S.Y.B.Sc (DATA SCIENCE) 2025-26

	Semester III Subjects	Credits		Semester IV Subjects	Credits
Major			**Major**		
BDD301	Data warehousing and Mining	2	**BDB401**	Big Data	2
			BDA402	Artificial Intelligence	2
BDS302	Data structure and Alg. using Python Programming	2	**BDBP403**	Big Data Practical	2
			BDAP404	Artificial Intelligence Practical	2
BDDP303	Data warehousing and Mining Practical	2			
BDSP304	Data structure and Alg. using Python Programming Practical	2			
Minor		2	**Minor**		
BDR305	Research Methodology		**BDS405**	Search Engine Optimization	2
BDRP306	Research Methodology Practical.	2	**BDSP406**	Search Engine Optimization Practical	2
OE		2	**OE**		
BDL307	Linear Algebra		**BDN407**	Numerical Methods	2
BDF307	Fundamental of Stock Market.		**BDM407**	Basics of Marketing	
			BDE407	Econometrics-II	
BDE307	Econometrics-I				
VSC			**SEC**		
BDW308	Web Technology	2	**BDT408**	Testing of Hypothesis	2
BDO308	Operating System		**BDC408**	Computer Graphics	
AEC BDH309/BDM309	Hindi/Marathi	2	**AEC BDH409/BDM409**	Hindi/Marathi	2
FP BDFP310	FP	2	**CEP BDCP410**	CEP	2
CC BDN311/BDY311	NSS/ Sports/ Cultural/ Yoga	2	**CC BDN411/BDY411**	NSS/ Sports/ Cultural/ Yoga	2

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Programme Name: **S.Y.B.Sc(Data Science)**	**Semester:III**
Course Category: Major	
Name of the Dept: **Science and Technology**	
Course Title: Data Warehousing and Mining	
Course Code: **BDD301**	Course Level: 5.0
Type : Theory	
Course Credit: 02	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	
Course Objectives: • To understand data warehouse with architectural types, architectural building blocks, aggregate tables and determine their usage. • To learn basics of data mining classification and clustering use of various data mining algorithms	
Course Outcomes: After the completion of the course, the learners would be able to: CO1 : Learner is able to demonstrate knowledge of data warehouse with clear understanding of architectural types, architectural building block, handle the processes of data preprocessing, data transformation and data reduction. CO2 : Learner has knowledge of using various Data Mining techniques for classification and clustering for analyzing the datasets using tools like Weka, R or Python	
Description the course: **(Including but not limited to)**	Introduction, relevance, Usefulness, Application, interest, connection with other courses, demand in the industry of Data Science, job prospects etc.

Syllabus: NEP 2020 w.e.f 2025-26

Unit No.	Content	Hours
I	**THE COMPELLING NEED FOR DATA WAREHOUSING:** Escalating Need for Strategic Information, Failures of Past Decision-Support Systems, Operational Versus Decision-Support Systems, Data Warehousing—The Only Viable Solution, Data Warehouse Defined **DATA WAREHOUSE:** The Building Blocks: Defining Features, Data Warehouses and Data Marts, Architectural Types, Overview of The Components, Metadata in The Data Warehouse **DIMENSION MODELLING:** The Star Schema, keys, The Snowflake Schema, Aggregate Fact Tables **DATA EXTRACTION, TRANSFORMATION, AND LOADING**: ETL Overview **INTRODUCTION TO DATA MINING:** Introduction, Data Mining Applications, Data Mining Process, Data Mining Techniques **BEGINNING WITH WEKA AND IRIS DATASET IN R:** Understanding Fisher‘s Iris Flower Dataset	15
II	**CLASSIFICATION:** Introduction to Classification, Types of Classification, Input and Output, , Introduction to the Decision Tree Classifier, Naive Bayes Method, Understanding Metrics to Assess the Quality of Classifiers **CLUSTER ANALYSIS:** Introduction to Cluster Analysis, Applications of Cluster Analysis, Partitioning Clustering, Hierarchical Clustering, Introduction to Modern Search Engines, Working of a Search Engine, PageRank Algorithm, Precision and Recall **INTRODUCTION TO ASSOCIATION RULE MINING:** : Defining Association Rule Mining, Representations of Items for Association Mining **THE APRIORI ALGORITHM:** The Apriori–TID Algorithm for Generating Association Mining Rules Direct Hashing and Pruning (DHP), Dynamic Itemset Counting (DIC), Mining Frequent Patterns without Candidate Generation (FP Growth)	15
	Total Hours	30

Books and References:

1. “DATA WAREHOUSING FUNDAMENTALS FOR IT PROFESSIONALS “ by PAULRAJ PONNIAH of “Wiley Second edition 2010”

2. “Data Mining and Data Warehousing : Principles and Practical Techniques” by Parteek Bhatia Cambridge University Press First 2019

3. “The Data Warehouse Toolkit” Ralph Kimball Margy Ross Wiley Third 2013

4. “Data Mining and Data Warehousing” by S.K. Mourya Shalu Gupta published "Alpha Science International Ltd First edition 2013"

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Proramme Name: **S.Y.B.Sc(Data Science)**	**Semester:III**
Course Category: Major	
Name of the Dept: **Science and Technology**	
Course Title: Data Structure and Algorithm Using Python Programming	
Course Code: **BDS302**	Course Level:5.0
Type : Theory	
Course Credit: 02	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	
Course Objectives: 1. To learn the significant Python implementation of popular data structures. 2. To learn about various data structure algorithms and design paradigms.	
Course Outcomes: OC1 . Learner is capable of choosing appropriate data structure in Python for specified Problems and algorithms. OC2 . Learner is able to implement Linked list, Stack, Queue, Tree data structure and various sorting algorithms.	
Description the course:	Data Structures and Algorithms using Python covers the fundamental concepts of organizing and manipulating data efficiently. This subject explores various data structures like linked lists, stacks, queues, trees, along with essential algorithms for searching, sorting, and optimization. By applying these concepts in Python, students learn to design and analyze solutions to real-world computational problems with an emphasis on performance and scalability.

Syllabus: NEP 2020 w.e.f 2025-26

Unit No.	Content	Hours
I	**Python Objects & Object-Oriented Programming:** Classes and object programming, Class Definitions, Inheritance, Data encapsulation and properties, Namespaces and Object-Orientation. **Principles of Algorithm Design:** An introduction to algorithms, Algorithm design paradigms Recursion and backtracking, Backtracking, Divide and conquer - long multiplication The recursive approach Runtime analysis Asymptotic analysis Big O notation, Composing complexity classes Omega notation, Theta notation, Amortized analysis. **Lists and Pointer Structures**: Arrays-Pointer structures **Singly linked lists**-Singly linked list class, The append operation, A faster append operation, Getting the size of the list, Improving list traversal, Deleting nodes, List search, Clearing a list **Doubly and circular linked lists**-A doubly linked list node Doubly linked list class, creating a circular list.	15
II	**Stacks**: Stack implementation, Push operation, Pop operation, Peek operation, Bracket-matching application. **Queues**:List-based queues, Stack-based queues Node-based queues, Application of queues Media player queues **Trees**: Terminology, Tree nodes, **Tree traversal**,Depth-first traversal-In-order traversal and infix notation, Pre-order traversal and prefix notation, Post-order traversal and postfix notation, Breadth-first traversal. **Binary trees**-Binary search trees,Binary search tree implementation, Binary search tree operations, Finding the minimum and maximum nodes Inserting nodes Deleting nodes. **Sorting:** Sorting algorithms- Bubble sort algorithms, Insertion sort algorithms, Selection sort algorithms, Quick sort algorithms	15
	Total Hours	30

References:

Sr.No.	Title	Author/s Publisher	Publisher	Edition	Year
1	Hands-On Data Structures And Algorithms with Python	Basant Agarwal, Benjamin Baka	Packt Publishing	2nd	2018
2	Data Structure and algorithm Using Python	Rance D. Necaise	Wiley India Edition		2016
3	Data Structure and Algorithm in Python	Michael T. Goodrich, RobertomTamassia	Wiley India Edition		2016

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Programme Name: **S.Y.B.Sc(Data Scinece)**	**Semester:III**
Course Category: Major	
Name of the Dept: **Science and Technology**	
Course Title: Data Warehousing and Mining Practical	
Type : Practical	
Course Code: **BDDP303**	Course Level: 5.0
Type : Theory	
Course Credit: 02	
Hours Allotted: 60 Hours	
Marks Allotted: 50 Marks	
Course Objectives: • To understand data warehouse with architectural types, architectural building blocks, aggregate tables and determine their usage. • To learn basics of data mining classification and clustering use of various data mining algorithms	
Course Outcomes: After the completion of the course, the learners would be able to: CO1 : Learner is able to demonstrate knowledge of data warehouse using Oracle 11g,dimension table, fact table. CO2 : Learner will have hands on training on various Data Mining techniques for classification and clustering for analyzing the datasets using tools like Weka, R or Python	
Description the course: **(Including but not limited to)**	Introduction, relevance, Usefulness, Application, interest, connection with other courses, demand in the industry, job prospects etc.

Syllabus: NEP 2020 w.e.f 2025-26

Sr. No.	Content	Hours
1	**Understanding Data Warehouse.**	
a	Installation of Oracle 11g	
b	Show the configuration of Listener	
c	Show the Creation of Database	
2	**Data Warehouse Design**	
a	Design dimension tables.	
b	Design fact tables.	
c	Create an indexed view and rebuild columnstore indexes.	
3	**Performing classification on data sets using Weka.**	
a	Building a Decision Tree Classifier in Weka	
b	Applying Naïve Bayes on Dataset for classification	
4	**Performing classification on data sets using R.**	
a	Decision Tree Operation with R	
b	Naïve Bayes Operation using R	
5	**Implementing Apriori Algorithm with R and Weka**	
a	Applying the Apriori Algorithm in Weka on a Real-World Dataset	
b	Applying the Apriori Algorithm on a Numeric Dataset	
6	**Implementing Clustering with Weka.**	
a	Clustering Fisher ‘s Iris Dataset with the Simple k-Means Algorithm	
b	Results Analysis after Applying Clustering	
7	**Implementing Clustering with R.**	
a	Clustering in R using Simple k-Means	
b	Clustering in R using Simple k-Means on numeric dataset.	
8	**Implementing Association Mining with R.**	
a	Applying Association Mining in R	
b	Application of Association Mining on Numeric Data in R	
9	**Implementing Association Mining with Weka.**	
A	Perform Association technique on Agriculture dataset.	
b	Perform Association technique on Weather dataset.	
10	**Web Mining**	
a	Implement Hyperlink Induced Topic Search (HITS) algorithm	
b	Implement PageRank Algorithm	
	Total Hours	60

Books and References:

1. “DATA WAREHOUSING FUNDAMENTALS FOR IT PROFESSIONALS “ by PAULRAJ PONNIAH of “Wiley Second edition 2010”

2. “Data Mining and Data Warehousing : Principles and Practical Techniques” by Parteek Bhatia Cambridge University Press First 2019

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Programme Name: **S.Y.B.Sc(Data Science)**	**Semester: III**
Course Category/Vertical: Major	
Name of the Dept: **Science and Technology**	
Course Title: Data Structure and Algorithm Using Python Programming Practical	
Course Code: **BDSP304**	Course Level: 5.0
Type: Practical	
Course Credit: 2 credits	
Hours Allotted: 60 Hours	
Marks Allotted: 50 Marks	
Course Objectives(CO): 1. To provide students with hands-on experience in implementing and applying various data structures and algorithms. 2. students will gain proficiency in designing efficient solutions for real-world computational problems, understanding time and space complexities, and optimizing code performance.	
Course Outcomes (OC): OC 1. Implement and manipulate various data structures (linked lists, stacks, queues using Python. OC 2. Apply different algorithms for searching, sorting, and tree traversal to solve practical problems.	
Description the course:	Data Structure and Algorithm using Python practical course offers students the opportunity to implement and experiment with various data structures and algorithms in Python. Through hands-on coding exercises, students will strengthen their understanding of key concepts such as searching, sorting, and optimizing algorithms while developing problem-solving skills in real-world scenarios.

Syllabus: NEP 2020 w.e.f 2025-26

Sr. No.	Content	Hours
1	Write Python Program to demonstrate OOP Concepts including Class, Objects,Inheritance and encapsulation.	
2	a. Write Python Program to create singly linked list and various operations on it. b. Write Python Program to create doubly linked list. c. Write Python Program to create circular linked list.	
3	Write Python Program to implement stack and demonstrate push, pop and peek operations.	
4	a. Write Python Program to implement list based queues and demonstrate various operations on it. b. Write Python Program to implement stack based queues and demonstrate various operations on it.	
5	Write Python Program to implement Node based queues and demonstrate various operations on it.	
6	a. Write Python Program to implement tree data structure and demonstrate depth first traversal. b. Write Python Program to implement tree data structure and demonstrate breadth first traversal.	
7	a. Write Python Program to implement binary search tree to find the minimum node. b. Write Python Program to implement binary search tree to find the maximum node.	
8	a. Write a Python implementation to demonstrate the insert and delete method to add/delete the nodes in the BST. b. Python implementation to search the node in the BST.	
9	a. Write a Python Program for implementing Insertion Sort. b. Write a Python Program for implementing Bubble Sort. c. Write a Python Program for implementing Quick Sort. d. Write a Python Program for implementing Selection Sort.	
		30

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Programme Name: **S.Y.B.Sc(Data Science)**	**Semester:III**
Course Category: Minor	
Name of the Dept: **Science and Technology**	
Course Title: Research Methodology	
Course Code: **BDR305**	Course Level: 5.0
Type : Theory	
Course Credit: 02	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	
Course Objectives: • To impart analytical skill in solving complex problems and to foster the ability to critically think in developing robust, extensible and highly maintainable solutions to simple and complex problems. • To explore the unknown and unlock new possibilities in different dimensions of the System and to portray accurately the characteristics of a particular individual, situation or a group under study.	
Course Outcomes: After the completion of the course, the learners would be able to: **CO 1:** Learner understands the reasons for doing research, the applications of research, characteristics and requirements of the research process, types of research and Research paradigms and also applying major approaches to information gathering, the relationship between attitudinal and measurement scales Methods for exploring attitudes in research. **CO 2:**Learner is able to analyze data in qualitative and quantitative studies , write a research report and use application of IT in data analysis & Research	
Description the course:	Research methodology is a systematic framework that outlines the techniques and procedures used to conduct research, ensuring the study remains objective and unbiased, and allows readers to evaluate the validity and reliability of the research.

Syllabus: NEP 2020 w.e.f 2025-26

Unit No.	Content	Hours
I	**Research Methodology-An Introduction:** Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India **Defining the Research Problem:** What is a Research Problem?, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration **Research Design:** Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs. **Sampling Design:** Census and Sample Survey, Implications of a Sample Design, Steps in Sampling Design, Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of Sample Designs, How to Select a Random Sample?, Random Sample from an Infinite Universe, Complex Random Sampling Designs **Measurement and Scaling Techniques:** Measurement in Research, Measurement Scales, Sources of Error in Measurement, Tests of Sound Measurement, Technique of Developing Measurement Tools, Scaling, Meaning of Scaling, Scale Classification Bases, Important Scaling Techniques, Scale Construction Techniques **Methods of Data Collection:** Collection of Primary Data, Observation Method, Interview Method, Collection of Data through Questionnaires, Collection of Data through Schedules, Difference between Questionnaires and Schedules, Some Other Methods of Data Collection, Collection of Secondary Data, Selection of Appropriate Method for Data Collection, Case Study Method,	15
II	**Processing and Analysis of Data:** Processing Operations, Some Problems in Processing, Elements/Types of Analysis, Statistics in Research, Measures of Central Tendency, Measures of Dispersion, Measures of Asymmetry (Skewness), Measures of Relationship, Simple Regression Analysis, Multiple Correlation and Regression, Partial Correlation, Association in Case of Attributes, Other Measures, Summary Chart Concerning Analysis of Data **Sampling Fundamentals:** Need for Sampling, Some Fundamental Definitions, Important Sampling Distributions, Central Limit Theorem, Sampling Theory, Sandler's *A*-test, Concept of Standard Error, Estimation, Estimating the Population Mean (m), Estimating Population Proportion, Sample Size and its Determination, Determination of Sample Size through the Approach Based on Precision Rate and Confidence Level, Determination of Sample Size through the Approach, Based on Bayesian Statistics **Testing of Hypotheses:** What is a Hypothesis? Basic Concepts	15

	Concerning Testing of Hypotheses, Procedure for Hypothesis Testing, Flow Diagram for Hypothesis Testing, Measuring the Power of a Hypothesis Test, Tests of Hypotheses, Important Parametric Tests, Hypothesis Testing of Means, Hypothesis Testing for Differences between Means, Limitations of the Tests of Hypotheses **Interpretation of Data and Paper Writing** – Layout of a Research Paper, Journals in Computer Science, Impact factor of Journals, When and where to publish?, UGC-CARE, Web of Science, SCOPUS, IEEE, ACM, Ethical issues related to publishing, Copyright, Data Privacy, Plagiarism and Self-Plagiarism, Software for detection of Plagiarism. ShodhShudhhi (PDS), smallseotools.com Use of Encyclopedias, Research Guides, Handbook etc., Academic Databases for Computer Science and Information Technology Discipline. Google Scholar, shodhganga, IEEE Xplore, ResearchGate, IDELS, DASH	
	Total Hours	30

Books and References:

Sr. No	Title	Author/s	Publisher	Edition	Year
1.	Research Methodology – Methods and techniques	C. R. Kothari	New Age International (P) Ltd., Publishers	---	---
2.	Business Research Methods	Donald R. Cooper Pamela Schindler	McGraw-Hill/Irwin	McGraw-Hill/Irwin	
3.	Business Research Methods	Allan Bryman Emma Bell	OXFORD University Press	---	---
4.	Research Methods for Business Students	Mark Saunders Philip Lewis Adrian Thornhill	Pearson Education Limited	---	---

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Programme Name: **S.Y.B.Sc(Data Science)**	**Semester:III**
Course Category: Minor	
Name of the Dept: **Science and Technology**.	
Course Title: Research Methodology Practical	
Course Code: **BDRP306**	Course Level: 5.0
Type : Practical	
Course Credit: 02	
Hours Allotted: 60 Hours	
Marks Allotted: 50 Marks	
Course Objectives: The primary course objectives of a research methodology practical are to equip students with the practical skills and knowledge to design, conduct, and analyze research projects, including understanding research methodologies, selecting appropriate methods, and interpreting findings.	
Course Outcomes: After the completion of the course, the learners would be able to: CO1 . Implement basics functions of LaTex , CO2 . Implement the art of interpretation and the art of writing research reports.	
Description the course: **(Including but not limited to)**	Provide hands-on experience in implementing various LaTex functions and Implement the art of interpretation and the art of writing research reports.

Syllabus: NEP 2020 w.e.f 2025-26

List of Practical	
1.	**Introduction to LaTex**
A.	**Report Writing:** report style having chapter, section and subsection, article style having section, subsection and subsubsection, Automatic generation of table of contents, toc file to store the information that goes into the table of contents, Automatic numbering of section numbers
B.	**Equations and Numbering Equations:** Creating an equation, writing multiple equations, Aligning multiple equations, creating matrices in Latex, label command, Cross referencing with ref command
C.	**Tables and Figures:** Tables and Figures Creating tables and figures in LaTeX
D.	**Bibliography:** Bibliography Creating Bibliography in LaTeX
2.	**Introduction to EndNote, Zotero or Mendeley**
A.	Integration with Word and adding citation and creating bibliographies
B.	Creating your own library
C.	Creating references from website
D.	Creating references manually
3.	Visit the college library or nearby research center or from internet collect 5 tittles of research papers/thesis and classify them according to types of research, Discuss how the problems are delineated, how they are relevant to scientific method etc.
4.	Identify 2 researchable problems relevant to your context and knowledge disciplines and justify the significance of their study.
5.	Preparation of a review article
6.	Identification of variables of a research study and their classification in terms of functions and level of measurement
7.	Preparation of a sampling design given the objectives and research questions/hypotheses of a research study
8.	Preparation of questionnaire for micro-level educational survey.
9.	Prepare 1 proposal on an identified research problem
10	Checking and removing plagiarism using Plagiarism Detection Software

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Programme Name: **S.Y.BSc (Data Science)**	**Semester: III**
Course Category/Vertical: **Open Elective**	
Name of the Dept: **Science and Technology**	
Course Title: Linear Algebra	
Course Code: **BDL307**	Course Level: 5.0
Type: Theory	
Course Credit: 2 credits	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	
Course Objectives (CO): (List the course objectives) CO 1. To develop a strong foundation in matrices, vector spaces, and orthogonality, enabling students to apply linear algebra techniques for solving systems of equations, performing data transformations, and optimizing models in data science and machine learning. CO 2. To equip students with the knowledge of determinants, eigenvalues, eigenvectors, and positive definite matrices, enabling them to apply these concepts in data science for dimensionality reduction, stability analysis, and optimization techniques.	
Course Outcomes (OC): (List the course outcomes) OC 1. Students will be able to apply matrix operations, vector space concepts, and orthogonal projections to efficiently solve linear systems, perform dimensionality reduction (PCA), and optimize regression models in data-driven applications. OC 2. Students will be able to analyze matrix properties, compute eigenvalues and singular value decomposition (SVD), and apply these techniques in principal component analysis (PCA), machine learning models, and numerical optimization.	
Description the course: **(Including but not limited to)**	This course provides a strong foundation in linear algebra, focusing on its applications in data science, machine learning, and numerical computing. Key topics include matrices, vector spaces, orthogonality, determinants, eigenvalues, and singular value decomposition (SVD). By the end of this course, students will develop a deep understanding of how linear algebra is used in data transformations, dimensionality reduction, optimization, and algorithms.

Syllabus: NEP 2020 w.e.f 2025-26

Unit No.	Content	Hours
I	**Matrices and Gaussian Elimination:** Introduction, The Geometry of Linear Equations, An Example of Gaussian Elimination, Matrix Notation and Matrix Multiplication, Triangular Factors and Row Exchanges, Inverses and Transposes, Special Matrices and Applications **Vector Spaces:** Vector Spaces and Subspaces, Solving $Ax = 0$ and $Ax = b$, Linear Independence, Basis, and Dimension, Linear Transformations **Orthogonality:** Orthogonal Vectors and Subspaces, Cosines and Projections onto Lines, Projections and Least Squares, Orthogonal Bases and Gram-Schmidt, The Fast Fourier Transform	15
II	**Determinants:** Introduction, Properties of the Determinant, Formulas for the Determinant, Applications of Determinants **Eigenvalues and Eigenvectors:** Introduction, Diagonalization of a Matrix, Complex Matrices, Similarity Transformations **Positive Definite Matrices:** Minima, Maxima, and Saddle Points, Tests for Positive Definiteness, Singular Value Decomposition, Minimum Principles, The Finite Element Method	15
	Total Hours	30

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition
1	Linear Algebra and Its Applications	Gilbert Strang	**Cengage Publication**	Fourth Edition
2	Advanced Linear Algebra	David Surowski		
3	Linear Algebra, Theory and Applications	Kenneth Kuttlet		

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Programme Name: **S.Y.B.Sc(Data Science)**	**Semester: III**
Course Category: Open Elective	
Name of the Dept: **Science and Technology**	
Course Title: Fundamental of Stock Market	
Course Code: **BDF307**	Course Level: 5.0
Type: Theory	
Course Credit: 2 credits	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	
Course Objectives(CO): (List the course objectives) CO1.To introduce students to the structure and functioning of stock markets. CO2. To provide knowledge of different stock market instruments and SEBI regulations and investor protection measures	
Course Outcomes (OC): (List the course outcomes) OC. 1Inculcate knowledge of corporate governance, financial regulations, and ethical investment Practice OC 2. Help students understand global financial markets, economic indicators, and international trade impact on investments	
Description the course: (Including but not limited to)	The Course provide a strong foundation in investment principles if Capital Market .It also inculcate knowledge of asset allocation, and risk-return trade-offs It enables learner to analyze securities, construct efficient portfolios, and apply modern portfolio theory and to equip students with tools for portfolio construction, diversification, and risk management. The learner will understand Global SEBI regulation

Syllabus: NEP 2020 w.e.f 2025-26

Unit No.	Content	Hours
I	**Unit 1: Introduction to Stock Market** • Basics of Financial Markets (Primary & Secondary Markets) • Role of Stock Exchanges (NSE, BSE, NYSE, etc.) • Key Market Participants (Investors, Traders, Brokers, Regulators) • SEBI and Regulatory Framework • How the Stock Market Works	15
II	**Unit 2: Financial Instruments & Risk Management** • Equity Shares (Common & Preferred) and IPO • Bonds & Debentures • Mutual Funds & ETFs • Derivatives (Futures & Options - Basics) • Risk Management -Meaning, Features and Importance • Types of Risks (Financial, Operational, Strategic, Compliance)	15
	Total Hours	30

Books and References:

- Risk Management-Manan prakashan
- Risk Management in Forex market-Dalnani Publication
- Risk Mangement - Vipul Prakashan
- Risk Management - Himalaya Publication
- Portfolio Management for New Products (Robert G. Cooper, Scott J. Edgett, and Elko J. Kleinschmidt)
- The Elements of Investing (Charles D. Ellis and Burton G. Malkiel)

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<table>
<tr><td colspan="2">Programme Name: S. Y. B.Sc (Data Science) Semester: III</td></tr>
<tr><td colspan="2">Course Category: Open Electives</td></tr>
<tr><td colspan="2">Name of the Dept: Economics</td></tr>
<tr><td colspan="2">Course Title: Econometrics I</td></tr>
<tr><td colspan="2">Course Code: BDE307 Course Level: 5.0</td></tr>
<tr><td colspan="2">Type: Theory</td></tr>
<tr><td colspan="2">Course Credit: 2 credits</td></tr>
<tr><td colspan="2">Hours Allotted: 30 Hours</td></tr>
<tr><td colspan="2">Marks Allotted: 50 Marks</td></tr>
<tr><td colspan="2">Course Objectives (CO):
• To provide students with a comprehensive understanding of random variables and their distributions
• To understand the joint and marginal distributions, and apply conditional probability concepts to solve real-world problems.</td></tr>
<tr><td colspan="2">Course Outcomes (OC):
1) Student will learn the concepts of random variable.
2) Students will Understand and analyze joint distributions for bivariate random variables and their marginal distributions.</td></tr>
<tr><td>Description the course:
(Including but not limited to)</td><td>The objective of this course is to impart a basic understanding of econometrics. The student will be able to appreciate the theoretical basis of the subject. At the same time, it will enhance the student's ability to apply the theoretical techniques to the problems of the real world. Topics like forecasting have been introduced to impart this practical orientation</td></tr>
</table>

Syllabus: NEP 2020 w. e. f 2025-26

Unit No.	Content	Hours
I	**MODULE I: Idea of a random variable** • Concept of a random variable: Discrete and continuous • Expected values of a random variable • Variance of a random variable • Discrete random variables: Bernoulli, Binomial, Poisson • Continuous random variables: The normal distribution	15
II	**UNIT - II: Jointly distributed Random variables** • Joint and marginal distributions for bivariate random variables • Conditional probability • Conditional mean and variance • Covariance • Correlation and Partial correlation • Central limit theorem (without proof)	15
	Total Hours	30

References:

1. Gujarati Damodar : Basic Econometrics,

2. Hatekar Neeraj (2009), Econometrics: The First Principles A Friendly Introduction

3. Kapoor V. k. (2011), Operations Research Problems & Solutions, sultan chand & sons

4. Lipschutz (Schaum Series) Theory and Problems of Statistics 5. Loomba Paul : An Introduction to linear programming.

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<table>
<tr><td colspan="2">Programme Name: S.Y.B.Sc(Data Scinece) Semester:III</td></tr>
<tr><td colspan="2">Course Category: VSC</td></tr>
<tr><td colspan="2">Name of the Dept: Science and Technology</td></tr>
<tr><td colspan="2">Course Title: Web Technology</td></tr>
<tr><td colspan="2">Course Code: BDW308 Course Level: 5.0</td></tr>
<tr><td colspan="2">Type : Practical</td></tr>
<tr><td colspan="2">Course Credit: 02</td></tr>
<tr><td colspan="2">Hours Allotted: 60 Hours</td></tr>
<tr><td colspan="2">Marks Allotted: 50 Marks</td></tr>
<tr><td colspan="2">Course Objectives:
• To understand the concepts of Hyper Text Markup Language and Cascading Style sheets.
• To learn JavaScript for creating dynamic websites</td></tr>
<tr><td colspan="2">Course Outcomes:
After the completion of the course, the learners would be able to:
CO1: Design valid, well-formed, scalable, and meaningful pages using emerging technologies.
CO2: Develop and implement client-side and server-side scripting language programs.</td></tr>
<tr><td>Description the course:
(Including but not limited to)</td><td>Introduction, relevance, Usefulness, Web Application, interest, connection with other Web courses, demand in the industry, job prospects etc.</td></tr>
</table>

Syllabus: NEP 2020 w. e. f 2025-26

Sr. No.	Content	Hours
1	a. Design a page having suitable background colour and text colour with title “My First Web Page” using all the attributes of the Font tag b. Create a HTML document giving details of your [Name, Age], [Address, Phone] and [Register Number, Class] aligned in proper order using alignment attributes of Paragraph tag, heading tag	
2	a. Create a web page for internal links; when the user clicks on different links on the web page it should go to the appropriate locations/sections in the same page. b. Write a HTML code to create a web page with pink color background and display moving message in red color.	
3	Design a web page that displays information in form of a. List Tags (all type) d. Image and Image Maps	
4	Design a webpage that makes use of a. Table tags b. Navigation across multiple pages	
5.	a. Create a web page which divides the page in two equal frames and place the audio and video clips in frame-1 and frame-2 respectively b. Wap in html to create a webpage with four frames (Picture, table, list, and hyperlink).	
6	Form Tags (forms with various form elements)	
7	Design a webpage that make use of Cascading Style Sheets with a. CSS properties to change the background of a Page b. CSS properties to change Fonts and Text Styles c. CSS properties for positioning an element	
8	Write JavaScript code for Performing various mathematical operations such as a. calculating factorial b. finding Fibonacci Series c. Displaying Prime Numbers in a given range	
9.	Write JavaScript code for a. Evaluating Expressions b. Calculating reverse of a number c. Validating the various Form Elements	
10	Write JavaScript code for a. Demonstrating different JavaScript Objects such as String, RegExp, Math, Date b. Demonstrating different JavaScript Objects such as Window, Navigator, History, Location, Document c. Storing and Retrieving Cookies	

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Programme Name: **S.Y.B.Sc(Information Technology)**	**Semester:III**
Course Category: VSC	
Name of the Dept: **Science and Technology**	
Course Title: Operating System	
Course Code: **BSOS308** Course Level:5.0	
Type : Theory	
Course Credit: 02	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	
Course Objectives: • Learners must understand proper working of operating system. • To provide a sound understanding of Computer operating system, its structures, functioning and algorithms.	
Course Outcomes: After the completion of the course, the learners would be able to: CO1 : To provide a understanding of operating system, its structures and functioning CO2 : Develop and master understanding of algorithms used by operating systems for various purposes.	
Description the course: **(Including but not limited to)**	Introduction, relevance, Usefulness, Application, interest, connection with other courses, demand in the industry, job prospects etc.

Syllabus: NEP 2020 w.e.f 2025-26

Unit No.	Content	Hours
I	**Introduction and Operating-Systems Structures:** Definition of Operating system, Operating System's role, Operating-System Operations, Functions of Operating System, Computing Environments, Operating-System Structures: Operating-System Services, User and Operating-System Interface, System Calls **Processes:** Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication **Threads:** Overview, Multicore Programming, Multithreading Models **Process Synchronization:** General structure of a typical process, race condition, The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors	15
II	**CPU Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms **Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock **Main Memory:** Background, Logical address space, Physical address space, MMU, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table **Virtual Memory** **Mass-Storage Structure:** Overview, Disk Structure, Disk Scheduling, Disk Management **File-System Interface: File** Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing **File-System Implementation:** File-System Structure, File-System Implementation	15
	Total Hours	30

References:

1. Abraham Silberschatz, Peter Galvin, Greg Gagne, Operating System Concepts, Wiley,8th Edition

Additional Reference(s):

1. Achyut S. Godbole, Atul Kahate, Operating Systems, Tata McGraw Hill

2. Naresh Chauhan, Principles of Operating Systems, Oxford Press

3. Andrew S Tanenbaum, Herbert Bos, Modern Operating Systems, 4e Fourth Edition, Pearson Education, 2016

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Programme Name: S.Y. B.Sc. (Data Science)	**Semester:III**
Course Category: CC	
Name of the Department: Sociology	
Course Title: Fundamentals of Social Service and Volunteering	
Course Code: BDN311	**Course Level:** 5.0
Type: Theory / Practical	
Course Credit: 2 credit	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	
Course Objectives: 1. To introduce students to the fundamental principles of social service and volunteering. 2. To develop a sense of social responsibility and commitment to community development.	
Course Outcomes: 1. Gain an understanding of the significance of social service in nation-building. 2. Develop an appreciation for volunteerism and its role in addressing social issues. .	
Introduction: Social service and volunteering are essential aspects of a responsible and engaged society. They provide individuals with opportunities to contribute to the well-being of their communities while fostering personal growth and social awareness. This course aims to instill a spirit of volunteerism and service in students by equipping them with theoretical knowledge and practical experience in social service initiatives. Relevance and Usefulness: In today's world, social inequalities, environmental concerns, and community challenges require active engagement from individuals. Volunteering bridges the gap between the privileged and the underprivileged, offering solutions to pressing social issues. Through structured participation in social service activities, students develop empathy, teamwork, and leadership skills, making them responsible citizens and change-makers. Interest and Connection with Other Courses: This course complements various disciplines such as sociology, social work, public administration, psychology, and political science. The knowledge and skills gained through social service and volunteering enhance students' understanding of social structures, human behavior, and policy-making. Additionally, it fosters civic engagement, making it valuable for students aspiring to careers in social work, public service, or non-governmental organizations (NGOs).	

Syllabus: NEP 2020 w.e.f 2024-25

Unit No.	Content	Hours
I	**UNIT I: Introduction to Social Servicing and Volunteering** A. Meaning and Importance of Social Service B. Role of Youth in Social Service C. Challenges and Ethical Considerations in Voluntary Work	15
II	**UNIT II: Community Engagement and Social Change** A. Different Forms of Community Service (Health, Education, Environment, Disaster Relief) B. Government and Non-Government Organizations in Social Service C. Impact of Volunteerism on Society	15
	Total Hours	30

References:

• National Service Scheme Manual (Revised) 2006, Government of India, Ministry of Youth Affairs and Sports, New Delhi.

• University of Mumbai National Service Scheme Manual 2009.

• http://nss.nic.in

• https://www.rccmindore.com/wp-content/uploads/2023/04/NSS-Notes-II.pdf

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Programme Name: S.Y. B.Sc. (Data Science)	**Semester: III**
Course Category/Vertical: **Co-Curricular (CC)**	
Name of the Dept: **Psychology**	
Course Title: **Yoga**	
Course Code:	Course Level: 5
Type: Theory / Practical	
Course Credit: 2 credits	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	
Learning Objectives: 1. To impart to the students the knowledge of teachings and philosophy of yoga tradition. 2. To provide the knowledge of various Yoga therapy practices like asana (posture), pranayama (voluntarily regulated breathing techniques).	
Course Outcomes (CO): OC 1. Students will be able to understand the basic principles and applications of Yoga. OC 2. Students will be able to use the Practical knowledge in their day to day life.	
Description the course: **(Including but not limited to)**	Yoga practices will be important for the upcoming lifestyle hence students can seek a career in the same. Students will understand the importance of yoga in life. Students will be having practical exposure. Hence, practicing yoga will help students to maintain their health.

Unit No.	Content	Hours
I	**Theory of Yoga** A) Yogic Sanchalan (Yogic Movements), Kapalbhati (Cleansing Breath Technique), Suryanamaskar (Sun Salutation) B) Chandrabhedan Pranayama (Left Nostril Breathing), Surya Bhedana Pranayama (Right Nostril Breathing), Sakshi Bhav (Witness Consciousness)	**15**
II	**Practical** A) Padmasana (Lotus Pose), Parvatasana (Mountain Pose), Janushirasana (Head-to-Knee Forward Bend), Ustrasana (Camel Pose), Veerbhadrasana (Warrior Pose), Trikonasana (Triangle Pose), Vrikshasana (Tree Pose), Ardha Naukasana (Half Boat Pose) B) Ardha Shalabhasana (Half Locust Pose), Makarasana (Crocodile Pose), Ardha Dronasana (Half Warrior Plank), Ardha Pavanmuktasana (Half Wind-Relieving Pose), Utthita Ekpadasana (Extended One-Leg Pose)	**15**
	Total Hours	**30**

References:

1. G. V Kadam - Yoga Life Sutra, Girish Vasant Kadam (2012)
2. ajayoga - Swami Vivekananda - Ramakrishna Ashrama Publications
3. C.D. Sharma: Critical Survey of Indian Philosophy, Motilal Banarsidass Publications 2003