In Panel 4 (Hypothesis क्या है? Assumption क्या है?), the session clearly differentiated between a research hypothesis and foundational statistical assumptions, such as normality, independence, and equal variance. Prof. Srivastava noted that while a failed hypothesis still advances scientific boundaries, a failed or ignored assumption entirely invalidates the statistical analysis itself. Under Panel 5 (Variables समझे बिना Regression?), he critiqued running advanced procedures like regressions without identifying variable types or verifying data measurement levels.

Furthermore, Panel 6 (Significance किसकी हुई?) addressed the widespread academic obsession with obtaining a p-value of 0.000. It was pointed out that a statistically significant number does not automatically translate into a significant real-world contribution to policy, practice, or learning. In Panel 7 (Assumptions टूट रही हैं, Researcher खुश है?), Prof. Srivastava exposed a common paradox where researchers celebrate a significant output even when underlying normality and outlier criteria are completely violated, comparing it to an incorrect medical report that merely looks visually appealing.

The critique extended to Panel 8 (Likert Scale और Decimal का प्रेम), focusing on the false precision of carrying ordinal Likert scale averages out to multiple decimal points, explaining that decimal precision often masks deep conceptual confusion. Instead of rushing blindly to inferential modeling, Panel 9 (Descriptive Statistics: सजावट या Insight?) urged scholars to

evaluate descriptive statistics, as the truest research insights are often hidden within skewed distributions and outliers rather than a deceptively balanced mean.

Turning to literature mapping in Panel 10 (Bibliometric Analysis या दीपावली की झालर?), he warned that software-generated bibliometric maps are often treated as mere decorations rather than tools for identifying genuine research gaps. For qualitative data, Panel 11 (Qualitative Research: Theme बची, इंसान गायब) cautioned against over-coding interviews, noting that if human context is lost to generate a rigid theme, qualitative rigor is destroyed. The session concluded with Panel 12 (AI Researcher या Prompt Operator?) by evaluating Artificial Intelligence, noting that while AI can flawlessly generate code and summaries, it completely lacks conceptual understanding. The final takeaway underscored that AI is a powerful assistant, but the researcher must ultimately generate the insight.



Outcomes of the Session:

- Prioritized validating underlying mathematical assumptions including normality, variance, and independence over blindly accepting software-generated p-values.
- Developed the analytical capability to see past superficial indicators, such as excessive decimal precision on Likert scales or complex bibliometric network maps, to extract true, actionable insights.
- Maintained complete conceptual command over methodology selection and substantive interpretation while utilizing AI tools strictly to expedite execution and coding workflows.

Day 2: 26 May, 2026

Session - 4 & 5: Data Handling in Excel & Exploratory Data Analysis (EDA)

Resource Person: Prof. Gautam Bandyopadhyay, Former Professor, NIT, Durgapur

Objective of the Session:

- Explain the foundational data analytics framework, variable classifications, and the overall structured research data workflow.

- Execute practical data preparation, organization, and summarization workflows using Excel functions, Online Analytical Processing (OLAP) parameters, and Pivot Tables.
- Apply Exploratory Data Analysis (EDA) techniques, interpreting parametric and non-parametric descriptive statistics, data visualization trends, and correlation metrics.

The fourth & fifth technical sessions of the Training Program provided a comprehensive, sequential overview of data handling mechanisms and exploratory data analysis (EDA) techniques. Delivered by the expert resource person, Prof. Gautam Bandyopadhyay, these highly interactive sessions focused on developing a strong practical bridge between raw analytical datasets and intuitive statistical reasoning. The instruction commenced with a deep dive into the classic data analytics framework, broken down into Descriptive, Diagnostic, Predictive, and Prescriptive Analytics (DDPP). Prof. Bandyopadhyay explained how scientific inquiry systematically progresses from understanding past events to recommending optimal future actions. Throughout this progression, he emphasized that domain knowledge remains an absolute necessity for selecting the right analytical methods and interpreting software results accurately.

A significant portion of the training focused on the taxonomy of research variables. Participants explored the behavioral nuances of nominal, ordinal, categorical, and continuous variables. Using practical variables such as gender, designation, age, income, and family size, the resource person illustrated the vital distinction between categorical and scale data structures. He highlighted that correctly identifying these variable types is a prerequisite for selecting appropriate statistical tests. Following this, the structural organization of research datasets was addressed, with rows representing distinct observations and columns representing precise variables. Prof. Bandyopadhyay tied this structure directly to the comprehensive research workflow, which spans raw data collection, objective formulation, hypothesis development, methodology mapping, and subsequent result interpretation. To contextualize modern implementation, he introduced a range of analytical software packages and compared their utility, including Excel, Jamovi, SPSS, R, and Python.

The fifth session seamlessly shifted to Exploratory Data Analysis (EDA) and functional data summarization practices. Participants were introduced to Online Analytical Processing (OLAP) concepts, which were applied practically by deploying Pivot Tables within Excel to generate multi-dimensional analytical reports. The step-by-step process of configuring data filters, row headers, column parameters, and value aggregations was thoroughly demonstrated on real-world datasets.

The session further covered descriptive statistical foundations, breaking down the application of the mean, standard deviation, skewness, kurtosis, and quartile measures. The resource person contrasted parametric and nonparametric summaries, enabling participants to effectively evaluate diverse data distributions. For data visualization, scatter plots were generated to demonstrate how graphical formats reveal underlying data clustering and anomalies more quickly than text tables.

Finally, the session explored the mechanics of covariance and correlation, detailing how these tools measure the degree and direction of linear relationships. The interpretation of

correlation coefficients and the mandatory use of p-values in testing statistical significance were discussed in detail. The session concluded with brief introductions to advanced predictive metrics including partial, canonical, and multiple correlations alongside an overview of executing automated EDA routines using Python.

Outcomes of the Session:

- Mapped raw research data across rows and columns while accurately categorizing variables into continuous, nominal, ordinal, or categorical scales within the analytics framework.
- Utilized Excel and OLAP concepts to clean, organize, filter, and summarize complex raw data distributions into structured multi-dimensional analytical matrices.
- Derived and interpreted key descriptive statistics (including skewness and kurtosis), generated diagnostic scatter plots, and computed correlation coefficients to determine the significance of relationships between variables.



Session - 6: Concept of Diagnostic Analysis & Introduction to Hypothesis Testing

Resource Person: Dr. Parag B Shah, Associate Professor, H. L. College of Commerce, Ahmedabad

Objective of the Session:

- Differentiate between the core branches of data analytics, focusing on the transitioning pipeline from descriptive metrics to diagnostic problem-solving.
- Formulate scientifically sound null (H_0) and alternative (H_1) hypotheses based on explicit research parameters.
- Identify the structural dynamics of hypothesis testing, including the statistical implications and trade-offs of committing Type I and Type II errors.

The sixth technical session provided a systematic examination of the "Concept of Diagnostic Analysis & Introduction to Hypothesis Testing." Delivered by the expert statistician Dr. Parag

B. Shah, the training session focused on the critical development of scientific analytical thinking. The curriculum was specifically designed to move participants from basic exploratory data summaries to advanced causal diagnostics and structured parametric assumption checks. Dr. Shah initiated the discourse by evaluating the foundational roles that statistics occupies in academic research, instructional design, and institutional decision-making. The session quickly established mathematical boundaries by guiding participants through the classification of data into explicit qualitative (categorical) and quantitative (numerical) frameworks. This baseline layout directly informed a comprehensive breakdown of the four traditional levels of measurement: nominal, ordinal, interval, and ratio scales. Using practical illustrations such as gender groups for nominal classification, customer satisfaction rankings for ordinal scales, temperature values for interval metrics, and physical parameters like age or weight for ratio data the resource person clarified how data measurement limits the selection of mathematically viable statistical engines.

The presentation then transitioned into a comparative overview of the data analytics spectrum. While descriptive analytics was framed as the primary mechanism for summarizing and cleaning past data points, diagnostic analytics was established as the methodology for isolating the active drivers behind specific outcomes. Predictive analytics was introduced as the baseline for forecasting mathematical trends, whereas prescriptive analytics was defined as the operational framework for recommending optimized paths of action. To solidify this mathematical continuum, participants reviewed how classic measures of central tendency (mean, median, and mode) interact with measures of dispersion (range, variance, and standard deviation) to construct the initial data profile necessary for advanced diagnostics.

A major focus of the session was operationalizing diagnostic analysis to answer the critical question of "why" a specific phenomenon occurred. Dr. Shah outlined several core diagnostic techniques, including structured root cause analysis, multi-variable correlation indices, and comparative grouping methods. These strategies were immediately backed by applied case studies, showing participants how to dissect real-world datasets to uncover hidden structural anomalies. The second focus area introduced the formal apparatus of statistical hypothesis testing. A hypothesis was defined strictly as a falsifiable, tentative assumption subjected to rigorous scientific evaluation. Dr. Shah clearly distinguished between the null hypothesis (H_0), which posits the absence of an effect or difference, and the alternative hypothesis (H_1), which asserts an explicit empirical effect or statistical variance.

To ensure accurate interpretation, the session explored the critical errors encountered in significance testing. Participants analyzed Type I errors (the false-positive rejection of a true null hypothesis) and Type II errors (the false-negative acceptance of a failing null hypothesis). By utilizing practical datasets to show how descriptive metrics naturally flow into hypothesis testing, the resource person successfully demonstrated how to control for these testing errors when executing final research validations.

Outcomes of the Session:

- Classified raw variables into qualitative or quantitative matrices and applied proper nominal, ordinal, interval, or ratio levels of measurement to research datasets.
- Transitioned beyond basic descriptive metrics to apply root cause analysis,

comparative methods, and diagnostic techniques to isolate the active causes behind specific data outcomes.

- Formulated structured null (H_0) and alternative (H_1) hypotheses, mapped test parameters, and demonstrated a clear operational awareness of the risks associated with Type I and Type II errors in statistical reporting.



Session - 7: Introduction to Jamovi: Interface, Data Import, and Workflow

Resource Person: Prof. Raju D. Chaudhari, Associate Professor, M.G. Science Institute, Ahmedabad

Objective of the Session:

- Navigate the Jamovi user interface, including its operational tabs, installation setups, and modular libraries.
- Execute structured variable configurations, data cleaning protocols, and systematic file conversions within the software platform.
- Apply operational formulas, advanced data filtration rules, and statistical transformations to run baseline exploratory research workflows.

The seventh session provided a comprehensive, practical introduction to Jamovi, an open-source, R-based statistical software platform that delivers intuitive graphical interfaces for quantitative research. Dr. Raju D. Chaudhari initiated the technical demonstration by outlining Jamovi's structural advantages, noting that its modern interface eliminates the barrier of complex programming code while maintaining the analytical depth of the R programming language. The opening segment focused entirely on navigating the core software workspace, highlighting the spatial integration between the real-time data editor spreadsheet and the adjacent, interactive dynamic output presentation panel.

Participants walked through the baseline system installation procedures, navigated Jamovi's configuration architecture, and learned to optimize the software settings for diverse data-handling tasks. The trainer systematically unpacked the software's main navigation menu, detailing the distinct structural purposes of the Variables, Data, Analyses, and Edit tabs. Key foundational workflows were demonstrated, focusing on how researchers create

fresh workspace files, import external data blocks, save unified project spreadsheets, and export final statistical outputs into flexible, presentation-ready external document formats.

A significant portion of the session was dedicated to variable taxonomy management and technical specification setups. Dr. Chaudhari illustrated that users must actively define variable types based on their precise measurement levels, including ID, Nominal, Ordinal, and Continuous. The software's capacity to handle multiple data types such as integers, decimals, and character text labels was explored. The session emphasized that assigning clear text labels to numerical codes for categorical factors, such as gender boundaries or socioeconomic strata, prevents calculation errors and speeds output reading. The technical instruction then progressed to advanced data management, missing value isolation, and data filtration systems. Participants were taught to establish precise data quality rules using logical comparison operators, such as less than, greater than, and equal to, to instantly flag outliers or handle missing data. The software's live filtration system was shown to be an effective tool for running instant subgroup analyses without permanently modifying or damaging the master dataset arrays.

Furthermore, the session covered variable creation and data standardization transformations. Participants learned to write computational formulas within Jamovi to calculate new variables dynamically, using the classic example of deriving Body Mass Index (BMI) values directly from raw height and weight metric columns. The process of converting raw continuous parameters into standardized Z-scores was demonstrated alongside multi-level categorical recoding techniques. The session also introduced Jamovi's modular application library, showing how researchers can download and install external add-on packages to instantly expand their toolkit with specialized, advanced statistical routines. To anchor these skills, participants successfully engaged with a heart study dataset, cleaning and organizing real-world columns for age, smoking status, fasting blood glucose, and serum cholesterol.



Outcomes of the Session:

- Managed the core operational tabs, manipulated data files, and extended software capabilities using modular components from the built-in Jamovi library.

- Established variable parameters across all measurement scales (Nominal, Ordinal, Continuous), mapped data labels, and isolated missing values using logical evaluation rules.
- Generated customized new data variables using active algebraic formulas, executed data filters for subgroup analysis, and prepared data models for exploratory statistical routines.

Day 3: 27 May, 2026

Session - 8 & 9: Data Handling, Exploratory Data Analysis (EDA) & Introduction to Python with AI Tools

Resource Person: Prof. Gautam Bandyopadhyay, Former Professor, NIT, Durgapur

Objective of the Session:

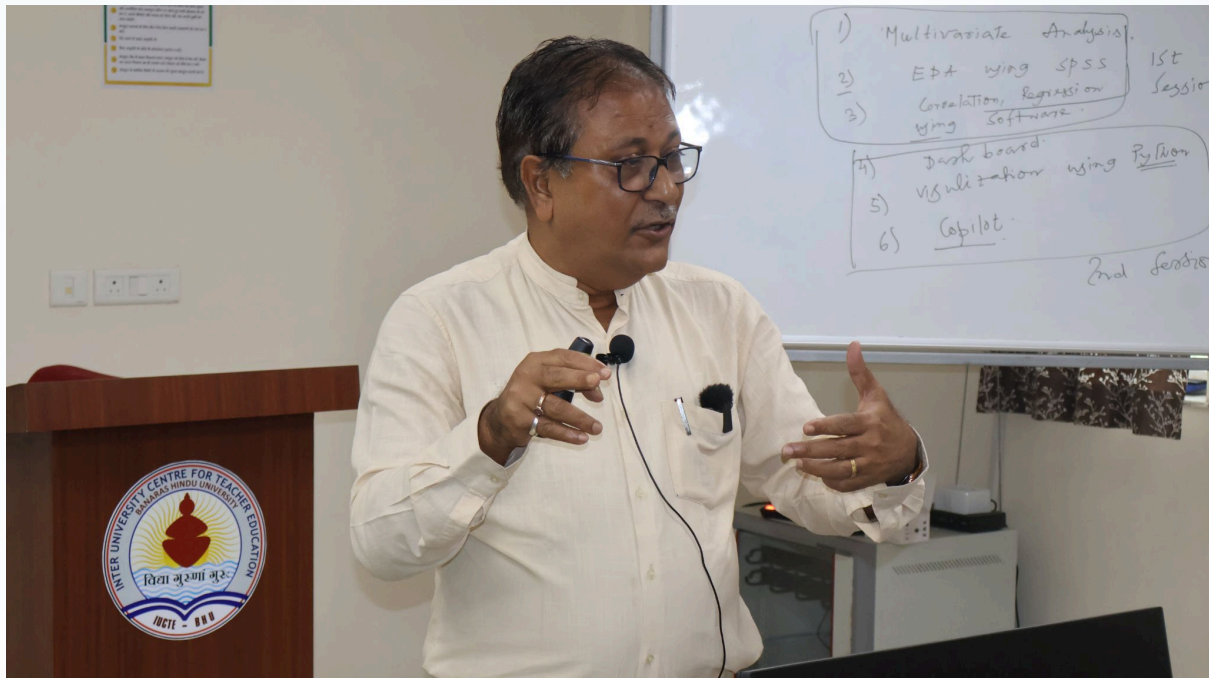
- Instill a deep understanding of data distributions, central tendencies, and data dispersion, ensuring participants can accurately interpret data spread and anomalies before modeling.
- Teach systematic, practical data-cleaning techniques essential for handling real-world, imperfect business datasets.
- Equip participants with the ability to build dynamic visual charts using both traditional tools (Excel) and modern AI assistants (Microsoft Copilot).
- Provide a foundational gateway into Python programming, introducing syntax, core data structures, and industry-standard libraries (Panda and NumPy) for handling large-scale data.

This intensive two-lecture series, conducted by the expert resource person Prof. Gautam Bandyopadhyay, successfully bridged the operational gap between foundational data manipulation and cutting-edge analytical modeling. Designed to equip participants with a comprehensive, industry-ready toolkit for data-driven decision-making, the sessions transitioned smoothly from baseline descriptive statistics to advanced predictive analytics frameworks. Prof. Bandyopadhyay guided the audience through a highly structured, progressive learning path that initiated with hands-on sessions in Microsoft Excel, advanced through Exploratory Data Analysis (EDA) platforms using IBM SPSS and Python, and concluded with modern AI-driven visualizations using Microsoft Copilot alongside binary classification modeling.

Descriptive Analytics, Visualization, and Dashboarding in Excel

The opening segment of the first lecture was dedicated entirely to the foundational pillars of descriptive statistics. Prof. Bandyopadhyay emphasized that researchers must thoroughly understand structural data distribution and vector shapes before attempting any advanced inferential modeling. He demonstrated the practical application of measures of central tendency, instructing attendees on how to efficiently calculate the Mean, Median, and Mode using native Excel formulas to map the exact mathematical midpoints of various business datasets. This layout was closely followed by an expansive exploration of the measures of dispersion. The instructor utilized Variance, Standard Deviation, and the Interquartile Range (IQR) to measure data volatility and successfully isolate anomalous data points. Additionally,

the professor highlighted the critical importance of extensive data cleaning, demonstrating systematic Excel techniques to handle missing values, eliminate duplicate observations, and standardize inconsistent formatting across imperfect business spreadsheets.



Dynamic Data Visualization and Dashboard Architecture

The second half of the series shifted the focus to advanced visualization mechanics, where participants learned to create dynamic charts and graphs in Microsoft Excel. Attendees deployed pivot charts for immediate data aggregation, scatter plots for identifying underlying linear trends and mathematical correlations, and structural histograms to visualize frequency distributions. Following the spreadsheet workflows, the session transitioned to the core programming concepts of Python. Prof. Bandyopadhyay introduced fundamental Python syntax, variable assignment rules, and primary object data structures, specifically lists, dictionaries, and tuples. He concluded this introductory programming module by previewing essential data science libraries, showing how “Pandas” and “NumPy” handle large-scale data manipulation and vector operations more robustly than traditional desktop spreadsheets. Furthermore, the lecture integrated cutting-edge tools by showcasing Microsoft Copilot to the participants, demonstrating how conversational AI engines are utilized to write code and instantly generate complex, research-grade data visualizations.

Outcomes of the Session:

- Calculated and interpreted the Mean, Median, Mode, Variance, Standard Deviation, and Interquartile Range (IQR) to precisely identify data midpoints and isolate anomalous outliers.
- Handled missing values, eliminated duplicate rows, and standardized formatting errors within raw, unorganized business datasets.
- Mastered Excel Pivot Tables and Pivot Charts for real-time data aggregation, and generated scatter plots and histograms to track trend paths and frequency curves.
- Grasped fundamental Python syntax, variable assignments, and primary data

structures (lists, dictionaries, tuples), understanding how libraries like “Pandas” and “NumPy” scale beyond traditional spreadsheets.

- Integrated Microsoft Copilot workflows to leverage generative AI models for automating complex data visualizations and expanding predictive research insights.

Session - 10: Jamovi: One-Sample Tests

Resource Person: Sh. Hitesh Solanki, Scientist-D, INFLIBNET Centre, Gandhinagar

Objective of the Session:

- Explain the foundational concepts of inferential statistics, including significance testing parameters and the theoretical purpose of One-Sample Tests.
- Verify the critical statistical assumptions required to execute a valid parametric test against a known or hypothesized population mean.
- Navigate Jamovi software to import datasets, configure test values, and accurately interpret generated outputs, confidence intervals, and p-values.

The tenth technical session provided a highly informative, practice-oriented exploration of "Jamovi: One-Sample Tests." Delivered by the expert resource person Sh. Hitesh Solanki, the session focused on operationalizing inferential statistics through hands-on software execution. The session's structural blueprint was intentionally designed to bridge the gap between abstract probability logic and concrete dataset manipulation, enabling researchers to confidently evaluate sample variations against baseline population metrics.

Sh. Solanki initiated the technical discourse with a comprehensive introduction to the broader mechanics of inferential statistics. He emphasized that while descriptive data features provide an initial portrait of a sample, inferential procedures are mandatory to draw generalized conclusions about larger populations. The core lecture focused on the explicit purpose of the One-Sample t-test, which is deployed to determine whether the calculated mean of an empirical sample significantly differs from a pre-established, known, or hypothesized population mean.

The session thoroughly covered the theoretical foundations governing the One-Sample t-test. Participants analyzed the components of hypothesis formulation, learning to structure rigorous null (H_0) and alternative (H_1) arguments. The resource person demystified the mathematical parameters underlying alpha levels (significance thresholds), confidence interval boundaries, and the calculation of test statistics. Sh. Solanki unpacked these complex criteria in an interactive, accessible manner, detailing how a p-value serves as a probabilistic index for deciding whether to accept or reject the baseline null hypothesis. Real-life case studies across educational, social, and scientific research domains were used to illustrate these concepts.

Following the theoretical framing, the session shifted into an active, live software masterclass inside the Jamovi environment. Participants were guided step-by-step through the software's data import pipelines. Sh. Solanki demonstrated how to select test variables, specify the precise hypothesized population "test value," and trigger the automated computation matrix.

The workspace was evaluated to showcase how Jamovi pairs real-time data adjustments with instant, dynamic output updates.

Special emphasis was placed on reading and interpreting the descriptive statistics and inferential outputs generated by the software. Participants learned to cross-examine the calculated t-statistic, degrees of freedom (df), and final significance values to formulate sound academic conclusions. The resource person also highlighted Jamovi's structural advantages as a modern, user-friendly tool, showing how its intuitive graphical user interface simplifies reporting workflows. Attendees practiced customizing output tables and exporting publication-ready statistical plots into external research documents. The session wrapped up with interactive problem-solving rounds where participants completed independent data analysis exercises to solidify their diagnostic skills.



Outcomes of the Session:

- Grasped the core purpose of One-Sample Tests, demonstrating the capability to formulate clear statistical hypotheses to evaluate sample deviations from population parameters.
- Managed Jamovi software functions to import raw data matrices, select test variables, and set precise population benchmark thresholds.
- Analyzed generated outputs accurately, interpreting critical test metrics including t-statistics, confidence intervals, and p-values to make valid research decisions.
- Developed hands-on data analysis competencies, enabling the clean translation of automated software outputs into structured academic reporting formats.

Session - 11: Jamovi: Two-Sample Tests

Resource Person: Sh. Hitesh Solanki, Scientist-D, INFLIBNET Centre, Gandhinagar

Objective of the Session:

- Explain the theoretical concept, purpose, and research applications of Two-Sample Tests in comparative studies.

- Navigate Jamovi software to execute Independent Samples t-tests, organize group variables, and manage multi-group datasets.
- Verify the critical assumptions of parametric two-sample testing and accurately interpret software outputs, significance levels (p-values), and confidence intervals.

The eleventh technical session provided a comprehensive, hands-on treatment of "Jamovi: Two-Sample Tests." Delivered by the expert resource person Sh. Hitesh Solanki, the session aimed to establish a practical workflow for comparative statistical analysis. The curriculum was systematically designed to help researchers move beyond single-sample benchmarks and master the methodologies for evaluating variance, detecting structural differences, and comparing mean scores between two distinct experimental or observational groups.

Sh. Solanki initiated the session by contextualizing the role of hypothesis testing within educational and social science research frameworks. To solidify foundational knowledge, the presentation began by contrasting descriptive statistics with inferential statistics. The resource person explained that while descriptive metrics simply catalog the properties of an isolated sample, inferential models allow researchers to make mathematically sound generalizations about broader populations. The core lecture focused on the Independent Samples t-test, defining it as a parametric test used to determine whether a statistically significant difference exists between the means of two independent, mutually exclusive groups.

The theoretical component of the session focused heavily on the mathematical assumptions required to run a valid Two-Sample Test. Sh. Solanki clearly outlined the prerequisites of normal distribution within each group, the independence of observations, and the homogeneity of variance across both groups. He explained how violating these criteria can distort test results, making assumption checks a mandatory phase of any data workflow. Key statistical metrics including the calculated t-statistic, degrees of freedom (df), level of significance, and confidence intervals were broken down to show how they collectively inform research conclusions.

Following the conceptual lecture, the session transitioned into an interactive software masterclass utilizing the Jamovi interface. Participants were guided through entering, grouping, and structuring multi-variable raw data. The resource person demonstrated, step by step, how to define a continuous dependent variable alongside a categorical grouping variable (such as treatment vs. control or male vs. female) in the software.

Using sample datasets, participants practiced running the Independent Samples t-test procedure. The workspace highlighted Jamovi's user-friendly interface, showcasing how it automates output generation and updates statistical tables in real time as data is modified. Special emphasis was placed on interpreting the generated p-value to confidently determine whether to accept or reject the null hypothesis (H_0). The session concluded with an open question-and-answer period and guided individual practice, where participants learned to maintain data accuracy and export publication-ready tables from Jamovi into their final research reports.

Outcomes of the Session:

- Grasped the core purpose and application of Two-Sample Tests, distinguishing between sample summaries and inferential group comparisons.

- Managed Jamovi software functions to organize categorical grouping variables and execute Independent Samples t-tests on continuous data.
- Identified and evaluated the core assumptions of two-sample testing, including normality and data independence, prior to interpreting final outputs.
- Evaluated generated statistical summaries, significance levels, and p-values to draw accurate, evidence-based conclusions for research reporting.

Day 5: 28 May, 2026

Session - 12: More than Two Groups (ANOVA): When and How to Use

Resource Person: Dr. Parag B Shah, Associate Professor, H. L. College of Commerce, Ahmedabad

Objective of the Session:

- Explain the mathematical logic, purpose, and research applications of Analysis of Variance (ANOVA) over multiple localized t-tests.
- Identify and evaluate the core parametric assumptions including normality, independence, and homogeneity of variance required for running an ANOVA model.
- Formulate statistical hypotheses, evaluate degrees of freedom, and interpret essential ANOVA outputs, such as the sum of squares, mean squares, and the calculated F-ratio.

The twelfth technical session provided a thorough, conceptually rigorous exploration of "More than Two Groups (ANOVA): When and How to Use." Delivered by the eminent resource person Dr. Parag B. Shah, the session focused on introducing participants to one of the bedrock multi-group parametric statistical frameworks utilized across quantitative disciplines. The instruction was systematically structured to transition researchers from simple binary group comparisons to multivariate variance analysis, enabling them to evaluate complex experimental designs without introducing statistical errors.

Dr. Shah initiated the academic discourse by addressing a common methodological pitfall: the improper use of repeated pairwise t-tests when comparing more than two groups. He explained that performing multiple independent t-tests on a single dataset can inflate the family-wise Type I error rate. To circumvent this compounding error, Analysis of Variance (ANOVA) is deployed as a powerful, unified statistical alternative. The core logic of ANOVA was introduced in a simple, highly structured manner, showing that the technique operates by partitioning the total variance observed in a dataset into two primary components: the variance existing *between* the separate experimental groups and the variance found *within* those individual groups.

The presentation then walked participants through the vital structural metrics that populate a standard ANOVA framework. Dr. Shah defined and contextualized key concepts, including the Sum of Squares (SS), Mean Squares (MS), degrees of freedom (df), and the final calculated F-ratio. He explained how the F-ratio acts as an index comparing between-group variability against within-group residual noise. Following the mathematical overview, the session detailed the strict parametric assumptions required for a valid ANOVA configuration. Participants analyzed the requirements of normal data distribution within each factor level,

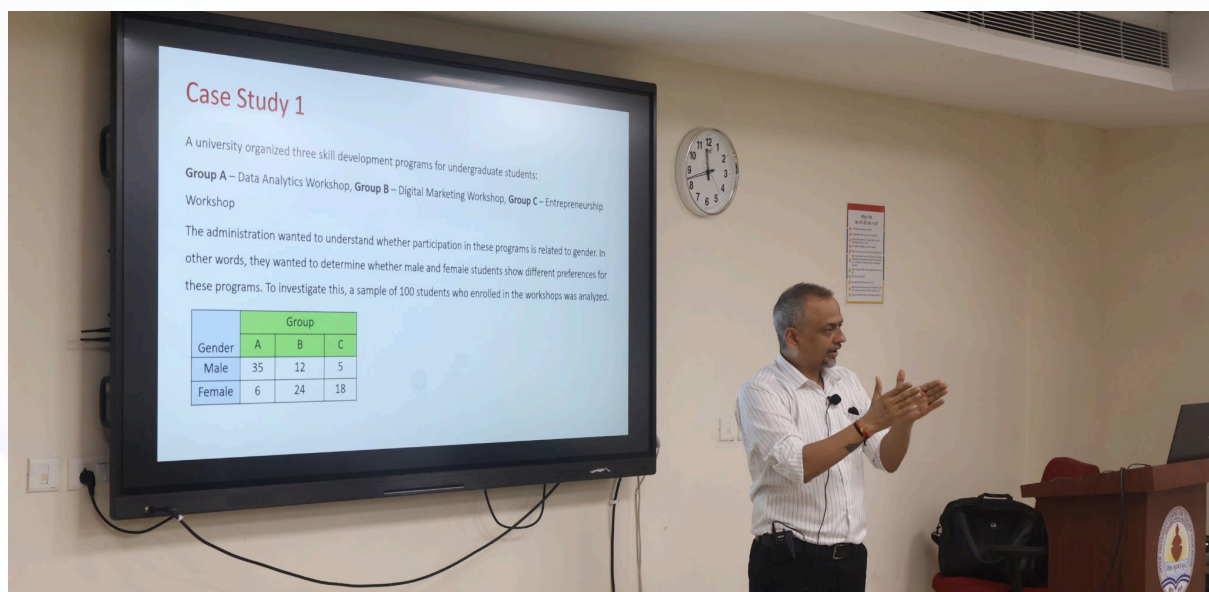
the independence of observations, and the homogeneity of variance (homoscedasticity) across all groups. Dr. Shah emphasized that evaluating these criteria using diagnostic tests is an absolute prerequisite before interpreting final model outcomes.

The session also distinguished between different ANOVA structural types, explicitly comparing One-Way ANOVA layouts (which involve a single categorical independent variable) with Two-Way ANOVA frameworks (which evaluate the simultaneous effects and potential interactions of two independent factors). To anchor these classifications, practical case studies from educational and social science research were introduced, such as evaluating differences in student achievement metrics across diverse instructional methodologies, distinct learning environments, or varied socio-economic brackets.

Step-by-step procedures for the complete analysis workflow were demonstrated. Participants learned how to construct formal null (H_0) and alternative (H_1) hypotheses, calculate test parameters, and interpret automated software tables using critical alpha thresholds and p-values. The session concluded with an active, interactive question-and-answer segment where Dr. Shah clarified operational doubts regarding data skewness and guided participants on selecting appropriate follow-up analytics for multi-group datasets.

Outcomes of the Session:

- Developed a comprehensive understanding of the purpose and importance of ANOVA, recognizing when to deploy it instead of multiple independent t-tests to control Type I error inflation.
- Mastery of core statistical parameters, successfully interpreting the relationships between the sum of squares, mean squares, degrees of freedom, and the final F-ratio output.
- Identified and applied the critical validation steps required to confirm data normality, observation independence, and homogeneity of variance across group segments.
- Acquired the skills to read, evaluate, and interpret significance values generated within One-Way and Two-Way ANOVA models to draw accurate, evidence-based research conclusions.



Session - 13: Chi-Square Tests (Association between Variables)

Resource Person: Dr. Parag B Shah, Associate Professor, H. L. College of Commerce, Ahmedabad

Objective of the Session:

- Explain the theoretical purpose and application of the Chi-Square test as a primary non-parametric statistical technique for qualitative data analysis.
- Differentiate between the Chi-Square Goodness-of-Fit test and the Chi-Square Test for Independence based on categorical data structures.
- Construct multi-variable contingency tables, compute expected frequencies and degrees of freedom, and interpret significance values to validate research hypotheses.

The thirteenth technical session provided a highly informative, conceptually detailed exploration of "Chi-Square Tests (Association between Variables)." Delivered by the expert resource person Dr. Parag B. Shah, the session was structured to equip researchers with the methodologies required to evaluate non-numerical, qualitative data. The session focused on shifting participants from parametric continuous models to non-parametric frequency calculations, ensuring they could systematically assess structural relationships across varied nominal and ordinal scales.

Dr. Shah initiated the discourse by defining the fundamental nature of categorical data, highlighting its widespread occurrence within educational, behavioral, and social science research. He explained that unlike parametric methods that evaluate population parameters like means and variances from continuous scales, non-parametric techniques operate on data presented strictly in the form of counts or frequencies. The core lecture focused on the Chi-Square Test for Independence, defining it as an inferential procedure used to determine whether a statistically significant association exists between two separate, categorical variables.

The mathematical logic underlying the Chi-Square framework was unpacked through a detailed evaluation of observed frequencies versus expected frequencies. Dr. Shah explained that the test evaluates whether the distribution of observed counts across a set of categories deviates from what would be expected under the null hypothesis of complete independence. Participants analyzed the mathematical formula:

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

Where χ^2 represents Chi-Square test statistic, $\sum$ represents Summation of all categories, "O" represents the empirically observed frequency and "E" represents the theoretically calculated expected frequency. The resource person demonstrated how the squaring of the differences prevents negative values from canceling each other out, ensuring a cumulative directional metric of overall data deviation.

Following the formula breakdown, the session highlighted the essential operational

assumptions required to run a valid Chi-Square analysis. These criteria included the absolute independence of observations, the use of mutually exclusive categorical classifications, and the adequacy of the sample size, specifically noting that no individual expected cell frequency should fall below 5. Dr. Shah also contrasted the Chi-Square Goodness-of-Fit test, which evaluates a single variable against a known or theoretical distribution, with the Chi-Square Test for Independence, which tests relationships between two distinct cross-tabulated factors.

To contextualize these models, step-by-step procedures were demonstrated using real-world educational variables. Participants practiced constructing multi-column contingency tables to examine associations between factors such as gender categories and academic performance, diverse teaching methodologies and student participation levels, or socio-economic backgrounds and institutional educational achievement. Participants learned to calculate expected frequencies, determine degrees of freedom (df) based on table dimensions, and evaluate the final calculated Chi-Square value against standard alpha thresholds and automated software p-values. The session wrapped up with an active interactive discussion where Dr. Shah clarified operational doubts regarding data pooling and provided guidance on avoiding common calculation errors when publishing qualitative research findings.

Outcomes of the Session:

- Developed a comprehensive understanding of the Chi-Square Test and its specialized application in analyzing qualitative, frequency-based categorical data.
- Acquired the skills to systematically test and interpret associations between independent qualitative variables within structured cross-tabulations.
- Mastery of core non-parametric parameters, successfully interpreting the relationships between observed frequencies, expected frequencies, and degrees of freedom.
- Evaluated null and alternative hypotheses using calculated Chi-Square statistics and p-values, enhancing their confidence to report qualitative data findings accurately in research publications.

Session - 14: Correlation Analysis & Introduction to Regression using Jamovi

Resource Person: Prof. Raju D. Chaudhari, Associate Professor, M.G. Science Institute, Ahmedabad

Objective of the Session:

- Explain the theory and types of correlation (positive, negative, zero, and spurious) and their significance in research.
- Select and apply appropriate numerical methods (Pearson's, Spearman's, or Kendall's) and graphical methods (scatter plots) based on data distribution.
- Execute, interpret, and evaluate simple linear regression models and their underlying assumptions using Jamovi software.

The primary focus centered on equipping participants with the skills to understand, calculate, and interpret relationships between quantitative variables in research and data analysis settings. Dr. Raju D Chaudhary initiated the session by breaking down the core concept of correlation as a fundamental statistical method for determining the strength and direction of

association between two or more variables.

To ensure a robust conceptual foundation, the trainer systematically explained different types of correlation, including positive, negative, and zero correlations, as well as the often-misunderstood phenomenon of nonsense or spurious correlation. Through everyday practical examples, Dr. Chaudhary demonstrated how certain variables naturally increased or decreased together, and conversely, how some variables appeared statistically related despite having absolutely no meaningful or logical cause-and-effect relationship.

The session thoroughly discussed the vital importance of correlation in research studies. Participants learned that establishing associations between variables was a crucial diagnostic step before jumping into more complex, advanced statistical modeling. He explained that a strong positive correlation indicated a constant, predictable rate of increase between variables, whereas a negative correlation reflected a clear inverse relationship. Furthermore, the concept of zero correlation was unpacked to clarify situations in which variables moved completely independently of one another, indicating the absence of a statistical relationship.

Moving from concepts to methodologies, the session introduced the two major approaches to studying correlation: graphical and numerical methods. Scatter plots were demonstrated on-screen as an exceptionally effective graphical technique for visualizing data distribution and trends. Participants learned how scatter plots helped researchers quickly identify linear, non-linear, and monotonic relationships. Following the visual approach, numerical methods of correlation, specifically Karl Pearson's correlation coefficient, Spearman's rank correlation, and Kendall's were explained in detail. He clarified that Pearson's correlation was suitable only for normally distributed continuous data, while Spearman's and Kendall's methods were nonparametric alternatives appropriate for ordinal data or continuous data that violated normality assumptions.

A major focus of the session was mastering the selection criteria for appropriate correlation methods based on the inherent nature and distribution of the data. Participants learned that Pearson's correlation coefficient (r) ranged from -1 to +1, with values close to +1 indicating strong positive relationships and those close to -1 indicating strong negative relationships. Dr. Chaudhri emphasized the mandatory step of checking data distribution and normality before selecting a correlation technique, noting that normality assumptions were bypassed when opting for Spearman's or Kendall's rank-based methods.

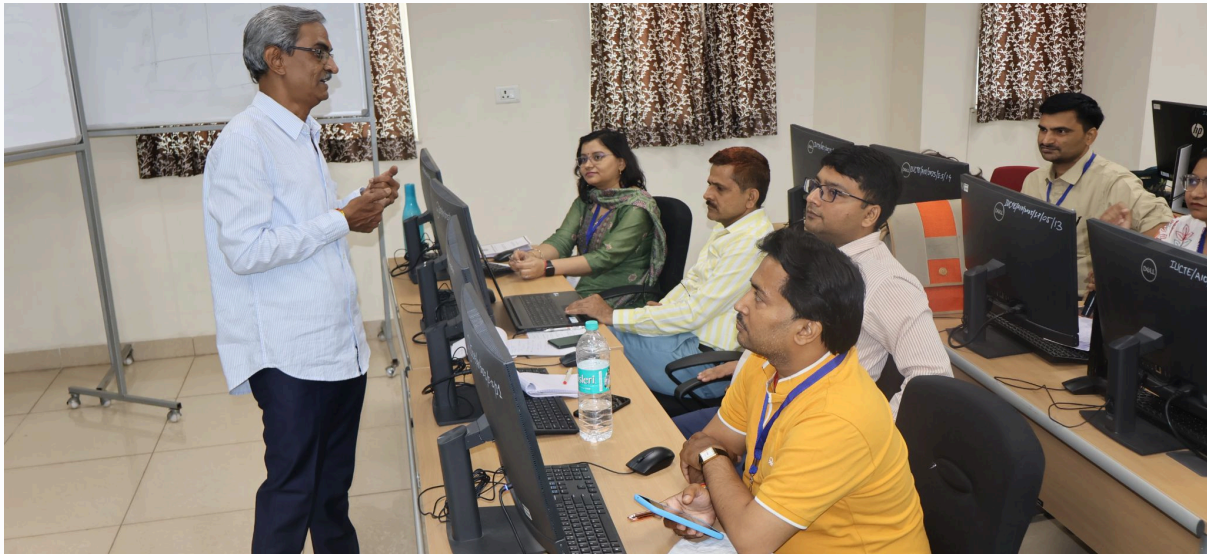
Another vital focus area was the hands-on implementation of these methodologies using Jamovi. Participants actively practiced importing external datasets (such as Score.xls) into the Jamovi interface. Through guided, step-by-step exercises, they learned to navigate the software to generate correlation matrices, evaluate significance values (p-values), and customize scatter plot outputs.

Finally, the session bridged the concept of correlation with an introduction to regression analysis, defining it as a predictive statistical technique used to investigate functional, causal relationships. Participants explored the structural differences between simple regression (with a single predictor) and multiple regression (with multiple predictors). The trainer explicitly demarcated the roles of dependent and independent variables, demonstrating how regression models aided in forecasting and understanding variable influence. Crucially, it was

highlighted that regression diagnostics and assumption checks were generally executed immediately after running the initial baseline analysis.

Outcomes of the Session:

- Correctly identified the strength, direction, and type of relationships between variables using coefficients (-1 to +1), linear/monotonic patterns, and scatter plots.
- Successfully imported datasets into Jamovi to run parametric (Pearson) and non-parametric (Spearman, Kendall) correlation analyses based on normality checks.
- Defined independent and dependent variables, ran simple regression models in Jamovi, and interpreted the software outputs for predictive modeling and research reporting.



Session - 15: Multiple Regression using Jamovi

Resource Person: Prof. Raju D. Chaudhari, Associate Professor, M.G. Science Institute, Ahmedabad

Objective of the Session:

- Explain the concept of Multiple Regression Analysis and the role of dependent and multiple independent variables in predictive modeling.
- Identify, evaluate, and interpret key regression assumptions, including multicollinearity, homoscedasticity, and the handling of categorical predictors.
- Perform multiple regression analysis in Jamovi, construct prediction equations, and interpret software outputs for research decision-making.

The fifteenth session provided a detailed, hands-on introduction to Multiple Regression Analysis using Jamovi, with extensive focus on its application in predictive modeling and quantitative statistical research. Dr. Raju D Chaudhary initiated the session by defining multiple regression as a powerful mathematical extension of simple linear regression. He explained that this method was utilized when researchers needed to evaluate how two or more independent variables collectively predicted or influenced a single, continuous dependent variable.

Throughout the presentation, the session highlighted the immense value of multiple

regression across various quantitative disciplines, including data science, healthcare, economics, and the social sciences. Participants learned that the technique enabled researchers to isolate significant predictors, estimate the unique strength of each relationship, and formulate evidence-based predictions. To anchor these concepts, practical examples were incorporated to demonstrate how distinct independent variables, such as age and weight, simultaneously contributed to predicting specific health outcomes within a unified statistical model.

A substantial portion of the session was dedicated to the mathematical framework of a multiple regression model. Dr. Chaudhri introduced foundational regression equations, demonstrating how structural relationships were written. The trainer explained that regression coefficients represented the expected change in the dependent variable given a one-unit change in a specific predictor variable, provided all other variables in the model were held constant.

The session emphasized that generating reliable regression results depended on strictly adhering to several statistical assumptions. Participants learned to evaluate linearity, error independence, normality of residuals, and homoscedasticity (equal error variance). Special attention was paid to multicollinearity, as strong correlations among predictor variables risked destabilizing regression estimates and distorting interpretation. He walked participants through the essential diagnostic steps to assess these inter-variable correlations before finalizing any predictive model.

Furthermore, the session covered the practical implementation of these workflows within the Jamovi interface. Participants actively imported sample datasets, defined variable roles, and ran multiple regression procedures. The trainer provided a thorough walkthrough of Jamovi's output tables, explaining how to interpret model summaries, coefficients, significance levels (p-values), and confidence intervals.

Finally, the inclusion of categorical variables in regression models was explored. Participants discovered that categorical predictors required the assignment of reference categories, where one baseline level was treated as a control and other categories were compared against it. The concept of factorial design was also introduced, with the trainer clarifying that at least one variable must remain continuous to ensure proper analysis and interpretation within this framework. By combining theoretical parameters with live software execution, the session successfully built a foundational competency in predictive data modeling.

Outcomes of the Session:

- Constructed and evaluated multiple regression equations, correctly interpreting how multiple continuous and categorical independent variables influenced a single dependent variable.
- Identified and verified critical statistical assumptions, including linearity, residual normality, homoscedasticity, and multicollinearity, to ensure the reliability of research findings.
- Successfully managed datasets within Jamovi to execute multiple regression analysis, extract model summaries, utilize reference categories, and interpret statistical outputs for research reporting.

Session - 16: Introduction to R & RStudio AI-assisted coding (prompt-based scripting)

Resource Person: Prof. Raju D. Chaudhari, Associate Professor, M.G. Science Institute, Ahmedabad

Objective of the Session:

- Explain the purpose, development history, and multidimensional applications of R and RStudio within quantitative research and data science.
- Code using foundational R syntax, operators, vector calculations, and critical data structures, including vectors, matrices, lists, and data frames.
- Import, clean, inspect, and visualize datasets by leveraging Base R functions, CRAN packages, and AI-assisted prompt engineering workflows.

The sixteenth technical session provided a comprehensive, practical introduction to R programming and the RStudio Integrated Development Environment (IDE). Delivered by the expert resource person, Dr. Raju D. Chaudhari, the session aimed to bridge the gap between classical command-line programming and modern, AI-assisted, prompt-based scripting workflows. The course's structure was tailored to enable participants to seamlessly install the technology, understand basic data syntax, manipulate complex data frames, and harness artificial intelligence to automate script generation.

Dr. Chaudhri began the session by exploring the development background of R, a free and open-source environment designed for statistical computing, data management, and publication-grade graphics. He explained that R was originally developed by Ross Ihaka and Robert Gentleman at the University of Auckland in 1993 and continues to be curated by the R Core Team. The instruction highlighted R's robust multiplatform compatibility, its comprehensive built-in computational functions, and its expansive, ever-growing ecosystem containing more than 23,000 external packages on the Comprehensive R Archive Network (CRAN).

Following the baseline history, participants were guided through the complete installation pipeline for R and RStudio, created by J. J. Allaire in 2009 and currently maintained by the Posit Team. The trainer demonstrated the operational layout of the RStudio IDE interface, walking users through the navigation bar and the distinct quadrants: the Script Editor, Console, Environment pane, and the multi-purpose Files/Plots/Packages window. Participants learned essential workflow management tactics, including setting up active working directories, executing code blocks line by line with keyboard shortcuts, clearing the console buffer, and structuring reproducible research files.

A significant block of the training focused on R's structural data taxonomy and data types. The session unpacked the functional differences separating vectors, matrices, lists, factors, and data frames. Special emphasis was placed on data frames, which allow researchers to store heterogeneous data types in separate columns while maintaining a cohesive tabular spreadsheet format in which rows represent individual observations and columns correspond to specific variables. The trainer showcased structural diagnostic commands, such as `head()`, `tail()`, and `str()`, to inspect imported files, alongside the usage of the dollar sign (\$) operator to

isolate specific data vectors.

Furthermore, the session examined categorical data handling using factors to represent nominal and ordinal variables. Using variables such as gender, species, habitat, socio-economic status, and medical conditions, Dr. Chaudhari demonstrated how character arrays are converted into factor variables to enable valid downstream statistical testing.

The session closed with an advanced module on graphic capabilities and AI-driven prompt engineering. Participants practiced installing packages from CRAN, setting up dependencies, and utilizing the ggplot2 engine to create and customize structural data visualizations. Crucially, the trainer integrated prompt-based scripting by showing how conversational AI models and the Posit Assistant can generate clean R code, debug script syntax errors, and explain complex functional arguments from simple textual prompts.

Outcomes of the Session:

- Downloaded, installed, and configured R and RStudio, demonstrating the capacity to set working directories, execute scripts, and navigate the Console, Environment, and Plotting windows.
- Constructed and managed vectors, matrices, lists, data frames, and factors, while converting character strings into structured nominal or ordinal factor levels for mathematical analysis.
- Formulated effective contextual prompts to leverage AI assistants for automated code generation, syntax optimization, error debugging, and script interpretation within the RStudio workspace.



Session - 17: Running Correlation & Regression in R

Resource Person: Dr. Parag B Shah, Associate Professor, H. L. College of Commerce, Ahmedabad

Objective of the Session:

- Understand the concept, types, and applications of correlation analysis.

- Learn to use R and RStudio for statistical data analysis.
- Understand hypothesis testing and assumptions associated with Pearson's correlation.
- Develop practical skills in data handling, package management, and analytical workflows in R.

The session focused on understanding and performing correlation analysis using R and RStudio while emphasizing the importance of statistical concepts over memorizing programming syntax. The resource person explained the role of R in research and industry, highlighting its advantages over graphical statistical software such as Jamovi and SPSS, particularly in terms of flexibility, scalability, and advanced analytical capabilities. Participants were encouraged to use modern AI-assisted tools to support coding while maintaining a strong conceptual understanding of statistical methods.

The session provided a detailed overview of correlation analysis, including its definition, applications, and distinction from causation. Different types of correlation measures were discussed, with special emphasis on Pearson's Correlation Coefficient for assessing relationships between numerical variables. Participants learned how correlation coefficients indicate the strength and direction of relationships and how hypothesis testing is used to determine statistical significance. A practical demonstration was conducted using a real-world dataset to examine the relationship between height and weight. The trainer explained the complete analytical process, including formulation of null and alternative hypotheses, checking assumptions, conducting statistical tests, and interpreting results. Participants learned how to verify assumptions such as linearity, normality, absence of major outliers, and the suitability of numerical variables before performing Pearson's correlation analysis. Techniques such as scatter plots, box plots, and normality tests were demonstrated within the R environment.



The session also introduced participants to essential RStudio operations, including setting the working directory, loading datasets, installing and managing packages, and executing R scripts. Comparisons between outputs generated in R and Jamovi were discussed to help participants understand the advantages and practical applications of both platforms. Hands-on

exercises enabled participants to perform correlation analysis independently and interpret the results accurately.

Outcomes of the Session:

- Participants gained a clear understanding of correlation analysis and its interpretation.
- They learned to conduct correlation analysis using RStudio and compare outputs with Jamovi.
- They acquired the ability to evaluate assumptions, test hypotheses, and interpret correlation results for research and decision-making purposes.

Session - 18: Multiple Regression in R

Resource Person: Dr. Parag B Shah, Associate Professor, H. L. College of Commerce, Ahmedabad

Objective of the Session:

- Understand the concepts of simple and multiple regression analysis.
- Learn the process of conducting regression analysis using R and RStudio.
- Develop skills in data preparation, model building, interpretation, and validation.
- Understand the predictive and diagnostic applications of regression models.

The eighteenth session focused on the concepts and practical implementation of Simple and Multiple Regression Analysis using R and RStudio. The resource person explained the importance of regression as a statistical technique for understanding relationships among variables and making predictions. The session emphasized the complete workflow of regression analysis, from data import and data structure examination to exploratory data analysis (EDA), model building, identification of significant variables, assumption testing, and model deployment for prediction.

Participants were introduced to the distinction between simple and multiple regression. Using a practical example of body temperature and heart rate, the trainer demonstrated how a simple regression model can be developed with a single independent variable. The process of importing datasets, understanding variable types, converting variables into appropriate formats, summarizing data, and visualizing relationships through scatter plots was explained in detail. The session highlighted the importance of exploratory analysis in detecting data issues, identifying outliers, and ensuring data quality before performing statistical modelling.

A hands-on demonstration was conducted to show how linear regression models are created in R using the `lm()` function. Dr. Parag interprets key regression outputs, including R-square values, F-statistics, p-values, regression coefficients, and model equations. The trainer explained how these outputs help assess model fit, determine the significance of predictor variables, and understand the impact of independent variables on the dependent variable. The predictive and diagnostic applications of regression analysis were also discussed.

The session further covered the assumptions of regression analysis, including linearity, independence of errors, normality, and homogeneity of variance. Participants learned how to assess these assumptions using graphical and statistical methods available in R. The importance of validating assumptions before applying a predictive model was emphasized. Practical insights were provided on improving regression models by removing insignificant

variables and refining model performance.

Outcomes of the Session:

- Participants gained practical knowledge of performing regression analysis in R.
- They learned to import datasets, conduct exploratory data analysis, and build regression models.
- Participants developed the ability to interpret regression outputs and evaluate model performance.
- They understood the assumptions of regression analysis and methods for validating statistical models before prediction and deployment.



Session - 19: Comparison of outputs (R vs Jamovi)

Resource Person: Dr. Raju D. Chaudhri, Associate Professor, M.G. Science Institute, Ahmedabad

Objective of the Session:

- Understand the creation and execution of R scripts in RStudio.
- Learn report generation using R scripts, R Markdown, R Notebooks, and Jamovi
- Develop skills in importing, managing, and visualizing data in RStudio and Jamovi
- Familiarize participants with document automation and reproducible research workflows.

The Nineteenth session focused on advanced functionalities of RStudio and Jamovi for statistical analysis, data management, visualization, and report generation. Dr. Raju began by revisiting the concept of R scripts and demonstrated different ways to execute code, including running individual lines and multiple blocks. Participants were familiarized with the various components of the RStudio interface, such as the script editor, console, environment pane,

plots pane, and history section. The importance of maintaining organized scripts and effectively utilizing command history for efficient coding was also discussed.

A major highlight of the session was the process of creating reproducible reports from R scripts. The trainer demonstrated how completed scripts can be compiled into HTML, PDF, and Word documents, automatically integrating code, outputs, tables, and graphical results into a single report. Participants learned how this approach reduces manual effort, minimizes errors, and enhances the transparency and reproducibility of research work. The session also covered methods for resolving common compilation errors and setting appropriate working directories for smooth execution of scripts.

Dr. Raju introduced R Markdown, R Notebooks, and Quarto documents, explaining how they combine narrative text, code, outputs, and visualizations into a single document. Practical demonstrations illustrated the use of YAML headers, code chunks, document formatting, hyperlinks, section headings, and preview options. Participants learned how to use these tools to create professional reports, research documents, and presentations in multiple formats. The distinction between traditional R scripts and notebook-based workflows was clearly explained, highlighting the advantages of dynamic and reproducible documentation.

The session further addressed data handling and visualization techniques. Participants explored methods for importing datasets from various formats, including CSV, Excel, SPSS, SAS, and STATA files, using both graphical interfaces and programming commands. The trainer demonstrated how imported datasets can be previewed, modified, and prepared for analysis. Visualization tools available in R, such as Base Graphics, GGPlot2, and Plotly, were discussed along with their applications in creating informative and interactive charts. References were also made to Jamovi as a user-friendly platform for conducting statistical analyses and generating visual outputs without extensive coding requirements.

Overall, the session provided participants with practical exposure to modern data analysis workflows using RStudio and Jamovi. Through demonstrations and hands-on exercises, participants gained a deeper understanding of script management, automated report generation, dynamic document creation, data import procedures, and visualization techniques, thereby strengthening their capacity to conduct and document statistical analyses effectively.

Outcomes of the Session:

- Participants learned to create and execute R scripts and manage analytical workflows effectively.
- They gained practical knowledge of generating reports in HTML, PDF, and Word formats.
- Participants developed an understanding of R Markdown, R Notebooks, and dynamic document creation.
- They acquired skills in data import, package management, and data visualization using RStudio and Jamovi.
- Participants understood the complementary use of Jamovi for user-friendly statistical analysis and RStudio for advanced programming, reporting, and customization.



Day 6: 30 May, 2026

Session - 20: Qualitative Data Analysis

Resource Person: Dr. Deepty Gupta, Assistant Professor, IUCTE

Objective of the Session:

- Explain the foundational concepts and significance of qualitative research in exploring deep human experiences, perceptions, and behaviors.
- Execute the systematic structural stages of qualitative data analysis, including raw data organization, coding mechanics, categorization, and theme development.
- Differentiate between deductive, inductive, and hybrid QDA approaches while leveraging traditional software (NVivo, ATLAS.ti) and conversational AI tools (NotebookLM, Gemini AI) for efficient data processing.

The session provided an insightful overview of the fundamentals of qualitative research, Qualitative Data Analysis (QDA) workflows, and the expanding role of artificial intelligence (AI) in supporting the management of non-numerical data. The resource person, Dr. Deepty Gupta, delivered a highly structured presentation demonstrating how modern software and computational models are transforming traditional manual research practices. Dr. Gupta explained that qualitative research seeks to understand human experiences, perceptions, attitudes, and behaviors in depth. Unlike quantitative models, which deal primarily with numerical frameworks, qualitative research explores meanings, contexts, and descriptive interpretations. She highlighted the growing global adoption of mixed-methods research designs, which combine qualitative and quantitative approaches to provide a comprehensive understanding of complex research problems.

A major component of the session focused directly on operationalizing Qualitative Data Analysis (QDA). QDA was described as a systematic process of examining unstructured data

text such as interview transcripts, field observations, historical documents, and visual media. The speaker explained that the process begins by identifying, organizing, and preparing raw data files for analysis. For example, visual data collected from faculty desks or observational environments can be parsed by systematically isolating physical objects, listing textual observations, and preparing arrays for subsequent coding layers.

The qualitative analysis workflow was shown to involve several distinct stages. First, the collected raw data are organized and structured. Next, meaningful information segments are labeled through coding. Similar codes are then grouped into clusters known as categories, which help researchers isolate broader behavioral patterns. These patterns are further synthesized into comprehensive themes that capture the study's key empirical findings. The findings are subsequently verified and validated to ensure credibility, trustworthiness, and academic accuracy before being compiled into a structured final report.

The session also evaluated various methods of qualitative data collection, emphasizing the importance of accurate data recording using modern tools such as audio recorders, smartphones, video setups, and document scanners. Dr. Gupta balanced her presentation by discussing the advantages and limitations of manual analysis versus software-assisted tools, noting that digital systems significantly improve workspace organization.

A significant portion of the session was devoted to deploying artificial intelligence within qualitative pipelines. AI-powered tools such as Gemini AI, Otter.ai, and research copilots were demonstrated to support researchers by transcribing audio files into text, generating preliminary code, organizing massive text datasets, and identifying patterns efficiently. The speaker introduced Google's NotebookLM, demonstrating its practical application in converting audio recordings, generating concise summaries, creating mind maps, and extracting themes. To anchor these skills, Dr. Gupta presented a case study on anxiety among university teachers across academic disciplines, illustrating how qualitative responses are coded and categorized. The session concluded with an overview of deductive, inductive, and hybrid QDA approaches alongside a comparative summary of tools like NVivo, ATLAS.ti, MAXQDA, Taguette, and QualCoder.

Outcomes of the Session:

- Developed a clear understanding of qualitative research methodologies and their importance in studying human experiences and social phenomena.
- Acquired practical knowledge of the QDA process, successfully moving data from raw text organization and open coding into categorization and structural theme development.
- Distinguished between deductive, inductive, and hybrid analytical frameworks while identifying the features of proprietary and open-source tools like NVivo, ATLAS.ti, and Taguette.
- Leveraged generative AI models and platforms like NotebookLM and Gemini AI to execute automated transcription, semantic data summarization, and tone mapping within large datasets.



Session - 21: Bibliometric Mapping using VoSviewer & Advanced Visualization using Scimago Graphica

Resource Person: Sh. Chakradhar Rana, Assistant Librarian, IUCTE

Objective of the Session:

- Explain the principles and standard quantitative workflows of bibliometric analysis for mapping research trends, citation impact, and scholarly collaboration networks.
- Construct and interpret complex bibliometric networks including citation, co-citation, co-authorship, and keyword co-occurrence maps using VOSviewer.
- Execute multi-dimensional data processing and build publication-quality scientific charts, geographic overlay maps, and Sankey diagrams using SCImago Graphica.

The twenty-second technical session of the Short-Term Training Program (STTP) provided a thorough, hands-on exploration of "Bibliometric Mapping Using VOSviewer and Advanced Visualization Using SCImago Graphica." Delivered by the expert resource person Sh. Chakradhar Rana, Assistant Librarian at the Inter University Centre for Teacher Education (IUCTE), Banaras Hindu University (BHU), Varanasi, introduced participants to quantitative landscape mapping. The primary focus centered on training researchers to extract massive structural metadata from global citation indices and transform that raw bibliography into meaningful, publication-quality scientific visualization frameworks.

Mr. Rana began the presentation with an overview of bibliometric analysis as a highly structured, quantitative methodology for evaluating scholarly publications, citation velocity, authorship trends, and institutional collaborations. The resource person explained that bibliometrics has evolved into a mandatory tool for researchers, academic librarians, and institutional policymakers to assess overall research productivity and strategic impact. By plotting these literary networks, investigators can easily track historical shifts, identifying emerging sub-fields and declining research themes within any given scientific discipline.

The session detailed how structural bibliometric mapping operates as an engine for systematic literature reviews. Participants observed how network visualization exposes

hidden intellectual structures, allowing scholars to isolate highly influential authors, landmark publications, and core journals while explicitly pinpointing unaddressed research gaps. Furthermore, the session established how major bibliometric metrics—such as publication counts, citation impact factors, h-index variations, and international collaboration indexes serve as evidence-based data points to support research planning and funding policy decisions.

A substantial block of the training focused on the standard bibliometric data workflow, which progresses systematically from initial data collection and programmatic data cleaning to structural visualization and analytical interpretation. The technical demonstration utilized Lens.org to showcase how to compile and export accurate bibliographic metadata packages. Mr. Rana then provided a guided walkthrough of VOSviewer, explaining how the software maps network configurations derived from Web of Science, Scopus, PubMed, and Dimensions databases. Participants learned to configure networks based on direct citation, bibliographic coupling, co-authorship relationships, and keyword co-occurrence frequencies via built-in text-mining algorithms.

The practical segment trained participants to interpret the three core visualization dimensions of VOSviewer: Network Visualization for structural clustering, Overlay Visualization for tracking temporal evolution and chronological trends, and Density Visualization heat maps for identifying high-concentration research domains. Following this, the training transitioned to SCImago Graphica, a specialized open-source data visualization software developed by SCImago Lab. Mr. Rana demonstrated how to bridge VOSviewer network outputs with SCImago Graphica to construct advanced, custom-designed scientific graphics. Participants practiced generating complex Sankey diagrams, interactive network matrices, and spatial geographic maps to trace global co-authorship paths, successfully equipping them to present scientific findings with optimal clarity and high aesthetic value.



Outcomes of the Session:

- Developed a solid conceptual framework regarding bibliometric indicators, citation analysis workflows, and their strategic utility in mapping structural knowledge fields.
- Successfully imported bibliographic datasets from platforms like Lens.org into VOSviewer to run keyword co-occurrence, co-authorship, and bibliographic coupling calculations.
- Evaluated and extracted actionable literature insights using Network, Overlay, and Density heat map visualization templates within the software.
- Mastered the operational tools of SCImago Graphica to transform flat tabular research metadata into advanced, publication-ready visual architectures, including network maps, geographic data displays, and Sankey diagrams.

Session - 22: Group Presentations

The group presentations were conducted to provide participants with an interactive platform to practically apply their newly acquired data competencies to real-world research problems. The primary objectives were to foster collaborative research design, encourage cross-disciplinary data analysis, and evaluate participants' hands-on proficiency in executing and interpreting statistical models using modern digital and AI-driven tools.

Group Number	Name of Participants	Title of Presentation
Group 1	Akanksha Gupta, Alok Dubey, Anil Kumar Singh, Arun Pandey	STTP Workshop Assessment and Evaluation
Group 2	Arzoo Gupta, Deepika Pandoi, Deobrat Singh, Devyani Awasthi	The Impact of Social Media Usage on Academic Performance of University Students: Assignment Presentation using Jamovi and Independent Samples t-test
Group 3	Gulab Chand, Hemant Kumar Maurya, Ketul Kumar, Komal Arora	Psychosocial Stressors and Working Conditions of Female Domestic Workers in Varanasi: A Qualitative-Thematic Analysis
Group 4	Dr. Manish Kumar Dwivedi, Dr. Manish Yadav, Dr. Manish Kumar, Dr. Manish Kumar Gautam	Influence of Nomophobia on Academic Procrastination and Technostress among The Higher Education Students

Group 5	Dr. Parama Kundu, Dr. Mukesh Vishwakarma, Dr. Poonam Beniwal, Dr. Niladri	Groundwater Quality Assessment: A Case Study of Jaipur Village, Mirzapur, Uttar Pradesh, India
Group 6	Dr. Preeti Tarkar, Dr. Promila Dabas, Dr. Ravi Mishra, Ms. Richa Singh	Assessing the Effectiveness of Training Programs on Students' Reading Comprehension Skills
Group 7	Sajan K S, Santosh Kumar, Shashikala Yadav, Shiv Gopal	Socioeconomic Status, Parental Education, and Academic Achievement among School Students
Group 8	Dr. Sneha Rai Priyadarshani, Dr. Suneeta Yadav, Dr. Upendra Singh, Dr. Vandana Pareek	Career Anxiety, Scarcity Marketing and Educational Overconsumption: A Correlational Study
Group 9	Dr. Vivek K Prasad, Dr. Vishal Srivashtav, Dr. Vishakha Mishra, Dr. Vipasha Rana, Dr. Yogendra Mishra	Salt-Stress Data Analysis in Rice Crop

Groupwise Summary of Presentations

- Group 1: This quantitative study evaluated workshop evaluation datasets to analyze technical skill acquisition. Using a localized, cross-platform approach, the team performed analyses in Excel, Jamovi, Python, and R/RStudio. Because the satisfaction and competency scales are ordinal, they used nonparametric Wilcoxon Signed-Rank Tests to identify significant proficiency shifts. Additionally, they executed an Ordinary Least Squares (OLS) linear regression to evaluate how theoretical comprehension scores statistically predicted practical project presentation performance.
- Group 2: This study employed a quantitative comparative survey design to examine the impact of daily social media use on university students' CGPAs. Using Jamovi as their primary statistical software, the team analyzed a mock dataset that tracked continuous academic scores alongside nominal group frequencies. They performed descriptive statistics, frequency distributions, and Levene's test for equality of variances to check parametric assumptions. Ultimately, they conducted an Independent Samples t-test, rejecting the null hypothesis and finding a statistically significant difference in performance between the low- and high-use groups.
- Group 3: This research represents a specialized mixed-methods approach balancing qualitative and computational linguistics to profile the lived emotional experiences and psychosocial stressors of female domestic workers in Varanasi. Utilizing R for

text preprocessing, the authors executed a rule-based natural language processing (NLP) framework for keyword-based coding. They transformed qualitative narrative text into distinct numeric thematic indices, performing age-group differential analysis and cumulative theme-intensity analysis to visualize lifecycle-based vulnerabilities.

- Group 4: This quantitative empirical study investigated how nomophobia influences academic procrastination and technostress among higher education students. Utilizing Jamovi, the researchers evaluated a simulated sample of 220 students across demographic variables. They checked parametric prerequisites with the Shapiro-Wilk normality test and Levene's homogeneity test. Upon identifying violated assumptions, they deployed nonparametric Mann-Whitney U tests for gender comparisons and Kruskal-Wallis tests (with Welch's ANOVA) for multi-stream analysis, alongside a Spearman's rank correlation matrix.
- Group 5: This environmental case study utilized a quantitative simulation framework to conduct a comprehensive groundwater quality assessment of Jaipur Village in Mirzapur. Within Jamovi, the team managed an extensive multi-parameter dataset of physicochemical and microbiological parameters. Their data analysis routine encompassed descriptive statistics, a Pearson correlation matrix mapping WQI scores to TDS sub-indices, and a multiple linear regression model. They also calculated a weighted arithmetic Water Quality Index (WQI) and calculated USEPA human health chronic daily intake risk quotients.
- Group 6: This experimental study used a combined correlational and experimental quantitative design to evaluate the efficacy of a training program on student reading comprehension. Utilizing Jamovi for computational execution, the team first conducted pre-test diagnostic profiling using descriptive statistics, skewness/kurtosis tracking, and a Shapiro-Wilk test. They then built a Pearson correlation matrix and ran a multiple linear regression to establish reading fluency as a primary predictor. Finally, they used a nonparametric Wilcoxon W test and a standard paired t-test, with a dynamic Q-Q residual plot.
- Group 7: This large-sample quantitative study examined the structural effects of socioeconomic status (SES) and parental education on overall academic achievement among 1,000 students. Using Jamovi as their core analytical workbench, the team verified data parameters using a Durbin-Watson autocorrelation test, VIF collinearity metrics, and a Shapiro-Wilk normality check supported by custom Q-Q plots. Because standard parametric variance assumptions were violated, they conducted a nonparametric Kruskal-Wallis test, followed by Dwass-Steel-Critchlow-Fligner post hoc pairwise comparisons, and a comprehensive multiple linear regression.
- Group 8: This exploratory behavioral study applied a quantitative correlational research design to examine how career anxiety and scarcity marketing drive educational overconsumption and course non-completion. Working with a simulated student dataset of 100 entries in the Jamovi software workspace, the team mapped variable taxonomies across nominal and continuous variables. Due to non-normal distributions, they conducted a nonparametric Spearman's Rank Correlation analysis to assess the direction and probabilistic significance (p-values) of associations among

variables.

- Group 9: This agricultural research project deployed a rigorous quantitative approach to evaluate the physiological impacts of variable salinity stress on rice crop phenotypes. To optimize data processing, the team implemented an integrated multi-platform workflow across RStudio, Python (Pandas, NumPy, and Scikit-learn), and Jamovi. Their analytical sequence included exploratory data analysis (EDA), a correlation heatmap, pair plots, an Ordinary Least Squares (OLS) multiple linear regression model, a One-Way Welch's ANOVA, and a follow-up Tukey post hoc test.



Valedictory Session

The valedictory session marked the formal culmination of the intensive six-day Short-Term Training Program (STTP) titled *“From Data to Insights: Statistical Analysis with Free and AI-Driven Tools.”* The concluding ceremony served as an essential forum for synthesizing the extensive academic discourse, technical software masterclasses, and computational frameworks explored throughout the week. The program was graced by Prof. O.P. Rai, Pro Vice-Chancellor of the Central University of South Bihar, Gaya, as the Chief Guest. In his valedictory address, Prof. Rai highlighted the highly transformative role that Artificial Intelligence (AI) occupies in modern research ecosystems, noting its immense capability to enhance workplace efficiency and institutional productivity. However, he balanced his technical overview by emphasizing that the deployment of advanced software algorithms must always be coupled with strict ethical considerations and the continuous development of rigorous critical thinking skills. Drawing a philosophical connection, Prof. Rai also observed that several structural features of the ancient Indian education system remain deeply relevant in the modern era, stressing that technological empowerment should always coexist with the deliberate inculcation of values in education.



The Guest of Honour, Prof. Nirmala Horo, Professor and member of the Athletics Association, Institute of Science, Banaras Hindu University (BHU), underscored the foundational truth that learning is an ongoing, lifelong process. She encouraged the educators in attendance to aggressively upgrade their digital competencies, emphasizing that mastering new data technologies is necessary to remain relevant in a rapidly evolving era.

Following these remarks, Prof. Prem Narayan Singh, Director of the Inter University Centre for Teacher Education (IUCTE), delivered his chair address. Prof. Singh proudly highlighted the Centre's expanding global presence, noting its active educational outreach across India and 38 countries of the Global South.

He reminded the participants that while earning formal academic degrees and technical certifications remains important, the true purpose of education ultimately lies in promoting holistic human development and sustainable social progress.

During the valedictory session, participants enthusiastically shared their feedback, expressing deep appreciation for the high-caliber resource persons, the meticulously designed sessions, and the warm hospitality extended by IUCTE. They collectively lauded the transformative nature of the training and formally requested the Centre to organize an advanced-level sequel to this program in the near future.



The formal closing proceedings transitioned to a comprehensive academic review as Dr. Deepty Gupta presented the detailed program report, detailing the technical journey from initial Excel data cleaning to advanced R and Python statistical modeling. Dr. Gupta concluded her presentation by delivering the official vote of thanks, expressing gratitude to the centre leadership, resource persons, and administrative staff. The valedictory session was seamlessly moderated by Sh. Chakradhar Rana, ensured an impactful conclusion to the multi-state national training initiative.



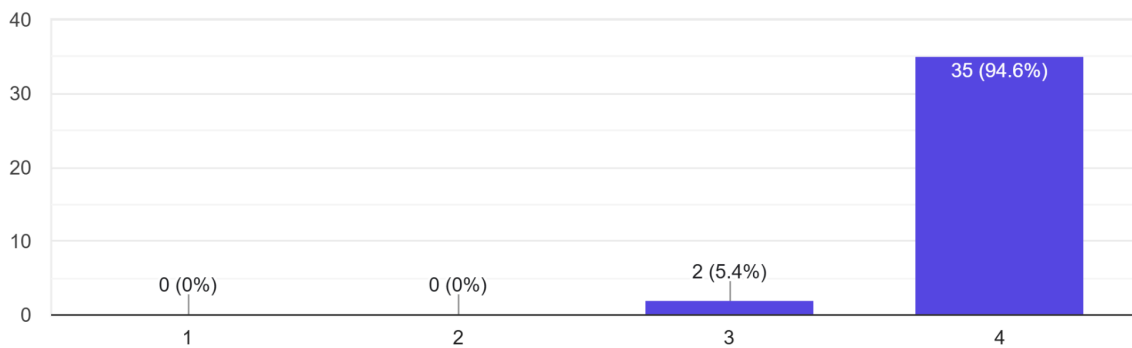
Program Outcomes

1. Participants developed a thorough understanding of the data analytics lifecycle, processing data systematically from raw observation to descriptive summaries, diagnostic evaluations, and predictive modeling.
2. Participants mastered classifying variables into qualitative (categorical) and quantitative (numerical) forms, and identified their exact scales at the Nominal, Ordinal, Interval, and Ratio levels of measurement.
3. Participants acquired a structured framework for seamlessly mapping explicit research questions and conceptual hypotheses to statistically valid parametric or nonparametric analytical tests.
4. Participants mastered Exploratory Data Analysis (EDA) visualization techniques, using scatter plots to detect data clustering, histograms to inspect frequency distribution shapes, and line graphs to map time-series trends.
5. Participants developed the critical capability to calculate and interpret complex measures of dispersion (including Variance, Standard Deviation, and Interquartile Range) alongside Skewness metrics and boxplots to isolate data anomalies before modeling.
6. Participants gained foundational knowledge in setting up scientific significance tests, formulating clear null and alternative hypotheses, while mitigating the statistical risks and trade-offs of Type I and Type II errors.
7. Participants acquired cross-platform technical skills to navigate the Jamovi interface, import heterogeneous external datasets, manage variable attributes, and run live statistical calculations.
8. Participants developed the ability to run multiscalar correlation indices, correctly deploying Karl Pearson's continuous linear coefficient, Spearman's rank-based index, and Kendall's tau, based on data normality checks.
9. Participants acquired the skills to rigorously evaluate complex regression assumptions—including linearity, error independence, residual normality, and homoscedasticity—by conducting residual plot analyses and Shapiro-Wilk testing routines.
10. Participants developed hands-on coding proficiency within RStudio, managing the Script Editor, Console, and Environment quadrants to execute line-by-line R commands, handle CRAN package dependencies, and export high-quality graphics using Base R and ggplot2.

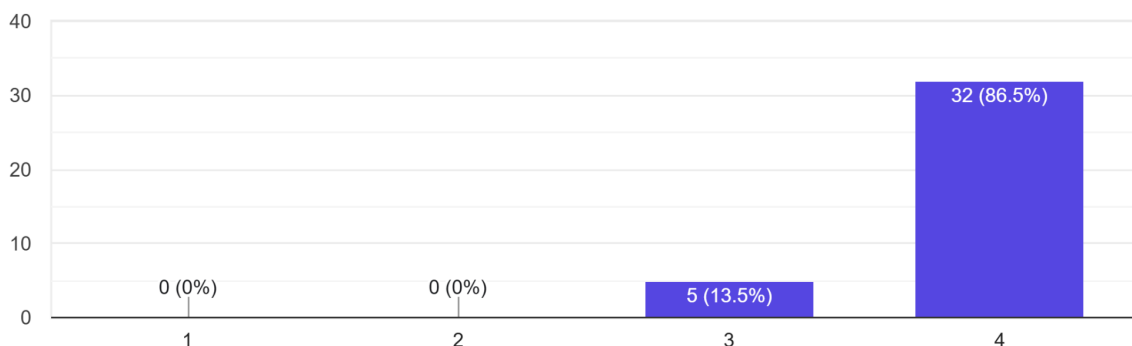
Annexure 1: Feedback Analysis of the participants

Feedback was collected from participants regarding the program's quality and various facilities. Additionally, the requirements of participants were also requested for future programmes. The detailed analysis is discussed below.

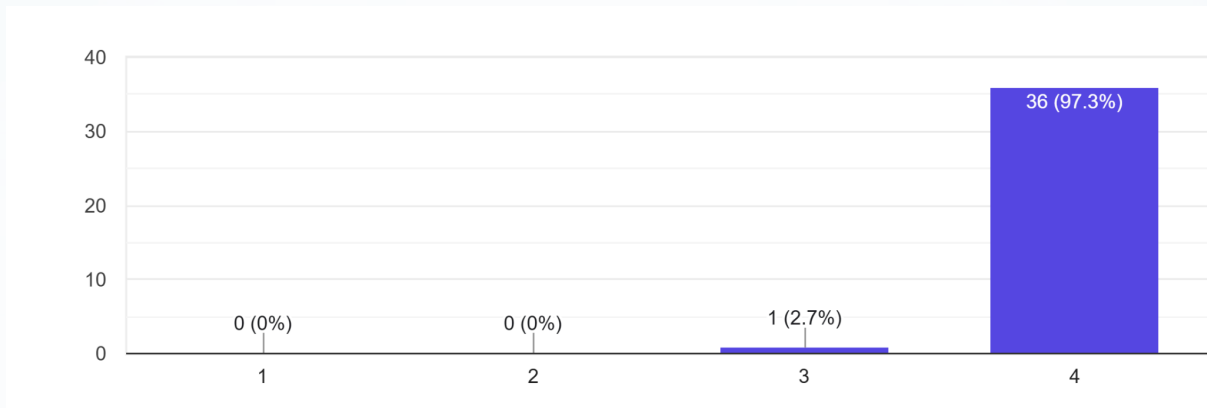
1. Regarding the Overall quality of the programme



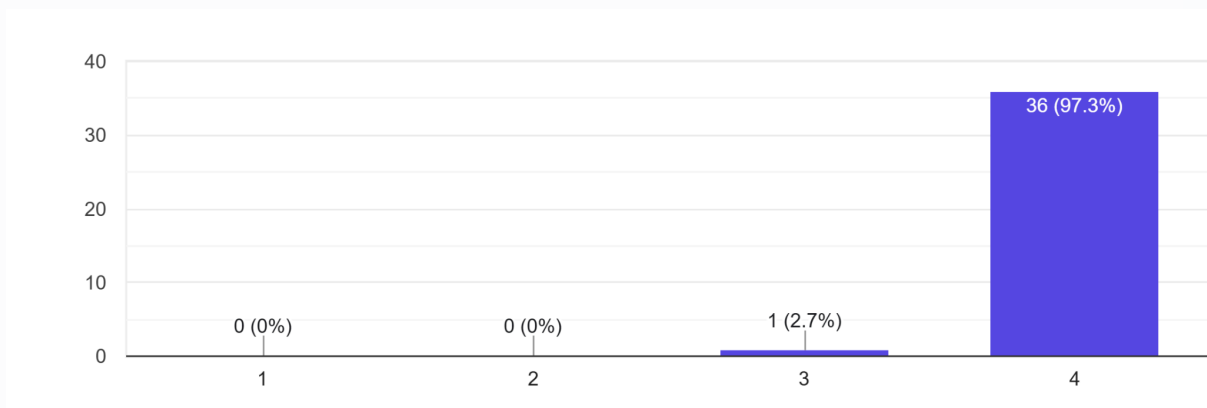
2. It was also asked whether the participants' expectations had been met through this workshop, and most participants rated them as met.



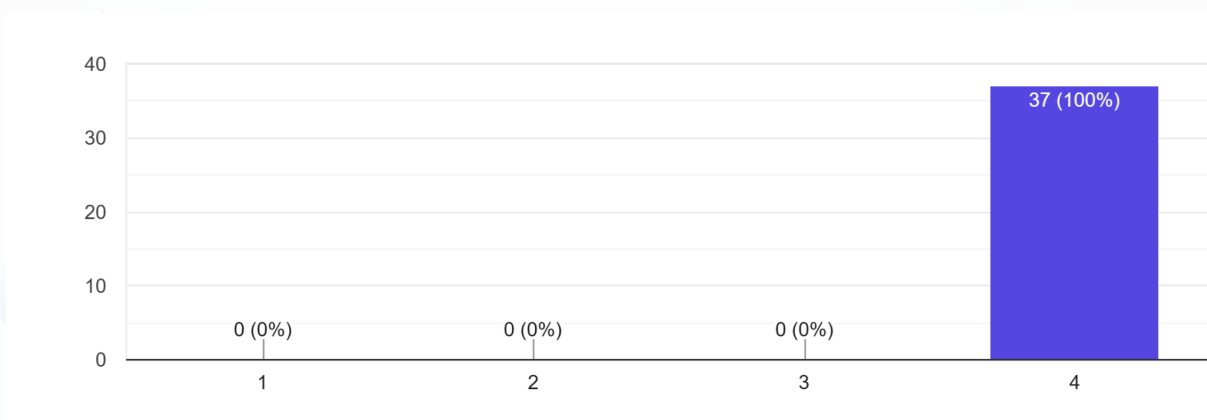
- 3. The organizers and Resource persons provided support during the workshop, and most participants appreciated it.**



- 4. Feedback regarding the logistics and food arrangements was also received from the participants and almost all have appreciated the arrangements provided during the program.**



- 5. Feedback regarding the technical support provided during the program was also received from the participants, and all appreciated the support offered by the technical team.**



6. Topics of the workshop which participants expect to cover in more detail were:

- Bibliometrics
- Quantitative data analysis
- Statistical modeling using AI-assisted tools, advanced regression techniques, machine learning applications in research, data visualization best practices
- Interpretation of complex statistical models.
- Logistic regression
- Jamovi, QLD
- Google Colab
- Excel
- Structural Equation Modelling and Qualitative Data
- Advanced-level statistics along with the use of AI

7. Suggestions were received regarding the topics/areas/themes for future training/workshops

- MOOCs
- PEDAGOGY
- AI for academic content creation
- Machine Learning and Artificial Intelligence for Research
- Advanced Statistical Analysis using R and Python
- Research Methodology and Academic Writing
- Bibliometric and Scientometric Analysis
- Data Visualization and Dashboard Development
- Generative AI Applications in Education and Research
- Advanced multivariate data analysis techniques, structural equation modeling (SEM) using software like AMOS/SmartPLS.
- Advance Statistical analysis and qualitative analysis tools and techniques
- Indian knowledge system and Curriculum framework
- Basics of research
- AI and prompt engineering, open source LLMs, bots and agentic AIs
- Quantum computing
- Curriculum development
- Refresher course in Psychology
- Bioinformatics related tools and softwares

8. Participants were also asked how they were going to implement the things they learned during this program at their institution/research work

- In teaching students and developing a research paper
- Will apply the knowledge gained to analyze research data more effectively using free and AI-driven statistical tools. Plan to use these tools in academic research, teaching, project work, and evidence-based decision-making while sharing the acquired skills with colleagues and students.

- Will utilize the newly learned tools and methodologies in upcoming research projects and for Ph.D students.
- In the Classroom: By updating pedagogical approach, integrating the modern frameworks and digital tools discussed into daily lectures, and designing more interactive, case-based learning experiences for students.
- In Research & Administration: By applying the refined methodological insights to current research pipelines and manuscripts, ensuring higher empirical rigor. Will also share these best practices with departmental colleagues through knowledge-sharing sessions to foster a collaborative academic environment.
- Conducting workshops for research scholars

Annexure 2: List of Resource Persons

S.No.	Name	Affiliation
1	Prof. Asheesh Srivastava	Dean (Academics and Research), IUCTE, BHU
2	Prof. Gautam Bandyopadhyay	Former Professor, NIT Durgapur
3	Prof. Gaurav Singh	Professor, Central Institute of Educational Technology, NCERT, New Delhi
4	Dr. Raju D. Chaudhari	Associate Professor, M.G. Science Institute, Ahmedabad
5	Dr. Parag B. Shah	Associate Professor, H.L. College of Commerce, Ahmedabad
6	Sh. Hiteshkumar Solanki	Scientist-D INFLIBNET Centre, Gandhinagar
7	Dr. Deepty Gupta	Assistant Professor, IUCTE, BHU, Varanasi
8	Sh. Chakradhar Rana	Assistant Librarian, IUCTE, BHU, Varanasi

Annexure 3: List of Participants

S. N.	Name	Designation	Organization
1	Akanksha Gupta	Assistant Professor	Banaras Hindu University, Varanasi
2	Alok Dubey	Assistant Professor	Ratan Sen Degree College, Siddhartha University, Kapilvastu
3	Anil Kumar Singh	Assistant Professor	S. M. M. Town Post Graduate College, Ballia, Jananayak Chandrashekhar University, Ballia
4	Arun Pandey	Assistant Professor	Awadhesh Pratap Singh University, Rewa, M.P.
5	Arzoo Gupta	Assistant Professor	Faculty of Management AKTU Lucknow
6	Deepika Pandoi	Assistant Professor	GLA University
7	Deobrat Singh	Assistant Professor	Dr. Vishwanath Karad MIT World Peace University Pune
8	Devyani Awasthi	Assistant Professor	Mahila Vidyalaya Degree College, University of Lucknow
9	Gulab Chand	Assistant Professor	Manipal University, Jaipur
10	Hemant Kumar Maurya	Assistant Professor	Indian Institute of Teacher Education (IITE), Gandhinagar
11	Ketul Kumar	Assistant Professor	Manipal University, Jaipur
12	Komal Arora	Academic Consultant	CIET, NCERT, Delhi
13	Manish Kumar	Assistant Professor	Manipal University, Jaipur
14	Manish Kumar Dwivedi	Assistant Professor	University of Lucknow
15	Manish Kumar Gautam	Assistant Professor	University of Allahabad
16	Manish Yadav	Assistant Professor	Banaras Hindu University, Varanasi
17	Mukesh Vishwakarma	Assistant Professor	Dr. Ghanshyam Singh P.G. College, Soyepur
18	Niladri	Assistant Professor	Aarybhatt Knowledge University
19	Parama Kundu	Associate Professor	Adamas University, West Bengal
20	Poonam Beniwal	Assistant Professor	Maharaja Surajmal Institute, GGSIPU, Delhi
21	Preeti Tarkar	Assistant Professor	GLA University

22	Promila Dabas	Assistant Professor	Maharaja Surajmal Institute, GGSIPU, Delhi
23	Ravi Mishra	Assistant Professor	Smt. Kapila Khandvala College of Education, University of Mumbai
24	Richa Singh	Assistant Professor	Kashi Institute of Technology, AKTU
25	Sajan K S	Assistant Professor	NSS Training College Ottapalam, University of Calicut
26	Santosh Kumar	Assistant Professor	Phool Chand Bagla P.G. College, Hathras, Raja Mahendra Pratap Singh University, Aligarh
27	Shashikala Yadav	Assistant Professor	MIT ADT University, School of Education And Research, Loni Kalbhor, Pune
28	Shiv Gopal	Assistant Professor	University of Allahabad
29	Sneha Rai Priyadarshani	Assistant Professor	Vmlg College Ghaziabad, CCS University, Meerut
30	Suneeta Yadav	Assistant Professor	Ram Jaipal College, Chapra, Bihar
31	Upendra Singh	Assistant Professor	Government Degree College Barakhal, Santkabir Nagar, Siddharth University Kapilvastu, Siddharth Nagar
32	Vandana Pareek	Professor	Lloyd Group of Institutions, AKTU
33	Vipasha Rana	Assistant Professor	Maharaja Surajmal Institute, GGSIPU, Delhi
34	Vishal Srivashtav	Assistant Professor	RGSC, BHU
35	Vishakha Mishra	Assistant Professor	Sunbeam Women's College, Varuna, Varanasi
36	Vivek Kumar Prasad	Assistant Professor	Nirma University, Rajasthan
37	Yogendra Kumar Verma	Assistant Professor	Mandsaur University

Annexure 4: Organizing Team

Chief Patron:	Prof. Prem Narayan Singh, Director, IUCTE, BHU, Varanasi
Workshop Director:	Prof. Asheesh Srivastava, Dean (Academic & Research) IUCTE, BHU, Varanasi
Workshop Convenors:	Dr. Deepty Gupta, Assistant Professor, and Sh. Chakradhar Rana, Assistant Librarian, IUCTE, BHU, Varanasi

Technical Team

- Mr. Rana Pratap Rao, Hardware Engineer
- Mr. Vikas Janu, Webmaster
- Mr. Kuldeep Pandey, System Analyst
- Mr. Anand Jaiswal, Server Engineer
- Mr. Abhigyan Kumar Srivastava, Technician (Software Management)
- Mr. Shubham Prajapati, Technical Assistant (Multimedia)
- Mr. Anubhav Kumar Pandey, Consultant Editor (Multimedia)

Administrative Team

- Dr. Anil Kumar Singh, SO (Admin)
- Mr. Brijendra Sarkar, Assistant
- Mr. Anand Yadav, LDC
- Ms. Priti Singh, LDC
- Mr. Raghvind Jha
- Mr. Jai Kumar Chaurasia
- Mr. Amit Kumar Singh
- Mr. Shatrughan

Accounts Section

- Mr. M.R. Ramasubramaniam, Administrative Officer (Finance)
- Dr. Vijay Kumar Rai, Assistant
- Ms. Neha Patel, LDC

Annexure 5: Media Advocacy and Press Releases about the Program

शिक्षकों के लिए एआई, डिजिटल उपकरणों का प्रभावी उपयोग जरूरी



कार्यक्रम में शामिल शिक्षक। ख्यां

वाराणसी। अंतर विश्वविद्यालय अध्यापक शिक्षा केंद्र (आईयूसीटीई) में शॉर्ट टर्म कार्यक्रम में वक्ताओं ने शिक्षा के क्षेत्र में एआई की उपयोगिता पर चर्चा की। बतौर मुख्य अतिथि राष्ट्रीय शैक्षिक योजना एवं प्रशासन संस्थान (नीपा) नई दिल्ली के कुलाधिपति प्रो.रमेशचंद्र दुबे ने कहा कि शिक्षा व्यवस्था को समाज की आवश्यकताओं और बदलती परिस्थितियों के अनुरूप होना चाहिए। इसके लिए शिक्षकों को एआई, डिजिटल उपकरणों का प्रभावी उपयोग करना होगा।

आईयूसीटीई में प्रो. दुबे ने कहा कि शिक्षकों और संकाय सदस्यों को इस प्रकार

सशक्त बनाया जाना आवश्यक है कि वे विद्यार्थियों को वैश्विक स्तर की दक्षताओं एवं प्रतिस्पर्धात्मक क्षमताओं से युक्त कर सकें।

राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद नई दिल्ली के प्रो. गौरव सिंह ने कहा कि वर्तमान समय में आंकड़ा-आधारित निर्णय शिक्षा की गुणवत्ता, प्रभावशीलता बढ़ाने में महत्वपूर्ण भूमिका निभाते हैं। अध्यक्षता करते हुए निदेशक प्रो. प्रेम नारायण सिंह ने शिक्षा के विकास में एआई को उपयोगी बताया। कार्यक्रम में प्रो. आशीष श्रीवास्तव, डॉ. राजा पाठक, डॉ. दीपति गुप्ता, सोडी राणा मौजूद रहे। व्यूरो

अमर उजाला, पृष्ठ-02, दिनांक 25.05.2026

अंतर विश्वविद्यालय अध्यापक शिक्षा केन्द्र में शॉर्ट टर्म ट्रेनिंग प्रोग्राम

बदलती परिस्थितियों में सशक्त बनें शिक्षक

बीएचयू

वाराणसी, मुख्य संवाददाता। शिक्षा व्यवस्था को सदैव समाज की आवश्यकताओं एवं बदलती परिस्थितियों के अनुरूप उत्तरदायी होना चाहिए। शिक्षकों एवं संकाय सदस्यों को इस प्रकार सशक्त बनाया जाना आवश्यक है कि वे विद्यार्थियों को वैश्विक स्तर की दक्षताओं एवं प्रतिस्पर्धात्मक क्षमताओं से युक्त कर सकें।

वे बातें राष्ट्रीय शैक्षिक योजना एवं प्रशासन संस्थान (नीपा), नई दिल्ली के कुलाधिपति प्रो. रामाशंकर दुबे ने कहीं। वह सोमवार को बीएचयू के अंतर विश्वविद्यालय अध्यापक शिक्षा केंद्र में आरंभ हुए शॉर्ट टर्म प्रशिक्षण कार्यक्रम के उद्घाटन सत्र को बतौर मुख्य अतिथि संबोधित कर रहे थे।

‘फ्रॉम डेटा टू इनसाइट्स’ : स्टैटिस्टिकल एनालिसिस विद फ्री एंड एआई-ड्रिवन टूल्स विषयक छह दिवसीय कार्यक्रम में उन्होंने कहा कि गणित प्राचीन काल से ही भारतीय समाज एवं ज्ञान परंपरा का अभिन्न अंग रहा है। समय-समय पर विश्व ने अनेक तकनीकों की परिवर्तनों को देखा है।



बीएचयू में शुरू हुए शॉर्ट टर्म प्रशिक्षण कार्यक्रम में शामिल प्रतिभागियों संग राष्ट्रीय शैक्षिक योजना एवं प्रशासन संस्थान के कुलाधिपति प्रो. रामाशंकर दुबे। (मुलाखी जैकेट में)।

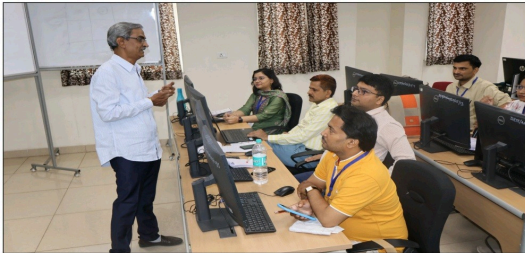
कृत्रिम बुद्धिमत्ता वर्तमान समय की प्रभावशाली तकनीक

अध्यक्षीय उद्घोषण में आईयूसीटीई बीएचयू के निदेशक प्रो. प्रेमनारायण सिंह ने कहा कि कृत्रिम बुद्धिमत्ता वर्तमान समय की एक महत्वपूर्ण एवं प्रभावशाली तकनीक है। इसका उपयोग अत्यंत जिम्मेदारी, नैतिकता एवं सावधानी के साथ होना चाहिए। एआई का सकारात्मक एवं रचनात्मक उपयोग शिक्षा, शोध तथा समाज के विकास में महत्वपूर्ण योगदान दे सकता है। विशिष्ट अतिथि के रूप में दिल्ली के राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद के प्रो. गौरव सिंह ने शिक्षा क्षेत्र में आंकड़ों की समझ एवं उनके विश्लेषण की आवश्यकता पर प्रकाश डाला।

वर्तमान कृत्रिम बुद्धिमत्ता तथा आंकड़ा-आधारित तकनीकों का युग है। ऐसे में शिक्षकों, शोधकर्ताओं एवं विद्यार्थियों को कृत्रिम बुद्धिमत्ता तथा अन्य आधुनिक डिजिटल उपकरणों का प्रभावी उपयोग करते हुए आंकड़ों को समझने, उनका विश्लेषण करने तथा उनसे सार्वक निकष निकालने की क्षमता विकसित करनी चाहिए। आगामी का स्वागत प्रो. आशीष श्रीवास्तव, संचालन डॉ. दीपति गुप्ता तथा धन्यवाद सोडी राणा ने किया।

हिंदुस्तान, पृष्ठ-06, दिनांक 26.05.2026

आईयूसीटीई में सांख्यिकीय विश्लेषण पर कार्यशाला आयोजित



भारतीय सिटी अपडेट/जूही मिश्रा

वाराणसी। अंतर विश्वविद्यालय अध्यापक शिक्षा केंद्र (आईयूसीटीई) में फ्रॉम डेटा टू इनसाइट्स: स्टैटिस्टिकल एनालिसिस विद फ्री एंड एआई-ड्रिवन टूल्स विषय पर आयोजित छह दिवसीय शॉर्ट टर्म कार्यक्रम के चौथे दिन विशेषज्ञों ने एएनओवीए, ची-स्क्वेयर टेस्ट, कोरिलेशन एनालिसिस, रिग्रेशन एवं मल्टिपल रिग्रेशन पर व्याख्यान और प्रायोगिक प्रशिक्षण दिया। डॉ. पराग बी. शाह एवं डॉ. राजू डी. चौधरी ने शोध एवं डेटा विश्लेषण में इन तकनीकों के महत्व को उदाहरणों सहित समझाया। कार्यक्रम में देश के 10 राज्यों से 37 से अधिक प्रतिभागियों ने भाग लिया। कार्यक्रम का संयोजन डॉ. दीपति गुप्ता एवं सह-संयोजन श्री सी. डी. राणा कर रहे हैं।

आईयूसीटीई में एआई व डेटा एनालिसिस पर छह दिवसीय प्रशिक्षण कार्यक्रम

वाराणसी। अंतर विश्वविद्यालय अध्यापक शिक्षा केंद्र (आईयूसीटीई), वाराणसी में आयोजित

छह दिवसीय शॉर्ट टर्म कार्यक्रम फ्रॉम डेटा टू इनसाइट्स: स्टैटिस्टिकल एनालिसिस विद फ्री एंड एआई-ड्रिवन टूल्स के दूसरे दिन विशेषज्ञों ने डेटा एनालिसिस,



एक्सेल, ईडीए, हाइपोथीसिस टेस्टिंग और जामोवी सॉफ्टवेयर पर व्याख्यान दिए। प्रो. गौतम बंद्योपाध्याय ने डेटा हैंडलिंग एवं एक्सप्लोरेटरी डेटा एनालिसिस पर जानकारी दी, जबकि डॉ. पराग बी. शाह ने डायनोस्टिक एनालिटिक्स और हाइपोथीसिस टेस्टिंग की उपयोगिता बताई। डॉ. राजू डी. चौधरी ने जामोवी सॉफ्टवेयर के इंटरफेस, डेटा इम्पोर्ट और वक्रप्लो पर प्रशिक्षण दिया। कार्यक्रम में देश के 10 राज्यों से 37 से अधिक प्रतिभागी शामिल हैं। कार्यक्रम का संयोजन डॉ. दीपति गुप्ता एवं सह-संयोजन श्री सी. डी. राणा कर रहे हैं।

आईयूसीटीई में एआई और डेटा एनालिटिक्स पर विशेषज्ञों ने साझा किए आधुनिक शोध के गुर

इंडिया सावधान न्यूज
संतोष कुमार सिंह

वाराणसी :- अंतर विश्वविद्यालय अध्यापक शिक्षा केन्द्र (आईयूसीटीई) वाराणसी में हफ्ता डेटा टू इनसाइट्स स्टैटिस्टिकल एनालिसिस विद फ्री एंड एआई-डिवन टूल्स विषय पर छह दिवसीय शॉर्ट टर्म कार्यक्रम का आयोजन किया जा रहा है। दूसरे दिन के प्रथम सत्र के वक्ता प्रो. गौतम बंधोपाध्याय, पूर्व प्रोफेसर प्रबंधन अध्ययन विभाग, राष्ट्रीय प्रौद्योगिकी संस्थान, दुर्गापुर ने डेटा हैंडलिंग इन एक्सेल विषय पर अपने विचार प्रस्तुत किए। उन्होंने बताया कि किस प्रकार डेटा को व्यवस्थित, विश्लेषित और प्रस्तुत करके निर्णय लेने की प्रक्रिया को बेहतर बनाया जा सकता है। इस सत्र में प्रतिभागियों को एक्सेल के

उन्नत उपकरणों के उपयोग से कार्य को सरल बनाने और रिपोर्टिंग में सटीकता बढ़ाने के उपाय सिखाए गए। साथ ही उन्होंने जोर दिया कि डेटा प्रबंधन में दक्षता आज के शिक्षक तथा छात्रों के लिए अत्यंत आवश्यक है। द्वितीय सत्र में उन्होंने एक्सप्लोरेटरी डेटा एनालिसिस (ईडीए) विषय पर व्याख्यान दिया। उन्होंने बताया कि भारत में डेटा साइंस के क्षेत्र में एक्सप्लोरेटरी डेटा एनालिसिस का महत्व तेजी से बढ़ रहा है। यह तकनीक बड़े डेटा सेट को समझने और उसमें छिपे पैटर्न खोजने में मदद करती है। ईडीए के जरिए कंपनियाँ अपने निर्णय अधिक सटीक और प्रभावी बना रही हैं। कार्यशाला के तृतीय सत्र में डॉ. पराग बी. शाह, एसोसिएट प्रोफेसर एच.एल. कॉलेज ऑफ कॉमर्स, अहमदाबाद ने कन्सेप्ट ऑफ



डायग्नोस्टिक एनालिटिक्स एंड इंट्रोडक्शन टू हाइपोथीसिस टेस्टिंग विषय पर व्याख्यान दिया। उन्होंने बताया कि यह तकनीक किसी समस्या के मूल कारण को समझने और डेटा से गहराई में निष्कर्ष निकालने में मदद करती है। साथ ही उन्होंने बताया कि शोध जगत में हाइपोथीसिस टेस्टिंग को वैज्ञानिक निर्णय लेने का आधार माना जाता है। इस प्रक्रिया के जरिए शोधकर्ता यह परखते हैं कि कोई धारणा या

अनुमान वास्तविक डेटा पर कितना सही बैठता है। अंतिम सत्र में डॉ. राजू डी. चौधरी, एसोसिएट प्रोफेसर, एम.जी. साईंस इंस्टीट्यूट अहमदाबाद ने इंट्रोडक्शन टू जैमोवी (इंटरफेस, डेटा इम्पोर्ट, वर्कफ़्लो) विषय पर अपने विचार प्रस्तुत किए। उन्होंने बताया कि भारत में सांख्यिकीय विश्लेषण के लिए जैमोवी सॉफ्टवेयर का उपयोग तेजी से बढ़ रहा है। इसका इंटरफेस बेहद सरल है जिससे नए शोधकर्ताओं

को भी इसके उपयोग में आसानी होती है। इस प्लेटफॉर्म पर डेटा इम्पोर्ट करना अत्यंत आसान है तथा विभिन्न फाइल फॉर्मेट्स को आसानी से लोड किया जा सकता है। शोध कार्यों के लिए इसका वर्कफ़्लो स्पष्ट और व्यवस्थित है जिससे विश्लेषण तेजी से किया जा सकता है। इस छह दिवसीय कार्यक्रम में महाराष्ट्र, केरल, राजस्थान, हरियाणा, पश्चिम बंगाल, मध्य प्रदेश, बिहार, दिल्ली, गुजरात, उत्तर प्रदेश सहित 10 राज्यों के 37 से अधिक प्रतिभागी प्रतिभाग कर रहे हैं। इस कार्यक्रम का संयोजन डॉ. दीपि गुप्ता, सहायक प्राध्यापक, आईयूसीटीई तथा सह-संयोजन सी.डी. राणा सहायक पुस्तकालयाध्यक्ष आईयूसीटीई कर रहे हैं।

इंडिया सावधान न्यूज, पृष्ठ-04, दिनांक: 27.05.2026

आईयूसीटीई में डेटा एनालिटिक्स व एआई टूल्स पर प्रतिभागियों को मिला व्यावहारिक प्रशिक्षण, एक्सेल, डेटा विजुअलाइजेशन और जैमोवी पर हुआ गहन मंथन

मुरादाबाद न्यूज प्राइम
/(संतोष कुमार सिंह)

वाराणसी :- अंतर विश्वविद्यालय अध्यापक शिक्षा केन्द्र (आईयूसीटीई) वाराणसी में हफ्ता डेटा टू इनसाइट्स स्टैटिस्टिकल एनालिसिस विद फ्री एंड एआई-डिवन टूल्स विषय पर आयोजित छह दिवसीय शॉर्ट टर्म कार्यक्रम के तृतीय दिवस के विभिन्न शैक्षणिक सत्र सफलता पूर्वक सम्पन्न हुए। कार्यक्रम में देशभर से आए प्रतिभागियों ने सांख्यिकीय विश्लेषण, डेटा विजुअलाइजेशन तथा आधुनिक शोध उपकरणों से संबंधित विषयों पर सक्रिय सहभागिता की। प्रथम सत्र में प्रो. गौतम बंधोपाध्याय पूर्व प्रोफेसर प्रबंधन अध्ययन विभाग राष्ट्रीय प्रौद्योगिकी संस्थान दुर्गापुर ने हंडिस्क्रिप्टिव एनालिटिक्स यूजिंग एक्सेल विषय पर व्याख्यान दिया। उन्होंने एक्सेल



के माध्यम से डेटा के वर्णनात्मक विश्लेषण की विभिन्न तकनीकों को सरल एवं व्यवहारिक उदाहरणों द्वारा समझाया। उन्होंने बताया कि डेटा विश्लेषण के माध्यम से शोध कार्यों में सटीक निष्कर्ष प्राप्त किए जा सकते हैं। द्वितीय सत्र में उन्होंने हविजुअलाइजेशन एंड डैशबोर्डिंग विषय पर अपने विचार प्रस्तुत किए। इस सत्र में प्रतिभागियों को डेटा को प्रभावी ढंग से प्रस्तुत करने हेतु विभिन्न ग्राफ, चार्ट तथा डैशबोर्ड तैयार

करने की विधियों से अवगत कराया गया। उन्होंने कहा कि डेटा विजुअलाइजेशन निर्णय प्रक्रिया को अधिक स्पष्ट एवं प्रभावी बनाता है। तृतीय सत्र में श्री हितेश सोलंकी, वैज्ञानिक-डी, इन्फ्लेक्शन केंद्र, गांधीनगर ने हविजुअलाइजेशन विषय पर व्याख्यान दिया। उन्होंने प्रतिभागियों को जैमोवी सॉफ्टवेयर के माध्यम से सांख्यिकीय परीक्षणों की मूलभूत प्रक्रियाओं की जानकारी दी तथा शोध में इसके

उपयोग की उपयोगिता पर प्रकाश डाला। अंतिम सत्र में हितेश सोलंकी ने हविजुअलाइजेशन विषय पर प्रशिक्षण प्रदान किया। उन्होंने विभिन्न प्रकार के तुलनात्मक परीक्षणों की प्रक्रिया को व्यावहारिक रूप से समझाते हुए बताया कि यह तकनीक शोधकर्ताओं को डेटा आधारित वैज्ञानिक निष्कर्ष निकालने में अत्यंत सहायक है। इस छह दिवसीय कार्यक्रम में महाराष्ट्र, केरल, राजस्थान, हरियाणा, पश्चिम बंगाल, मध्य प्रदेश, बिहार, दिल्ली, गुजरात तथा उत्तर प्रदेश सहित विभिन्न राज्यों से 37 से अधिक प्रतिभागी सहभागिता कर रहे हैं। कार्यक्रम का संयोजन डॉ. दीपि गुप्ता सहायक प्राध्यापक, आईयूसीटीई तथा सह-संयोजन सी.डी. राणा सहायक पुस्तकालयाध्यक्ष आईयूसीटीई द्वारा किया जा रहा है।

आईयूसीटीई में एआई और डेटा एनालिटिक्स पर विशेषज्ञों ने साझा किए आधुनिक शोध के गुरु फ़ॉर्म डेटा टू इनसाइट्स कार्यक्रम में प्रतिभागियों को सिखाई गई एक्सेल,ईडीए और जामोवी की उन्नत तकनीकें



अमृत प्रसारण

वाराणसी :- अंतर विश्वविद्यालय अध्यापक शिक्षा केंद्र (आईयूसीटीई) वाराणसी में "फ़ॉर्म डेटा टू इनसाइट्स स्टेटिस्टिकल एनालिसिस विद फ्री एंड एआई-ड्रिवन टूल्स" विषय पर छह दिवसीय शॉर्ट टर्म कार्यक्रम का आयोजन किया जा रहा है। दूसरे दिन के प्रथम सत्र के वक्ता प्रो. गौतम बंधोपाध्याय, पूर्व प्रोफेसर प्रबंधन अध्ययन विभाग, राष्ट्रीय प्रौद्योगिकी संस्थान, दुर्गापुर ने डेटा हैंडलिंग इन एक्सेल विषय पर अपने विचार प्रस्तुत किए। उन्होंने बताया कि किस प्रकार डेटा को व्यवस्थित, विश्लेषित और प्रस्तुत करके निर्णय लेने की प्रक्रिया को बेहतर बनाया जा सकता है। इस सत्र में प्रतिभागियों को एक्सेल के उन्नत उपकरणों के उपयोग से कार्य को सरल बनाने और रिपोर्टिंग में सटीकता बढ़ाने के उपाय सिखाए गए। साथ ही उन्होंने जोर दिया कि डेटा प्रबंधन में दक्षता आज के शिक्षक तथा छात्रों के लिए अत्यंत आवश्यक है। द्वितीय सत्र में उन्होंने एक्सप्लोरेटरी डेटा एनालिसिस (ईडीए) विषय पर व्याख्यान दिया उन्होंने बताया कि भारत में डेटा साइंस के क्षेत्र में एक्सप्लोरेटरी डेटा एनालिसिस का महत्व तेजी से बढ़ रहा है। यह तकनीक बड़े डेटा सेट को समझने और उसमें छिपे पैटर्न खोजने में मदद करती है। ईडीए के ज़रिए कंपनियाँ अपने निर्णय अधिक सटीक और प्रभावी बना रही हैं। कार्यशाला के तृतीय सत्र में डॉ. पराग बी. शाह, एसोसिएट प्रोफेसर एच.एल. कॉलेज ऑफ कॉमर्स, अहमदाबाद ने कन्सेप्ट ऑफ डायग्नोस्टिक एनालिटिक्स एंड इंटीडक्शन टू हाइपोथी-

सिस टेस्टिंग विषय पर व्याख्यान दिया उन्होंने बताया कि यह तकनीक किसी समस्या के मूल कारण को समझने और डेटा से गहराई में निष्कर्ष निकालने में मदद करती है। साथ ही उन्होंने बताया कि शोध जगत में हाइपोथीसिस टेस्टिंग को वैज्ञानिक निर्णय लेने का आधार माना जाता है। इस प्रक्रिया के ज़रिए शोधकर्ता यह परखते हैं कि कोई धारणा या अनुमान वास्तविक डेटा पर कितना सही बैठता है। अंतिम सत्र में डॉ. राजू डी. चौधरी, एसोसिएट प्रोफेसर, एम.जी. साईंस इंस्टीट्यूट अहमदाबाद ने इंटीडक्शन टू जैमोवी (इंटरफेस, डेटा इम्पोर्ट, वर्कफ़्लो) विषय पर अपने विचार प्रस्तुत किए। उन्होंने बताया कि भारत में सांख्यिकीय विश्लेषण के लिए जैमोवी सॉफ्टवेयर का उपयोग तेजी से बढ़ रहा है। इसका इंटरफ़ेस बेहद सरल है, जिससे नए शोधकर्ताओं को भी इसके उपयोग में आसानी होती है। इस प्लेटफ़ॉर्म पर डेटा इम्पोर्ट करना अत्यंत आसान है तथा विभिन्न फ़ाइल फ़ॉर्मेट्स को आसानी से लोड किया जा सकता है। शोध कार्यों के लिए इसका वर्कफ़्लो स्पष्ट और व्यवस्थित है जिससे विश्लेषण तेज़ी से किया जा सकता है। इस छह दिवसीय कार्यक्रम में महाराष्ट्र, केरल, राजस्थान, हरियाणा, पश्चिम बंगाल, मध्य प्रदेश, बिहार, दिल्ली, गुजरात, उत्तर प्रदेश सहित 10 राज्यों के 37 से अधिक प्रतिभागी प्रतिभाग कर रहे हैं। इस कार्यक्रम का संयोजन डॉ. दीप्ति गुप्ता, सहायक प्राध्यापक, आईयूसीटीई तथा सह-संयोजन सी.डी. राणा सहायक पुस्तकालयाध्यक्ष आईयूसीटीई कर रहे हैं।

अमृत प्रसारण, पृष्ठ-01. दिनांक. 28.05.2026

फ्रॉम डेटा टू इनसाइट्स कार्यक्रम के चौथे दिन एएनओवीए,ची-स्केयर और रिग्रेशन पर हुआ प्रायोगिक प्रशिक्षण

अमृत प्रसारण

वाराणसी :- अंतर विश्वविद्यालय अध्यापक शिक्षा केंद्र (आईयूसीटीई) में फ्रॉम डेटा टू इनसाइट्स स्टैटिस्टिकल एनालिसिस विद फ्री एंड एआई-ड्रिवन टूल्स विषय पर छह दिवसीय शॉर्ट टर्म कार्यक्रम का आयोजन किया जा रहा है। कार्यशाला के चौथे दिवस के प्रथम सत्र में डॉ. पराग बी. शाह ने मोर देन टू गुप्स (एएनओवीए) व्हेन एंड हाउ टू यूज विषय पर प्रायोगिक हैंड्स-ऑन कराया। द्वितीय सत्र में उन्होंने ची-स्केयर टेस्ट्स (एसोसिएशन बिटवीन वैरिएबल्स) विषय पर व्याख्यान दिया। उन्होंने बताया कि यह परीक्षण विभिन्न चर के बीच संबंध को



समझने का एक महत्वपूर्ण उपकरण है। वक्ता ने कहा कि इस पद्धति से शोधकर्ताओं को डेटा में छिपे पैटर्न और निर्भरता का पता चलता है उन्होंने उदाहरण देते हुए समझाया कि सामाजिक विज्ञान और स्वास्थ्य अनुसंधान में इसका व्यापक उपयोग होता है। कार्यक्रम में उपस्थित छात्रों और

शोधकर्ताओं ने इस विषय पर गहरी रुचि दिखाई उन्होंने निष्कर्ष में कहा कि सही प्रयोग से यह तकनीक निर्णय लेने की प्रक्रिया को अधिक सटीक बना सकती है। तृतीय सत्र में डॉ. राजू डी. चौधरी ने कोरिलेशन एनालिसिस इंटरैक्शन टू रिग्रेशन विषय पर व्याख्यान दिया उन्होंने बताया कि को-रिलेशन एनालिसिस विभिन्न चर के बीच संबंधों की गहराई को समझने का एक सशक्त उपकरण है उन्होंने आगे कहा कि रिग्रेशन का परिचय शोधकर्ताओं को भविष्यवाणी और निर्णय लेने की प्रक्रिया में अधिक सटीकता प्रदान करता है उन्होंने उदाहरणों के माध्यम से समझाया कि अर्थशास्त्र,

समाजशास्त्र और स्वास्थ्य अनुसंधान में इन विधियों का व्यापक उपयोग होता है। अंतिम सत्र में उन्होंने मल्टिपल रिग्रेशन विषय पर प्रायोगिक हैंड्स-ऑन कराया। इस छह दिवसीय कार्यक्रम में महाराष्ट्र, केरल, राजस्थान, हरियाणा, पश्चिम बंगाल, मध्य प्रदेश, बिहार, दिल्ली, गुजरात, उत्तर प्रदेश सहित 10 राज्यों के 37 से अधिक प्रतिभागियों ने प्रतिभाग किया। संकाय सदस्यों सहित केंद्र के सभी अधिकारी व कर्मचारी उपस्थित रहें। इस कार्यक्रम का संयोजन डॉ. दीप्ति गुप्ता सहायक प्राध्यापक, आईयूसीटीई तथा सह-संयोजन सी.डी. राणा सहायक पुस्तकालयाध्यक्ष आईयूसीटीई कर रहे हैं।

आईयूसीटीई की कार्यशाला में एआई आधारित सांख्यिकीय विश्लेषण पर विशेषज्ञों ने दिए शोध के नए सूत्र

फ्रॉम डेटा टू इनसाइट्स कार्यक्रम के चौथे दिन एएनओवीए, ची-स्केयर और रिग्रेशन पर हुआ प्रायोगिक प्रशिक्षण

संतोष कुमार सिंह

वाराणसी :- अंतर विश्वविद्यालय अध्यापक शिक्षा केंद्र (आईयूसीटीई) में फ्रॉम डेटा टू इनसाइट्स स्टैटिस्टिकल एनालिसिस विद फ्री एंड एआई-ड्रिवन टूल्स विषय पर छह दिवसीय शॉर्ट टर्म कार्यक्रम का आयोजन किया जा रहा है। कार्यशाला के चौथे दिवस के प्रथम सत्र में डॉ. पराग बी. शाह ने मोर देन टू गुप्स (एएनओवीए) व्हेन एंड हाउ टू यूज विषय पर प्रायोगिक हैंड्स-ऑन कराया। द्वितीय सत्र में उन्होंने ची-स्केयर टेस्ट्स (एसोसिएशन बिटवीन वैरिएबल्स) विषय पर व्याख्यान दिया। उन्होंने बताया कि यह परीक्षण विभिन्न चर के बीच संबंध को समझने का एक महत्वपूर्ण उपकरण है। वक्ता ने कहा कि इस पद्धति से शोधकर्ताओं को डेटा में छिपे पैटर्न और निर्भरता का पता चलता है उन्होंने उदाहरण देते हुए समझाया कि सामाजिक विज्ञान और स्वास्थ्य अनुसंधान में इसका व्यापक उपयोग होता है।

कार्यक्रम में उपस्थित छात्रों और शोधकर्ताओं ने इस विषय पर गहरी रुचि दिखाई उन्होंने निष्कर्ष



में कहा कि सही प्रयोग से यह तकनीक निर्णय लेने की प्रक्रिया को अधिक सटीक बना सकती है। तृतीय सत्र में डॉ. राजू डी. चौधरी ने कोरिलेशन एनालिसिस इंटरैक्शन टू रिग्रेशन विषय पर व्याख्यान दिया उन्होंने बताया कि को-रिलेशन एनालिसिस विभिन्न चर के बीच संबंधों की गहराई को समझने का एक सशक्त उपकरण है उन्होंने आगे कहा कि रिग्रेशन का परिचय शोधकर्ताओं को

भविष्यवाणी और निर्णय लेने की प्रक्रिया में अधिक सटीकता प्रदान करता है उन्होंने उदाहरणों के माध्यम से समझाया कि अर्थशास्त्र, समाजशास्त्र और स्वास्थ्य अनुसंधान में इन विधियों का व्यापक उपयोग होता है। अंतिम सत्र में उन्होंने मल्टिपल रिग्रेशन विषय पर प्रायोगिक हैंड्स-ऑन कराया।

इस छह दिवसीय कार्यक्रम में महाराष्ट्र, केरल, राजस्थान, हरियाणा, पश्चिम बंगाल, मध्य

प्रदेश, बिहार, दिल्ली, गुजरात, उत्तर प्रदेश सहित 10 राज्यों के 37 से अधिक प्रतिभागियों ने प्रतिभाग किया।

संकाय सदस्यों सहित केंद्र के सभी अधिकारी व कर्मचारी उपस्थित रहें। इस कार्यक्रम का संयोजन डॉ. दीप्ति गुप्ता सहायक प्राध्यापक, आईयूसीटीई तथा सह-संयोजन सी.डी. राणा सहायक पुस्तकालयाध्यक्ष आईयूसीटीई कर रहे हैं।

उजाला शिखर, पृष्ठ-02. दिनांक 29.05.2026

Annexure 6: Glimpses of the program





Inter University Centre for Teacher Education

Banaras Hindu University
IUCTE Campus, Sundar Bagiya
Nariya-BLW Road, Varanasi - 221005
Uttar Pradesh

Contact No.: 0542-2368823
Email: directoroffice@iucte.ac.in