

CREDIT BASED ADD ON COURSE ON

Research Methodology and Data Analytics: Hands on Training in Advanced Excel, STATA, PYTHON and Artificial Intelligence

Organised by: DEPARTMENT OF ECONOMICS

SURENDRANATH COLLEGE FOR WOMEN

Introduction:

In today's world, good decision making relies on data and data analysis. The course is an introduction to the essential concepts, tools and methods of statistics for participants in business, economics and similar disciplines. The focus is on concepts, reasoning, interpretation and thinking rather than computation, formulae and theory. The course covers two main branches of statistics: descriptive statistics and inferential statistics. Descriptive statistics includes collecting data and summarising it, and interpreting it through numerical and graphical techniques. Inferential statistics includes selecting and applying the correct statistical technique in order to make estimates or test claims about a population based on a sample. By the end of this course, participants should understand and know how to use statistics in different fields of research. Participants will learn to use Software viz STATA, AND PYTHON in different fields of empirical research and project work.

Artificial Intelligence is a technology that utilizes advanced algorithms and computational power to tap into data, which is loaded with lots of useful information but can create obstacles to the distillation of accurate knowledge. In today's data-driven world, the marriage of artificial intelligence (AI) and data analytics has proven to be a game-changer. AI's ability to process, analyze, and derive meaningful insights from vast and complex datasets has revolutionized how businesses, researchers, and organizations harness the power of data. The unprecedented increase in data volume and detail has posed ever more challenging questions for traditional analytical procedures, which are increasingly inadequate for the mass of information they are expected to process.

Course Objectives:

This course will teach the learners how to judge and process quantitative information and how to use data to answer economic and social questions.

COURSE OUTCOMES:

- By the end of this course, the learners will be able to
- i) apply the basic concepts of distributions, charts and various types of measures.
 - ii) apply the concepts of estimation and its type in mean, proportion and variance.
 - iii) demonstrate the concept of testing of hypothesis for small and large samples by using various tests like t-test, z-test and chi-square test
 - iv) apply the concepts of Correlation and regressions
 - v) acquire the knowledge about Econometrics and its various tools and techniques.
 - vi) to investigate the problems, finding out the results using proper methodologies and interpretation of the results.
 - vii) Application of Artificial Intelligence in Data Analytics

Course Description: The Software based course intends to teach

- a) Introduction to univariate data analysis methods.
- b) Descriptive statistics and data visualization methods.
- c) Overview of sampling techniques for data collection.
- d) Introduction to statistical inference methods for decision making including simple and multiple linear regression, estimation procedures using confidence intervals and hypothesis testing.
- e) Drawing conclusions from the results.

Tentative Structure: (may be modified later)

Course Instructors:

1. Dr. Chandrima Cakraborty, Assistant Professor, Department of Economics, Vidyasagar University
2. Dr. Shirsendu Mukherjee, Associate Professor, Department of Economics, St. Pauls' Cathedral Mission College
3. Prof. Supriyo John Roy, Faculty, Scottish Church College
4. Haritabh Gupta, Sr Software Development Engineer, Aurora DB, Amazon Dev Center Ireland.
5. Faculty of Department of Economics, Surendranath College for Women

Course Organizers: Coordinator: Dr. Suparna Gangopadhyay

Organising Committee: Prof. Smita Mazumder

Prof. Budhaditya Banerjee (Head)

Prof. Kuheli Paul

Prof. Pooja Dey

Course Fee: Rs. 500.00

Eligibility Criteria: Basic knowledge on Statistics and computer operation, and basic knowledge about Excel operation.

Course Structure: The course is to be completed in 30 Hours. The course is divided into 15 credits (1 Credit = 2 Hours). The student has to earn at least 80% of the credit to get the completion certificate of the course.

Course Commencement and Duration: The thirty hour course will commence on May 14, 2024 and end on June 21, 2024.

Certification: The candidate successfully completing the course shall be awarded a certificate of completion.

Course Structure (Tentative):

<i>Module No.</i>	<i>Topic</i>	<i>Course Outline</i>	<i>Required Hours</i>
I (Credit: 1)	Introductory Concepts	<ul style="list-style-type: none"> • Exploring the Data • Types of data • Data and Representation • Description of Data with Bivariate Analysis 	Total: 2 Hours Theory: 1 Hours Practical: 1 Hour
II (Credit: 1)	Data Management	<ul style="list-style-type: none"> • An Overview of Database Management Concepts and Architectures • Database Storage Structures • Data Models • Relational Database design • Transaction Management • Backup and Recovery Techniques • Query Processing and Evaluation • Database Security and Authorization 	Total: 2 Hours Theory: 1 Hours Practical: 1 Hours
III (Credit: 1)	Graphics	<ul style="list-style-type: none"> • Understanding the Coordinate • Basic Two-Way Plots (eg. Scatter Plot) • Bar Chart & Pie Chart • Line Plot • Histogram • Box Plot • Adding Text to Graph • Working on Graph Editor 	Total: 2 Hours Practical: 2 Hours
IV (Credit: 3)	Bivariate analysis and Simple Linear Regression Model	<ul style="list-style-type: none"> • Classical Linear Regression Model (Simple linear regression and multiple linear regression) • Statistical inference in linear regression model • Consequences of Violations of Classical Assumptions • Regression Diagnostics 	Total: 6 Hours Practical: 6 Hours
V.(Credit: 3)	Multiple Regression Analysis	<ul style="list-style-type: none"> • Estimation • Inference • Qualitative Information: Binary Variables • Specification and Data Issues • Basic Regression Analysis with Time Series Data • Panel Data Methods 	Total 6 Hours Practical 6 Hours

VI. (Credit: 2)	Introduction to Python	<ul style="list-style-type: none"> • Introduction of Python. • Installing Python IDEs – Python IDLE and Anaconda. • Writing Your First Python Program. • Data-types in Python. • Variables in Python – Declaration and Use. • Typecasting in Python. • Operators in Python 	Total 4 Hours Practical Only
VII. (Credit 4)	Data Analytics and Artificial Intelligence	<ul style="list-style-type: none"> • Overview of AI • Areas of Application of AI in our daily lives • AI based Applications • Problem Solving by Search • Basics of Machine Learning • Neural Network and Deep Learning 	Total 4 Hours

Dates: May 14, 2024 to June 21, 2024

Tentative Dates: 14. 05. 2024, 22.05.2024, 26. 05. 2024 (online), 28. 05. 2024 (online), 06. 06. 2024, 07. 06. 2024, 08. 06. 2024, 20. 06. 2024, 21. 06. 2024.

Tentative Time Table of Classes taken by External Resource Persons:

Dates	Resource Person	Time	Topic (Title of the topic will be announced later)
22. 05. 2024	Dr.Shirsendu Mukherjee	9:00 am to 3:00 pm	Advanced Excel
26. 05. 2024 (Online)	Mr. Haritabh Gupta	3:00 pm to 5:00 pm	Data Analytics and Artificial Intelligence (Part-1)
28. 05. 2024 (Online)	Mr. Haritabh Gupta	3:00 pm to 5:00 pm	Data Analytics and Artificial Intelligence (Part-1I)
06. 06. 2024	1. Prof. Supriyo John Roy	9:00 am to 10:00 am	Fundamentals of Python (Part-1)
	2. Dr. Chandrima Cakraborty	10: 15 am to 12:15 pm	Data Analysis using STATA (Part-1)
07. 06. 2024	1. Prof. Supriyo John Roy	9:00 am to 10:00 am	Fundamentals of Python (Part-1I)
	2. Dr. Chandrima Cakraborty	10: 15 am to 12:15 pm	Data Analysis using STATA (Part-1I)
08. 06. 2024	Prof. Supriyo John Roy	9:00 am to 10:00 am	Fundamentals of Python (Part-1II)
20. 06. 2024	Dr. Chandrima Cakraborty	10:00 am to 12:00 noon	Data Analysis using STATA (Part-1II)
21. 06. 2024	To be announced later	10:00 am to 12:00 noon	Valedictory Session