Indrashil University

TEACHING SCHEME FOR POST GRADUATE DIPLOMA IN BUSINESS ANALYTICS (BA)

Trimester: 1	**Minimum Trimester Credit Required: 8 Cumulative Trimester Credit Required: 8**		
Course Code	**Course Name**	**L-T-P**	**Credits**
BA4101	INTRODUCTION TO PYTHON PROGRAMMING	2-0-2	3
BA4102	DATA ANALYTICS USING R PROGRAMMING	2-0-2	3
BA4103	FOUNDATIONS OF DATA SCIENCE	2-0-0	2
	Total	**6-0-4**	**8**
Trimester: 2	**Minimum Trimester Credit Required: 8 Cumulative Trimester Credit Required: 16**		
Course Code	**Course Name**	**L-T-P**	**Credits**
BA 4201	INTRODUCTION TO BUSINESS ANALYTICS	3-0-0	3
BA4202	PREDICTIVE ANALYTICS	2-0-0	2
BA4203	DATA VISUALIZATION	2-0-2	3
	Total	**7-0-2**	**8**
Trimester: 3	**Minimum Trimester Credit Required: 8 Cumulative Trimester Credit Required: 24**		
Course Code	**Course Name**	**L-T-P**	**Credits**
BA4301	FINANCIAL ANALYTICS	3-0-0	3
BA4302	SUPPLY CHAIN ANALYTICS	3-0-0	3
BA4303	PROJECT MANAGEMENT	2-0-0	2
BA4304	PROJECT/ RESEARCH PAPER	0-0-16	8
	*Choose 3 electives OR Live Project / Research Article in reputed Journal		
	Total	**7-0-2/0-0-16**	**8/8**

Indrashil University

PGDBA, 2021-22

Course Syllabus

Syllabus:
TRIMESTER-1

Course Code: BA4101, 2-0-2-3
INTRODUCTION TO PYTHON PROGRAMMING

Topic

Module 1: Introduction
- Relationship between computers and programs
- Basic principles of computers
- File systems
- Using the Python interpreter
- Introduction to binary computation
- Input / Output

Module 2: Data types and control structures
- Operators (unary, arithmetic, etc.)
- Data types, variables, expressions, and statements
- Assignment statements
- Strings and string operations
- Control Structures: loops and decision

Module 3: Modularization and Classes
- Standard modules
- Packages
- Defining Classes
- Defining functions
- Functions and arguments (signature)

Module 4: Exceptions and data structures
- Data Structures (array, List, Dictionary)
- Error processing
- Exception Raising and Handling

Module 5: Object oriented design
- Programming types
- Object Oriented Programming
- Object Oriented Design
- Inheritance and Polymorphism

Module 6: Remaining materials, Exam preparation.

Course Code: BA4102, 2-0-2-3

DATA ANALYTICS USING R PROGRAMMING

Topic

Module 1: Introduction to Data Analysis
- Overview of Data Analytics
- Need of Data Analytics
- Nature of Data
- Classification of Data: Structured, Semi-Structured, Unstructured
- Characteristics of Data
- Applications of Data Analytics

Module 2: R Programming Basics
- Overview of R programming
- Environment setup with R Studio
- R Commands
- Variables and Data Types
- Control Structures
- Array, Matrix, Vectors, Factors, Functions
- R packages.

Module 3: Data Visualization using R:
- Reading and getting data into R (External Data): Using CSV files, XML files, Web Data, JSON files, Databases, Excel files.
- Working with R Charts and Graphs: Histograms, Boxplots, Bar Charts, Line Graphs, Scatterplots, Pie Charts.

Module 4: Statistics with R:
- Random Forest
- Decision Tree
- Normal and Binomial distributions
- Time Series Analysis
- Linear and Multiple Regression, Logistic Regression
- Survival Analysis.

Module 5: Prescriptive Analytics:
- Creating data for analytics through designed experiments
- Creating data for analytics through active learning
- Creating data for analytics through reinforcement learning.

Course Code: BA4103, 2-0-2-3

FOUNDATIONS OF DATA SCIENCE

Topic

Module 1: Data Science Overview
- Introduction to Data Science
- Different Sectors Using Data Science
- Data science process
- Data science toolkit
- Types of data
- Example applications

Module 2: Data Science and Python

- Discovering the match between data science and python
- Considering the emergence of data science
- Outlining the core competencies of a data scientist, linking data science, big data, and AI,
- Understanding the role of programming
- Creating the Data Science Pipeline
- Preparing the data, performing exploratory data analysis, learning from data, Visualizing, Obtaining insights and data products.

Module 3: Data Cleaning using Pandas:

- Selecting Data from Pandas Data Frame
- Slicing and Dicing using Pandas
- Group By / Aggregate
- String with Pandas
- Cleaning with messy Data with Pandas
- Dropping Entries
- Selecting Entries.

Module 4: Data Visualization

- Introduction, Types of data visualization,
- Data for visualization: Data types
- Data encodings
- Retinal variables
- Mapping variables to encodings
- Visual encodings
- Data Visualization in python using matplotlib

Module 5: Data Wrangling:

- Playing with Scikit-learn
- Understanding classes in Scikit-learn,
- Defining applications for data science
- Performing the Hashing Trick, using hash functions,
- Demonstrating the hashing trick, working with deterministic selection
- Considering Timing and Performance, working with the memory profiler,
- Running in Parallel on Multiple Cores, performing multicore parallelism,
- Demonstrating multiprocessing.

TRIMESTER-2

Course Code: BA4201, 3-0-0-2
INTRODUCTION TO BUSINESS ANALYTICS

Topic

Module 1: Introduction to Business Analytics

- Concept of analytics
- Types of Analytics
- Application fields
- Marketing Analytics
- Finance Analytics
- HR Analytics
- Operation Analytics, organization and source of data, importance of data quality, dealing with missing or incomplete data
- Role of Data Scientist in Business & Society

Module 2: Data Bases, Data Warehousing and Data Mining

- Types of Data Sources- Structured Vs Semi Structured Vs Unstructured data
- Data Warehouse Vs Databases
- Relational Database vs Non-Relational Database
- RDBMS Data structures
- Columnar Data structures
- Data Mining meaning
- Association Rules and clustering
- Decision trees
- Random forests

Module 3: Analytics Methodology

- Introduction to Analytics Methodology
- preparing objectives & identifying data requirements
- Data Collection
- Understanding data
- Data preparation – Data Cleansing, Normalization, Data Blending, Data Modelling
- Evaluation & feedback

Module 4: Time series

- Trend Analysis
- Seasonality and cyclical behavior
- Moving Average
- Exponential smoothing methods – Single exponential, double exponential,
- HOLT-WINTERS
- ARIMA
- Multiple linear regression-based forecasting

Module 5: Business Analytics Future Trends

- Role of Artificial Intelligence in Business
- Machine Intelligence
- Competitive Intelligence
- Text Mining
- Web Analytics (Web content mining, Web usage mining, Web structure mining)
- Role of Intelligent Agents in e-business, e-commerce, m-commerce
- Location Analytics
- Intelligent Agent in search & retrieval
- Personalization and Comparison)
- Social Networking Analysis
- Big Data Tools & Techniques
- Content Analytics (Sentimental Analysis & Opinion Analysis)
- Ethical and Legal considerations in Business Analytics

Course Code: BA4202, 2-0-0-3

PREDICTIVE ANALYTICS

Topic

Module 1: Introduction to Data Mining

- What is Data Mining?
- Concepts of Data mining,
- Technologies Used
- Data Mining Process, KDD Process Model, CRISP – DM
- Mining on various kinds of data
- Applications of Data Mining
- Challenges of Data Mining.

Module 2: Data Understanding and Preparation

- Introduction, Reading data from various sources
- Data visualization
- Distributions and summary statistics
- Relationships among variables
- Extent of Missing Data. Segmentation
- Outlier detection
- Automated Data Preparation
- Combining data files, Aggregate Data
- Duplicate Removal, Sampling DATA, Data Caching, Partitioning data, Missing Values.

Module 3: Model development & techniques

- Data Partitioning
- Model selection
- Model Development Techniques
- Neural networks
- Decision trees
- Logistic regression, Discriminant analysis
- Support vector machine, Bayesian Networks
- Linear Regression, Cox Regression, Association rules.

Module 4: Model Evaluation and Deployment

- Introduction, Model Validation
- Rule Induction Using CHAID
- Automating Models for Categorical and Continuous targets
- Comparing and Combining Models
- Evaluation Charts for Model Comparison
- Metalevel Modeling
- Deploying Model, Assessing Model Performance
- Updating a Model.

Course Code: BA4203, 2-0-2-3
DATA VISUALIZATION

Topic

Module 1: Introduction to Data Visualization
- Acquiring and Visualizing Data
- Simultaneous acquisition and visualization
- Applications of Data Visualization
- Keys factors of Data Visualization (Control of Presentation, Faster and Better JavaScript processing, Rise of HTML5, Lowering the implementation Bar)
- Exploring the Visual Data Spectrum: charting Primitives (Data Points, Line Charts, Bar Charts, Pie Charts, Area Charts)
- Exploring advanced Visualizations (Candlestick Charts, Bubble Charts, Surface Charts, Map Charts, Infographics)

Module 2: Basics of Data Visualization – Tables
- Reading Data from Standard text files (.txt, .csv, XML)
- Displaying JSON content Outputting Basic Table Data (Building a table, Using Semantic Table, Configuring the columns)
- Assuring Maximum readability (Styling your table, increasing readability, Adding dynamic Highlighting)
- Including computations, using data tables library, relating data table to a chart

Module 3: Visualizing data Programmatically
- Creating HTML5 CANVAS Charts (HTML5 Canvas basics, Linear interpolations, A Simple Column Chart, Animations)
- Starting with Google charts (Google Charts API Basics, A Basic bar chart, A basic Pie chart, Working with Chart Animations).

Module 4: Introduction to D3.js
- Getting setup with D3
- Making selections, changing selection's attribute
- Loading and filtering External data: Building a graphic that uses all of the population distribution data
- Data formats you can use with D3
- Creating a server to upload your data, D3's function for loading data
- Dealing with Asynchronous requests
- Loading and formatting Large Data Sets

Module 5: Advanced Data Visualization
- Making charts interactive and Animated: Data joins, updates and exits, interactive buttons, updating charts, adding transactions, using keys
- Adding a Play Button: wrapping the update phase in a function, adding a Play button to the page, Making the Play button go, Allow the user to interrupt the play, sequence

TRIMESTER-3

Course Code: BA4301, 3-0-0-3
FINANCIAL ANALYTICS

Topic

Module 1: Introduction to Financial Analytics

- Introduction to Financial Analytics
- Importance of Financial Analytics
- Types of Financial Analytics – Fundamental Analysis – Technical Analysis - Component of Financial Analytics – Features of Financial Analytics – Financial Analytics and Data Analysis
- Implementation of Financial Analytics
- Corporate Financial Analytics
- Investment Financial Analytics
- Financial Analytics and Current Financial Challenges – Fraud - Risk – Profitability – Portfolio Management

Module 2: Introduction to Machine Learning

- Definition of Machine Learning
- Understanding Objectives of Machine Learning
- Various Components of Machine Learning – Data Storage – Data Processing – Deriving Variables – Transformation – Generalization – Sampling
- Features of Machine Learning
- Types of Machine Learning – Supervised – Unsupervised
- Reinforcement Learning - Techniques
- Predictive Models – Deployment of Solution – Strategic Solution

Module 3: Machine Learning and Financial Analytics

- Adoption of Machine Learning in Financial Analytics
- Importance of Machine Learning in Financial Analytics
- Applications of Machine Learning in Finance
- Financial Data
- Types of Data -Financial Data - Market Data - Business Data
- Various Use Case on Machine Learning and Financial Analytics - Process Automation- Risk and Security- Underwriting and Credit scoring- Algorithmic trading

Module 4: Machine Learning Techniques and Financial Analytics

- Machine Learning Techniques and their Application in Various Financial Aspects
- Descriptive Statistics
- Central Tendencies
- Measures of Distribution
- Understanding Shape of Data
- Inferential Statistics – Predictive Modelling - Simple Linear Regression- Multiple Linear regression- Correlation – Cluster Analysis – Time Series Analysis

Module 5: Machine Learning and Financial Analytics Use Cases

- Sales and Revenue Analytics
- Profitability Analytics
- Price Elasticity
- Cash Flow Analytics
- Risk Analytics – Credit Risk and Market Risk Analytics – Value at Risk – Trading
- Sentiment Analysis – Credit Ratings – Customer Attrition Analysis – GARCH Models

Course Code: BA4302, 3-0-0-3

SUPPLY CHAIN ANALYTICS

Topic

Module 1: Introduction to Supply Chain Management

- Evolution of Supply Chain Management
- Analytics in Supply Chain Management
- Supply Chain Planning
- Different views of Supply Chain

Module 2: Supply Chain Strategy

- Supply Chain Drivers
- Developing Supply Chain Strategy
- Strategic Fit in Supply Chain
- Demand Forecasting in Supply Chain

Module 3: Bullwhip Effect and Time Series Analysis

- Exponential Smoothing Method of Forecasting
- Measures of Forecasting Errors
- Tracking Signal and Seasonality Models
- Forecasting using multiple characteristics in Demand Data and Inventory Management in Supply Chain

Module 4: Inventory Management in Supply Chain

- Multi echelon Inventory Management
- Multi echelon Inventory Management (Continued)
- Multi echelon Inventory Management for four stations
- Multi echelon Inventory Management for four stations (Numerical Example)

Module 5: Multi echelon Inventory Management for four stations (Numerical Example continued)

- Network Design in Supply Chain
- Network Design of Global Supply Chain
- Alternative channels of Distribution
- Location Decisions in Supply Chain

Course Code: BA4303, 2-0-0-2

PROJECT MANAGEMENT

Topic

Module 1: Introduction

- Definition of project
- Project Management Vs. General Management
- Three goals of project
- The life cycle of projects
- Selecting projects to meet organizational goals
- Confronting Uncertainty, Project portfolio process
- An approach to Project Formulation

Module 2: Organizing the project

- The PM's Roles
- The PM's responsibility to the project
- Selection of a Project Manager
- Project Management as a profession
- Fitting projects into the parent organization
- The project teams

Module 3: Planning the project

- The contents of a project plan
- The planning process-overview
- The planning process- Nuts and Bolts
- The work breakdown structure and other aids
- Multidisciplinary Teams-Balancing Pleasure

Module 4: Budgeting the Project

- Methods of budgeting
- Cost estimating
- Improving Cost Estimates
- Budget Uncertainty and risk management

Module 5: Scheduling the Project

- PERT and CPM Networks
- Project uncertainty and risk management,
- Simulation
- The Gantt charts
- Extensions to PERT/CPM

OR

Course Code: AIML4304, 0-0-16-8

INDUSTRY PROJECT/ MAJOR PROJECT

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Evaluation Scheme:

1. Continuous evaluation components- 30%
    - Classroom participation and attendance
    - Presentation, role play, Quiz etc
    - Assignments, case study analysis.
2. Mid-Trimester exam- 20%
3. External examination- 50%
4. Project work –
    - Mid Presentation: 25%
    - Final presentation cum viva-voce: 75% (it includes thesis evaluation)