SYLLABUS FOR DATA ANALYTICS COURSE

EN 233 :Data Analytics For Energy (3 Credits)

Module-01: Basic data & variables(C-1, L- 10, 5 -S/ D/ T)

Significance of Data, Analyzing Data, Identify Types of Data Variables, Summarizing data, Identify Measures of central tendency, Describe Measures of spread, Identify Skew-ness of data distribution, Data Collection and Management Framework,Data Collection,Data Dictionary,Outlier Treatment, Missing Value Imputation. Standardization of scores, Standard Deviation, Standard Scores Data distribution, Normal Distribution, Hypothesis Testing- Developing Null and Alternative Hypotheses, Type I and Type II Errors One-Tailed Tests About a Population Mean Two-Tailed Tests About a Population Mean. Introduction to Data Structure in R

Module 02: Analysis of data (C-1, L- 10, 5-S/ D/ T)

What is Regression? Covariance & Correlation, Features of r (correlation), Testing the significance of the correlation coefficient,Types of regression analysis, Purpose of regression analysis, Purpose of regression analysis, R2 coefficient determination, Coefficient of determination (R2) and Adjusted R2, Multiple Linear Regression, Typical Applications of Regression Analysis, Residual Analysis. Multi-collinear, Hetero-skedasticity. Case Study with R. Logistic Regression Basics, Generalized Linear Model (glm), What is logistic regression ? Types of logistic regression analysis, Applications of logistic regression analysis ,Prerequisite / when & why binary logistic regression.What is clustering?, When to use cluster analysis? Application of cluster analysis, Types of cluster analysis , K means (In detail), What is decision tree? Why decision tree? Types of decision tree Constructing decision tree, Random forest and CART (In detail)Case Study with R.

Module 03: Analysis tools and programming (C-1, L- 10, 5 -S/ D/ T)

Introduction to analytics & different terms of analytics. Need of Analytics.Analytics vs analysis, Intelligence vs Data Science, Data Analyst Vs Business Analyst, Types of Analytics, Tools for Analytics Latest. Trends of   analytics Business Analytics in Practice-Asset Health Analytics, Supply Chain Analytics, Operational Analytics, HR Analytics, Financial Analytics, Marketing Analytics, Text Analytics.

What is Time series, Components of Time Series,Techniques for forecasting- Simple Moving Average,Weighted Moving Average, Simple Exponential Smoothing, Double Exponential Smoothing, Triple Exponential Smoothing, Time Series Models Comparison, Use Cases, Industry Applications, Basic Concepts (acf, pacf, AR, MA), ARMA Model, ARIMA Model ,Industry Applications.Case Study with R

What is R? Data science & R, Components of R, Installing R, Using command line in R, Introduction to R Studio (IDE),Finding Help & solving issues in R, Data types in R, Program Structure in R, Flow Control : For loop, If condition, While conditions and repeat loop ,Debugging tools, Concatenation of Data, Combining Vars , cbind, rbind, Sapply, apply, tapply functions, Built - in functions in R, File operations in R, Reading file, Writing to a file, Importing and exporting a file, Vectors, Lists, Scalars, Data Frames, Matrices, Arrays, Factors, Use of data structures in different conditions

REFERENCE BOOKS:

Sr. No.	Book Title	Author	Edition	Publication
1	Fundamentals Of Mathematical Statistics	Gupta & Kapoor	Fourth Edition	Sultan Chand Publication
2	Time Series Analysis & Its Application	Shumway & Stuffer	Fourth Edition	Springer
3	Statistical Inference	Shrivastav	First Edition	Phi
4	Design And Analysis Of Experiments	Duglass C Mongtomery	Ninth Edition	Wiley
5	Hands On Programming With R	Garrett Gorelumund	First Edition	Oreilly
6	Essential Of R For Data Analysis	PBR Books	First Edition	PBR Books
7	Basic Statistics	Mohonty, P.K.	First Edition	Sceintific Publisher
8	Fundamental Of Applied Statistics	Gupta & Kapoor	Fouth Edition	Sultan Chand & Sons
9	Basic Statistics For Business & Economics	Lind &Marchal	First Edition	Tata Mcgraw Hill
10	Operations Research	Mohonty, P.K.	First Edition	Sceintific Publisher

Preamble- Data Analytics Course for SPPU Energy students:

Today data is being generated in almost every aspect of our lives, in all processes and in all industries. Real Challenge is to extract meaningful information from this data for decision making. Industry focus data analytics course will help students to extract useful information from millions of bytes within minutes. The course will provide Industry specific & Business Function analytics training and coaching for the industries vertical covering manufacturing, oil & gas, refinery, petrochemical, chemical, power, service Industries and functions covering Production, Delivery ,Marketing, Finance, HR , Retails etc.

These courses are focused on Forecasting, Econometrics, Time Series Analysis, quantitative analysis and predictive modelling outcomes based on historical patterns to come out with right & informed decision making. The program consists of classroom training with a specially designed hands-on workshop for students where participants will able to interpret the data and the analyse the result. This will enable to build core competency, strong knowledge base about the process, control, forecast and predictive modelling for sustainable improvement and desired output. Also, this course will equip students to get new career opportunity in near future.
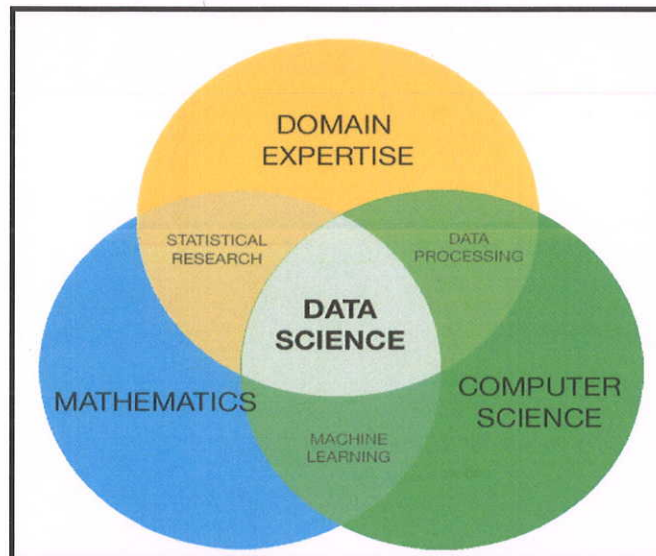
Course Deliverables:

This course will enable studentsto :
1) Understandfundamental & advance concepts of data analytics
2) Know the purpose and goals of data analytics (BA)
3) Evaluate, learn & master stages of analytics process
4) Get exposure todata analytics process used offor solving theproblems & develop analytics models in future
5) Enable participants to provide solution by interpreting the analysis
6) To develop Road map for Data Analytics of the organization
7) Enable Faster, accurate &actionableanalytics gap
8) Exploit Career opportunity in the field of Data Science / Business Analytics

Need for the business analytics course for energy students

DataAnalytics Training with Industry Perspective:

The term 'Industry 4.0' stands for the fourth industrial revolution. Behind the scenes of the world's leading industrial companies, a profound digital transformation is now underway. Industrial leaders are digitising essential functions and processes. They are enhancing their product portfolio with digital functionalities and are investing in data analytics as a foundational capability to drive innovation and significant improvements in efficiency. In India as well, we see industrial companies planning to dramatically increase their overall level of digitisation.
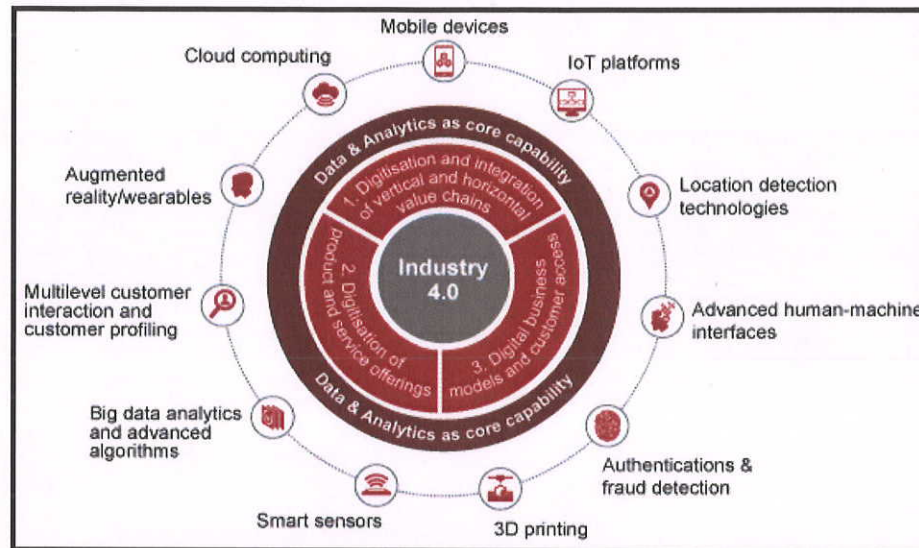
Industries are also strengthening their offerings to customers by digitising existing products, either by offering them through digital channels, offering connected services or using data analytics to find hidden correlations to identify new product ideas even before customers know they want them. The opportunity is there not only to greatly increase the ability to respond flexibly and more rapidly to customer demands but also to anticipate demands, thereby helping customers get ahead of themselves in a range of predictive ways.

Analytics is at the core of Industry 4.0 & digital transformation journey.

As per NASSCOM Report "Big Data – The next big thing":

India is expected to be in the forefront of Big Data analytics and related IT services, fuelling demand for data scientists and IT engineers.

• India follows closely behind the US in terms of Big Data talent availability and service provider's initiatives to build such talent

- India is ahead of most outsourcing destinations like China, Poland and Philippines, in terms of talent availability

- IT companies like EMC, Oracle, IBM, Infosys, etc., are leveraging their academic alliance programs, with universities in India and overseas to introduce courses in various areas of Big Data.

India's Big Leap into the Digital

Evolving technologies are now integral to modern living and this digital transformation is altering the business environment as well. Businesses are adapting and evolving, putting technology to use to improve efficiencies, keep pace with consumer expectations and foster innovation. Research conducted by Microsoft and International Data Corporation (IDC) shows that digital transformation will add an estimated $154 billion to India's GDP by 2021, as well as increase the growth rate by 1% annually

ET GRAPHICS

IMPACT OF DIGITAL TRANSFORMATION AT WORK

Improved performance	32%
Upskilling and reskilling	41%
Better project opportunities	16%
New job offers	11%

IN-DEMAND DOMAINS FOR UPSKILLING

Bar chart values: 23% 18% 20% 14% 13% 12%

- Data & Analytics
- Artificial Intelligence
- Cloud Computing
- Digital Marketing
- Cyber Security
- Others

*Source: Simplilearn Career Data Labs and collective research from job portals such as LinkedIn, Indeed, Naukri, Monster, and TimesJobs.

THE MOTIVATION FOR COMPLETING AN E-UPSKILLING PROGRAMME

39%	33%	17%	11%
Increase in salary	Rewards & recognition	Promotion	Gamification of training

KEY ATTRIBUTES TO LOOK FOR IN UPSKILLING PROGRAMMES

44%	25%	17%	14%
Valid certification	Projects & assessments	Teaching support /Guidance	User experience

DOMAINS & TOP JOB ROLES

Data Science
20092
Data Scientists

Artificial Intelligence
8000
AI Engineers

Cloud Computing
14072
Cloud Architects

Cyber Security
36000
Cyber Security Specialists

Project Management
18000
Digital Project Manager

INDUSTRIES IMPACTED

- Health & Pharma
- Telecom
- Technology
- Finance
- Media
- Automative

SIDDHARTH