

B.Sc. DATA SCIENCE

CURRICULUM, SYLLABI AND SCHEME



**MANONMANIAM SUNDARANAR
UNIVERSITY**

IN COLLABORATION WITH



MADURAI KAMARAJ UNIVERSITY

2023-24 ONWARDS
MANONMANIAM SUNDARANAR UNIVERSITY

Manonmaniam Sundaranar University, Tirunelveli – 12

B.Sc., Data Science

under CBCS with effect from the academic year 2023-2024 and onwards

Introduction

Data Science is the area of study which involves extracting insights from vast amounts of data using various scientific methods, algorithms, and processes. It helps you to discover hidden patterns from the raw data. The term Data Science has emerged because of the evolution of mathematical statistics, data analysis, and big data. Data Science is an interdisciplinary field that allows you to extract knowledge from structured or unstructured data. Data science enables you to translate a business problem into a research project and then translate it back into a practical solution.

Why to learn Data Science?

With the amount of data being generated and the evolution in the field of Analytics, Data Science has become a necessity for companies. To make the most out of their data, companies from all domains, be it Finance, Marketing, Retail, IT or Bank. All are looking for Data Scientists. This has led to a huge demand for Data Scientists all over the globe. With the kind of salary that a company has to offer and IBM is declaring it as a trending job of the 21st century, it is a lucrative job for many. This field is such that anyone from any background can make a career as a Data Scientist.

Components of Data Science

Machine Learning: Machine Learning involves algorithms and mathematical models, chiefly employed to make machines learn and prepare them to adapt to everyday advancements. For example, these days, time series forecasting is very much in use in trading and financial systems. In this, based on historical data patterns, the machine can predict the outcomes for the future months or years. This is an application of machine learning.

Big Data: Everyday, humans are producing so much data in the form of clicks, orders, videos, images, comments, articles, RSS Feeds etc. This data is generally unstructured and is often called Big Data. Big Data tools and techniques mainly help in converting this unstructured data into a structured form. For example, suppose someone wants to track the prices of different products on e-commerce sites. He/she can access the data of the same products from different websites using Web APIs, and RSS Feeds. Then convert them into structured form.

Business Intelligence: Each business has and produces too much data every day. This data when analyzed carefully and then presented in visual reports involving graphs, can bring good decision making to life. This can help the management in taking the best decision after carefully delving into patterns and details the reports bring to life.

Eligibility for Admission: Candidates who have passed the higher secondary examination conducted by Government of Tamil Nadu with Statistics / Mathematics / Business Statistics / Business Mathematics / Computer Science as one of the courses or other equivalent examinations are eligible for admission to the first year of the B.Sc., (Data Science) degree program.

Duration of the Program: The duration of the program is three academic years comprising of six semesters with two semesters in each academic year. Examinations will be conducted at the end of each semester for the respective courses.

Medium of Instructions and Examinations: The medium of instructions and examinations for the courses of Part I and Part II shall be in the languages concerned. For the courses of Part III and Part IV, the medium of instructions and examinations shall be in English.

Examination: The regulations for examination, passing minimum in each course and classification of successful candidates and award of ranks are at par with the regulations for other undergraduate science programs of the University.

SCHEME OF EXAMINATION

Sem. (1)	Pt. I/II/ III/ IV/V (2)	Sub No. (3)	Course Status (4)	Course Title (5)	Contact Hrs./week (6)	L Hrs. / week (7)	T Hrs. / week (8)	P Hrs. / week (9)	C Credits (10)
I	I	1	Language	Tamil / Other Languages	6	6	0	0	3
	II	2	Language	English – I	4	4	0	0	3
	III	3	Core-I	Introduction to Data Science	5	4	1	0	4
	III	4	Core-II	Python for Data Science	5	4	1	0	4
	III	5	Elective - I	Statistical foundation for Data Science	4	4	0	0	3
	IV	6	SEC-I	Fundamentals of Information Technology	2	2	0	0	2
	IV	7	Foundation Course	Problem Solving Techniques	2	2	0	0	2
	IV	8	Soft Skill-I	Ability Enhancement Compulsory Course(AECC 1)	2	2	0	0	2
Subtotal					30	28	2	0	23
II	I	9	Language	Tamil / Other Languages	6	6	0	0	3
	II	10	Language	English – II	4	4	0	0	3
	III	11	Core-III	Machine Learning	4	3	1	0	4
	III	12	Core-IV	Artificial Intelligence	4	3	1	0	4
	III	13	Major Practical - I	Practical-I	3	0	0	3	3
	III	14	Elective- II	Probability and Distributions	3	3	0	0	3
	IV	15	SEC-II	Computer Fundamentals	2	2	0	0	2
	IV	16	SEC-III	Introduction to HTML	2	2	0	0	2
	IV	17	Soft skill-II	Ability Enhancement Compulsory Course(AECC 2)	2	2	0	0	2
Subtotal					30	25	2	3	26

B.Sc., Data Science Degree Programme

Programme Objectives

The B.Sc., Data Science degree programme offered by Manonmaniam Sundaranar University aims to

- ❖ Students are prepared to be employed in IT industries by providing expected domain Knowledge
- ❖ Students are provided with practical training, hands-on and project experience to meet the industrial needs.
- ❖ Students are motivated in career and entrepreneurial skill development to become global leaders.
- ❖ Students are trained to demonstrate creativity, to develop innovative ideas and to work in teams to accomplish a common goal.
- ❖ Students are trained to address social issues and guided to approach problems with solutions.
- ❖ Inculcate towards developing computer programs for carrying out essential soft computations
- ❖ Prepare skilled human resource for the needs of Data Science personnel in Central and State Government organizations and private sector institutions.

Programme Specific Outcomes (PSOs)

On completion of the B.Sc., Data Science degree programme, the students will be able to

PSO1: To develop the ability to understand concepts that lead to various data science theories in Statistics, Mathematics, IT and Computer Science.

PSO2: To identify, analyze and design solutions for problems using the fundamental principles of Statistics and relevant domain disciplines.

PSO3: To acquire the skill of handling data science programming tools for problem- solving.

PSO4: To understand and commit to Data ethics, cyber regulations, responsibilities, and norms of professional computing practices.

PSO5: To understand the role of statistical, ML, AI approaches and apply the same to solve real- life problems in the fields of data science.

PSO6: To apply, analyze and solving the knowledge-based problems in data science.

Programme Outcomes (POs)

On completion of the B.Sc., Data Science degree programme, the students will be able to

PO1: Understand and apply fundamental principles, concepts and methods in critical areas of science and multidisciplinary fields.

PO2: Demonstrate problem-solving, analytical and logical skills to provide solutions for scientific requirements.

PO3: Develop critical thinking with scientific temper and apply the technologies in various fields of Data Science

PO4: Draw relevant inferences in decision-making problems involving uncertainty

PO5: Understand professional, ethical, and social responsibilities.

PO6: Succeed in national and state level competitive examinations; to work as Statistics personnel in Central and State Government organizations and private sector institutions

SEMESTER – I

1.1 Tamil / Other Languages

1.2 English –I

1.3 Introduction to Data Science (Core-I)

COURSE TITLE	INTRODUCTION TO DATA SCIENCE		CREDITS			4
COURSE CODE	COURSE CATEGORY	Part - III	L	T	P	C
Semester - I	Core - I		4	0	0	4
Prerequisite	Basic knowledge of Statistics and Computer Science		Syllabus version		2023 - 2024	

Course Description: To provide strong foundation for data science and application area related to information technology and understand the underlying core concepts and emerging technologies in data science.

Course Objectives

Upon completion of this course, the students should be able to:

1. Explore the fundamental concepts of data science
2. Understand data analysis techniques for applications handling large data
3. Understand various machine learning algorithms used in data science process
4. Visualize and present the inference using various tools
5. Learn to think through the ethics surrounding privacy, data sharing and algorithmic decision-making

Course (Learning) Outcomes

CO1	To understand the fundamental concept of Data science
CO2	Infer various data visualization tool
CO3	Demonstrate various Data driven technique and perform predictive analysis
CO4	Solve the Deep Reinforcement Learning problem.
CO5	Solve the real time problems of data science.

Detailed Syllabus

UNIT – I	INTRODUCTION TO DATA SCIENCE	9 Hrs
Definition – Big Data and Data Science Hype – Why data science – Getting Past the Hype – The Current Landscape – Who is Data Scientist? - Data Science Process Overview – Defining goals – Retrieving data – Data preparation – Data exploration – Data modeling – Presentation.		
UNIT II	BIG DATA	9 Hrs
Problems when handling large data – General techniques for handling large data – Case study – Steps in big data – Distributing data storage and processing with Frameworks – Case study.		
UNIT-III	MACHINE LEARNING	9 Hrs
Machine learning – Modeling Process – Training model – Validating model – Predicting new observations –Supervised learning algorithms – Unsupervised learning algorithms.		

UNIT -IV	DEEP LEARNING	9 Hrs
Introduction – Deep Feedforward Networks – Regularization – Optimization of Deep Learning Convolutional Networks – Recurrent and Recursive Nets – Applications of Deep Learning.		
UNIT- V	DATA VISUALIZATION	9 Hrs
Introduction to data visualization – Data visualization options – Filters – Map Reduce – Dashboard development tools – Creating an interactive dashboard with dc.js-summary.		
Total Lecture Hours		
TEXT BOOK(S)		
1	Introducing Data Science, Davy Cielen, Arno D. B. Meysman, Mohamed Ali, Manning Publications Co.,1st edition, 2016	
2	An Introduction to Statistical Learning: with Applications in R, Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, Springer, 1st edition, 2013	
3	Deep Learning, Ian Goodfellow, Yoshua Bengio, Aaron Courville, MIT Press, 1st edition,2016	
4	Ethics and Data Science, D J Patil, Hilary Mason, Mike Loukides, O' Reilly, 1st edition,2018	
REFERENCE BOOKS:		
1	Data Science from Scratch: First Principles with Python, Joel Grus, O'Reilly, 1st edition,2015	
2	Doing Data Science, Straight Talk from the Frontline, Cathy O'Neil, Rachel Schutt, O'Reilly, 1st edition, 2013	
3	Mining of Massive Datasets, Jure Leskovec, Anand Rajaraman, Jeffrey David Ullman,Cambridge University Press, 2nd edition, 2014	

Mapping of Course Outcomes to Programme Outcomes

	<i>PO1</i>	<i>PO2</i>	<i>PO3</i>	<i>PO4</i>	<i>PO5</i>	<i>PO6</i>
<i>CO1</i>	High	High	High	Medium	High	High
<i>CO2</i>	High	High	High	High	High	High
<i>CO3</i>	High	Medium	High	High	Medium	High
<i>CO4</i>	High	High	High	Medium	Medium	High
<i>CO5</i>	High	High	High	Medium	Medium	High
Correlation Levels:	<i>Low</i>	<i>Medium</i>	<i>High</i>			

Mapping of Course Outcomes to Programme Specific Outcomes (PSOs)

	<i>PSO1</i>	<i>PSO2</i>	<i>PSO3</i>	<i>PSO4</i>	<i>PSO5</i>	<i>PSO6</i>
<i>CO1</i>	High	High	High	High	High	High
<i>CO2</i>	High	High	Medium	High	Medium	High
<i>CO3</i>	High	High	High	High	Medium	High
<i>CO4</i>	High	High	High	High	Medium	High
<i>CO5</i>	Medium	High	High	High	High	High
Correlation Levels:	<i>Low</i>	<i>Medium</i>	<i>High</i>			

1.4 Python for Data Science (Core-II)

COURSE TITLE	Python for Data Science			CREDITS			4
COURSE CODE	COURSE CATEGORY	Part - III		L	T	P	C
Semester - I	Core - II			4	0	0	4
Prerequisite	Fundamentals of computer programming, basic knowledge of data structures and algorithms, and some experience with Python programming language.			Syllabus version		2023 - 2024	

Course Description: This course is designed to provide an introduction to Object-Oriented Programming (OOP) concepts using the Python programming language. Students will learn how to design and implement programs using OOP principles and the Python language, including creating and manipulating objects, inheritance, polymorphism, and encapsulation. The course will also cover best practices for OOP programming.

Course Objectives

Upon completion of this course, the students should be able to:

1. To learn the principles of Object-Oriented Programming (OOP) and its implementation in Python.
2. To understand the concepts of classes and objects, inheritance, polymorphism, and encapsulation in Python.
3. To develop skills in designing and implementing programs using OOP in Python.
4. To understand and apply best practices for OOP programming in Python.
5. To apply OOP concepts to solve real-world programming problems.

Course (Learning) Outcomes

CO1	Design and implement programs using Object-Oriented Programming (OOP) principles in Python.
CO2	Understand and apply concepts of classes and objects, inheritance, polymorphism, and encapsulation in Python.
CO3	Develop Python programs that use OOP concepts to solve real-world programming problems.
CO4	Develop Python programs that use OOP concepts to solve real-world programming problems.
CO5	Analyze and modify existing Python code that uses OOP principles.

Detailed Syllabus

UNIT - I	Introduction to Python programming language	9 Hrs
Basic concepts of Python programming - Data types, variables, and operators - Control flow statements - Functions and modules. Object-Oriented Programming (OOP) concepts: Classes and objects - Inheritance - Polymorphism - Encapsulation.		
UNIT II	Advanced OOP concepts	9 Hrs
Composition - Abstraction - Interfaces - Design patterns Exception handling in Python: Basic exception handling concepts - Handling exceptions using try/except blocks - Raising and handling custom exceptions.		
UNIT-III	Functional programming in Python	9 Hrs

Introduction to functional programming - Functions as first-class objects - Higher-order functions - Lambda expressions and closures. GUI programming with Python: Introduction to GUI programming - Using tkinter for GUI programming.

UNIT -IV	GUI programming with Python/ File handling in Python	9 Hrs
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Creating windows, widgets, and menus - Event handling in GUI programming.
Reading and writing text files - Reading and writing CSV and JSON files - Working with binary files - Error handling in file handling.

UNIT- V	Database programming with Python	9 Hrs
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Introduction to database programming - SQL basics - Using SQLite with Python - Database CRUD operations in Python. Best practices for OOP programming in Python: Coding conventions and style guides - Debugging techniques - Code optimization - Software development life cycle.

Total Lecture Hours		
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TEXT BOOK(S)

1	Python 3 Object-Oriented Programming: Build robust and maintainable software with object-oriented design patterns in Python 3.8 and 3.9, 2nd Edition, Dusty Phillips, Packt Publishing, 2020.
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REFERENCE BOOKS:

1	Fluent Python: Clear, Concise, and Effective Programming by Luciano Ramalho, O'Reilly Media, 2015.
2	Python Tricks: A Buffet of Awesome Python Features by Dan Bader, Dan Bader (Self-published), 2017.
3	Python Cookbook: Recipes for Mastering Python 3 by David Beazley and Brian K. Jones, O'Reilly Media, 2013.
4	Effective Python: 90 Specific Ways to Write Better Python by Brett Slatkin, Addison-Wesley Professional, 2015.

Mapping of Course Outcomes to Programme Outcomes

	<i>PO1</i>	<i>PO2</i>	<i>PO3</i>	<i>PO4</i>	<i>PO5</i>	<i>PO6</i>
<i>CO1</i>	High	High	High	High	Low	High
<i>CO2</i>	High	Medium	Medium	High	Medium	High
<i>CO3</i>	High	High	Medium	High	High	High
<i>CO4</i>	High	High	High	Medium	Medium	High
<i>CO5</i>	High	High	High	High	Low	High

Mapping of Course Outcomes to Programme Specific Outcomes (PSOs)

	<i>PSO1</i>	<i>PSO2</i>	<i>PSO3</i>	<i>PSO4</i>	<i>PSO5</i>	<i>PSO6</i>
<i>CO1</i>	High	Medium	High	High	Medium	High
<i>CO2</i>	High	Medium	Medium	High	Medium	High
<i>CO3</i>	Medium	High	High	Medium	High	High
<i>CO4</i>	High	High	High	High	High	High
<i>CO5</i>	Medium	High	High	High	Medium	High

1.5 Statistical foundation for Data Science (Elective – I)

COURSE TITLE	Statistical foundation for Data Science			CREDITS		4
COURSE CODE	COURSE CATEGORY	Part – III		L	T	P
Semester – I	Elective – I			4	0	0
Prerequisite	Nil			Syllabus version		2023 – 2024

Course Description: This course covers the foundations of probability theory and statistical inference as applied to data science algorithms. Students will learn about different statistical techniques such as probability, distribution, estimation, hypothesis testing, estimation, Bayesian inference, and model selection and how to apply them to solve problems in Data Science.

Course Objectives

Upon completion of this course, the students should be able to:

1. Develop a solid understanding of the fundamental statistical concepts and methods used in AI and ML algorithms, including probability theory, statistical inference, hypothesis testing, and regression analysis.
2. Learn how to apply statistical techniques to solve real-world problems in AI and ML, such as designing experiments, analyzing datasets, and building predictive models.
3. Develop critical thinking and problem-solving skills in statistical analysis by working on challenging problems that require the application of statistical concepts and techniques.
4. Gain hands-on experience with popular statistical software tools such as R and Python, and learn how to use them to implement statistical models and analyze data.
5. Develop the ability to interpret and communicate statistical results effectively, both in written reports and oral presentations, and understand the ethical considerations involved in statistical analysis.

Course (Learning) Outcomes

CO1	Demonstrate an understanding of the basic concepts of probability theory, including random variables, probability distributions, and statistical inference.
CO2	Apply hypothesis testing and parameter estimation techniques to analyze data in AI and ML applications.
CO3	Utilize Bayesian methods to make inferences and select models for data analysis in AI and ML applications, and interpret the resulting statistical results.
CO4	Develop practical skills in using statistical software to analyze data, and to effectively communicate statistical concepts and results.
CO5	Critically evaluate and interpret statistical results in the context of real-world problems in AI and ML, and apply appropriate statistical techniques to solve these problems.

Detailed Syllabus

UNIT – I	Descriptive statistics and data visualization	9 Hrs
Measures of central tendency and variability, Boxplots, histograms, and scatterplots, Correlation and covariance. Introduction to probability theory: Random variables and probability distributions, Joint, marginal, and conditional distributions – Bayes' rule and conditional probability		
UNIT II	Statistical inference: Estimation	9 Hrs
Estimation– Point estimation and interval estimation – Maximum likelihood estimation – Bootstrap and jackknife resampling.		

UNIT-III	Statistical inference: Hypothesis testing	9 Hrs
Introduction to hypothesis testing - Null and alternative hypotheses - p-values and significance levels - Type I and Type II errors - One-sample and two-sample tests.		
UNIT -IV	Bayesian inference	9 Hrs
Introduction to Bayesian methods - Bayes' theorem and posterior distributions - Prior and posterior predictive distributions - Bayesian network models - Markov Chain Monte Carlo (MCMC) methods.		
UNIT- V	Model selection	9 Hrs
Overfitting and underfitting - Bias-variance tradeoff - Cross-validation and regularization		
Total Lecture Hours		
TEXT BOOK(S)		
1.	Probability and Statistics for Engineers and Scientists" by Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, and Keying Ye. Published by Pearson in 2011.	
2.	Fan, J., Li, R., Zhang, C. H., & Zou, H. (2020). Statistical foundations of data science. CRC press	
3.	Baumer, B. S., Kaplan, D. T., & Horton, N. J. (2017). Modern data science with R. CRC Press.	
4.	Agresti, A., & Kateri, M. (2021). Foundations of Statistics for Data Scientists: With R and Python. CRC Press.	
5.	Uma Maheswari, R. Sujatha (2021) Introduction to Data Science Paperback, Wiley Publisher	
REFERENCE BOOKS:		
1	Introduction to Bayesian Statistics" by William M. Bolstad. Published by John Wiley & Sons in 2007.	
2	The Elements of Statistical Learning: Data Mining, Inference, and Prediction" by Trevor Hastie, Robert Tibshirani, and Jerome Friedman. Published by Springer in 2009.	
3	Statistical Methods for Spatial Data Analysis" by Oliver Schabenberger and Carol A. Gotway. Published by Chapman and Hall/CRC in 2005.	

Mapping of Course Outcomes to Programme Outcomes

	<i>PO1</i>	<i>PO2</i>	<i>PO3</i>	<i>PO4</i>	<i>PO5</i>	<i>PO6</i>
<i>CO1</i>	High	Medium	High	High	Medium	High
<i>CO2</i>	High	Medium	Medium	High	Medium	High
<i>CO3</i>	High	Medium	Medium	High	Medium	High
<i>CO4</i>	High	High	High	Medium	Medium	High
<i>CO5</i>	High	High	High	Medium	Medium	High

Mapping of Course Outcomes to Programme Specific Outcomes (PSOs)

	<i>PSO1</i>	<i>PSO2</i>	<i>PSO3</i>	<i>PSO4</i>	<i>PSO5</i>	<i>PSO6</i>
<i>CO1</i>	High	Medium	High	High	Medium	High
<i>CO2</i>	High	Medium	Medium	High	Low	High
<i>CO3</i>	Medium	High	High	Medium	Medium	High
<i>CO4</i>	High	High	High	High	Medium	High
<i>CO5</i>	Medium	High	High	High	Low	High

1.6 Fundamentals of Information Technology

COURSE TITLE	Statistical foundation for Data Science	CREDITS			4
COURSE CODE	COURSE CATEGORY	Part - III			C
Semester - I	Fundamentals of Information Technology	4	0	0	4
Prerequisite	Nil	Syllabus version		2023 - 2024	

Course Objectives

Upon completion of this course, the students should be able to:

Understand basic concepts and terminology of information technology, have a basic understanding of personal computers and their operation, identify data storage and its usage, get great knowledge of software and its functionalities, Understand about operating system and their uses.

Course (Learning) Outcomes

CO	On completion of this course, students will
CO1[K1]	Learn the basics of computer, Construct the structure of the required things in computer, learn how to use it.
CO2[K2]	Develop organizational structure using for the devices present currently under input or output unit.
CO3[K3]	Concept of storing data in computer using two headers namely RAM and ROM with different types of ROM with advancement in storage basis.
CO4[K5]	Work with different software, Write program in the software and applications of software.
CO5[K6]	Usage of Operating system in information technology which really acts as an interpreter between software and hardware.

Detailed Syllabus

UNIT - I	Introduction to Computers	9 Hrs
Introduction, Definition, .Characteristics of computer, Evolution of Computer, Block Diagram Of a computer, Generations of Computer, Classification Of Computers, Applications of Computer, Capabilities and limitations of computer		
UNIT II	Basic Computer Organization	9 Hrs
Role of I/O devices in a computer system. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, Output Units: Monitors and its types. Printers: Impact Printers and its types. Non-Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers.		
UNIT-III	Storage Fundamentals	9 Hrs
Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAM ROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Tapes, Magnetic Disks. Cartridge tape, hard disks, Floppy disks Optical Disks, Compact Disks, Zip Drive, Flash Drives.		
UNIT -IV	Software	9 Hrs
Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Application S/W and its types: Word Processing, Spread Sheets Presentation, Graphics, DBMS s/w.		

UNIT- V	Operating System	9 Hrs
Functions, Measuring System Performance, Assemblers, Compilers and Interpreters. Batch Processing, Multiprogramming, Multi-Tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux.		
Total Lecture Hours		
TEXT BOOK(S)		
1	Anoop Mathew, S. Kavitha Murugesan (2009), " Fundamental of Information Technology", Majestic Books.	
2	Alexis Leon, Mathews Leon," Fundamental of Information Technology", 2nd Edition.	
3	S. K Bansal, " Fundamental of Information Technology".	
REFERENCE BOOKS:		
1.	Bhardwaj Sushil Puneet Kumar, "Fundamental of Information Technology"	
2.	GG WILKINSON, "Fundamentals of Information Technology", Wiley-Blackwell	
3.	A Ravichandran , "Fundamentals of Information Technology", Khanna Book Publishing	
Web Resources:		
1.	https://testbook.com/learn/computer-fundamentals	
2.	https://www.tutorialsmate.com/2020/04/computer-fundamentals-tutorial.html	
3.	https://www.javatpoint.com/computer-fundamentals-tutorial	
4.	https://www.tutorialspoint.com/computer_fundamentals/index.htm	
5.	https://www.nios.ac.in/media/documents/sec229new/Lesson1.pdf	

Mapping of Course Outcomes to Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	High	Medium	High	High	Medium	High
CO2	High	Medium	Medium	High	Medium	High
CO3	High	Medium	Medium	High	Medium	High
CO4	High	High	High	Medium	Medium	High
CO5	High	High	High	Medium	Medium	High

Mapping of Course Outcomes to Programme Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	High	Medium	High	High	Medium	High
CO2	High	Medium	Medium	High	Low	High
CO3	Medium	High	High	Medium	Medium	High
CO4	High	High	High	High	Medium	High
CO5	Medium	High	High	High	Low	High

1.7. Problem Solving Techniques

COURSE TITLE	Statistical foundation for Data Science			CREDITS			4	
COURSE CODE	COURSE CATEGORY		Part - III		L	T	P	C
Semester - I	Problem Solving Techniques			4	0	0	4	
Prerequisite	Nil			Syllabus version		2023 - 2024		
Course Objectives								
<p>Upon completion of this course, the students should be able to:</p> <p>Familiarize with writing of algorithms, fundamentals of C and philosophy of problem solving. Implement different programming constructs and decomposition of problems into functions. Use data flow diagram, Pseudo code to implement solutions. Define and use of arrays with simple applications. Understand about operating system and their uses</p>								
Course (Learning) Outcomes								
CO	On completion of this course, students will							
CO1[K1]	Study the basic knowledge of Computers. Analyze the programming languages.							
CO2[K2]	Study the data types and arithmetic operations. Know about the algorithms. Develop program using flow chart and pseudocode.							
CO3[K3]	Determine the various operators. Illustrate the concept of Loops							
CO4[K4]	Analyze about Arrays.							
CO5[K5]	Illustrate program modules. Creating and reading Files							
Detailed Syllabus								
UNIT - I	Introduction						9 Hrs	
<p>History, characteristics and limitations of Computer. Hardware/Anatomy of Computer: CPU, Memory, Secondary storage devices, Input Devices and Output devices. Types of Computers: PC, Workstation, Minicomputer, Main frame and Supercomputer. Software: System software and Application software. Programming Languages: Machine language, Assembly language, High-level language, 4 GL and 5GL-Features of good programming language. Translators: Interpreters and Compilers.</p>								
UNIT II	Data						9 Hrs	
<p>Data types, Input, Processing of data, Arithmetic Operators, Hierarchy of operations and Output. Different phases in Program Development Cycle (PDC), Structured Programming: Algorithm: Features of good algorithm, Benefits and drawbacks of algorithm. Flowcharts: Advantages and limitations of flowcharts, when to use flowcharts, flowchart symbols and types of flowcharts. Pseudocode: Writing a pseudocode. Coding, documenting and testing a program: Comment lines and types of errors. Program design: Modular Programming.</p>								
UNIT-III	Selection Structures						9 Hrs	
<p>Relational and Logical Operators -Selecting from Several Alternatives - Applications of Selection Structures. Repetition Structures: Counter Controlled Loops -Nested Loops- Applications of Repetition Structures.</p>								
UNIT -IV	Data						9 Hrs	
<p>Numeric Data and Character Based Data. Arrays: One Dimensional Array - Two Dimensional Arrays - Strings as Arrays of Characters.</p>								

UNIT- V	Data Flow Diagrams	9 Hrs
Definition, DFD symbols and types of DFDs. Program Modules: Subprograms-Value and Reference parameters- Scope of a variable - Functions – Recursion. Files: File Basics-Creating and reading a sequential file- Modifying Sequential Files.		
Total Lecture Hours		
TEXT BOOK(S)		
1	Stewart Venit, "Introduction to Programming: Concepts and Design", Fourth Edition, 2010, Dream Tech Publishers.	
Web Resources:		
1.	https://www.codesansar.com/computer-basics/problem-solving-using-computer.htm	
2.	http://www.nptel.iitm.ac.in/video.php?subjectId=106102067	
3.	http://utubersity.com/?page_id=876	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	3	3	3	3
CO 3	3	2	3	3	3	3
CO 4	3	3	2	3	3	3
CO 5	3	3	3	3	3	2
Weightage of course contributed to each PSO	15	14	14	15	15	14
	S-Strong-3	M-Medium-2		L-Low-1		

Mapping of Course Outcomes to Programme Specific Outcomes (PSOs)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	High	Medium	High	High	Medium	High
CO2	High	Medium	Medium	High	Low	High
CO3	Medium	High	High	Medium	Medium	High
CO4	High	High	High	High	Medium	High
CO5	Medium	High	High	High	Low	High

1.8 Soft Skill-I: Ability Enhancement Compulsory Course (AECC 1)

SEMESTER – II

2.1 Tamil / Other Languages

2.2 English –II

2.3 Machine Learning (Core-III)

COURSE TITLE	Machine Learning		CREDITS			
COURSE CODE	COURSE CATEGORY	Part - III	L	T	P	C
Semester - II	Core-III		4	0	0	4
Prerequisite	Basic knowledge of Statistics, Probability, Calculus, Linear Algebra and Programming Languages		Syllabus version		2023 - 2024	

Course Description: This course is to provide students with a solid foundation in the theory and practice of machine learning, and equip them with the skills needed to develop intelligent systems that can learn from data and make accurate predictions or decisions.

Course Objectives

The main objectives of this course are to

1. Understanding the fundamental concepts and techniques of machine learning, including supervised, unsupervised, and reinforcement learning.
2. Learning how to build and train machine learning models using popular tools and libraries such as scikit-learn, TensorFlow, and Keras.
3. Developing the skills to evaluate and fine-tune machine learning models using metrics such as accuracy, precision, recall, and F1 score.
4. Learning how to select appropriate algorithms and techniques for different types of problems and datasets.
5. Understanding the ethical considerations and potential biases that can arise when developing and deploying machine learning models.

Course (Learning) Outcomes

CO1 (K1, K2)	Understanding the principles and techniques of machine learning, including supervised, unsupervised, and reinforcement learning.
CO2 (K1-K5)	Understanding the importance of data preprocessing and feature engineering in machine learning, and ability to perform these tasks using Python libraries such as Pandas and NumPy.
CO3 (K2-K5)	Ability to evaluate and fine-tune machine learning models using metrics such as accuracy, precision, recall, and F1 score.
CO4 (K2, K4)	Understanding the ethical considerations and potential biases that can arise when developing and deploying machine learning models, and ability to mitigate these issues.
CO5 (K1-K6)	Ability to apply machine learning to real-world problems, such as predictive modeling, natural language processing, and computer vision.
CO6 (K1-K6)	Ability to explore advanced topics in machine learning, such as deep learning, reinforcement learning, and transfer learning.

Detailed Syllabus

UNIT – I	Introduction to Machine Learning	9 Hrs
Machine Learning - Types of Machine Learning: Supervised, Unsupervised, and Reinforcement Learning - Examples of Applications of Machine Learning - Ethics and Bias in Machine Learning: Fairness in Machine Learning, Privacy and Security Bias and Discrimination		

UNIT II	Data Preparation and Pre-processing	9 Hrs
Data cleaning and transformation - Feature engineering - Data normalization and scaling - Data encoding		
UNIT-III	Regression Analysis and Classification	9 Hrs
Regression Analysis: Linear regression, Polynomial regression, Ridge and Lasso regression - Classification: Logistic regression, Decision trees, Random forests, Naive Bayes and Support vector machines		
UNIT -IV	Neural Networks and Deep Learning	9 Hrs
Introduction to neural networks - Multilayer Perceptrons (MLPs), Convolutional neural networks (CNNs), Recurrent neural networks (RNNs) and Generative Adversarial Networks (GANs)		
UNIT- V	Evaluation Metrics and Model Selection	9 Hrs
Confusion matrix - Precision, Recall, F1-score, Cross-validation, Overfitting and underfitting, Clustering and Dimensionality reduction		
UNIT-VI	Contemporary Issues: Expert lectures, online seminars – webinars	2 Hrs.
Note 1: Students will be trained to develop appropriate computer programmes in R and Python related to computations taught in this course.		
Note 2: Examination shall be conducted on contents of UNIT I through UNIT V only.		
Total Lecture Hours		
TEXT BOOK(S)		
1.	Murphy, K. P. (2012). Machine Learning: A Probabilistic Perspective. MIT Press.	
2.	Bishop, C. M. (2006). Pattern Recognition and Machine Learning. Springer.	
3.	Raschka, S., & Mirjalili, V. (2017). Python Machine Learning. Packt Publishing.	
4.	Burkov, A. (2019). The Hundred-Page Machine Learning Book. Andriy Burkov.	
REFERENCE BOOKS:		
1	Géron, A. (2019). Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems (2nd ed.). O'Reilly Media.	
2	Bishop, C. M. (2006). Pattern Recognition and Machine Learning. Springer.	
3	Raschka, S., & Mirjalili, V. (2017). Python Machine Learning. Packt Publishing	
4	Goodfellow, I., Bengio, Y., & Courville, A. (2016). Deep Learning. MIT Press.	
5	Murphy, K. P. (2012). Machine Learning: A Probabilistic Perspective. MIT Press.	

Mapping of Course Outcomes to Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	High	High	Medium	High	Medium	High
CO2	Medium	High	High	High	Medium	High
CO3	High	High	Medium	Medium	Low	High
CO4	High	High	High	Medium	High	High
CO5	High	Medium	High	High	Medium	High
CO6	Medium	High	High	High	Medium	High

Mapping of Course Outcomes to Programme Specific Outcomes

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	High	High	Medium	High	Medium	High
CO2	Medium	High	High	High	High	High
CO3	High	Medium	High	High	High	Medium
CO4	High	High	High	High	High	High
CO5	Medium	High	High	Medium	Medium	High
CO6	High	High	High	High	High	Low

2.4 Artificial Intelligence (Core-IV)

COURSE TITLE	Artificial Intelligence		CREDITS				4
COURSE CODE	COURSE CATEGORY		Part - III				L T P C
Semester - II	Core-IV		4	0	0	4	
Prerequisite	Basic knowledge on understanding and analyzing the problems strategies.				Syllabus version	2023 - 2024	
Course Description:							
Course Objectives							
<p>The main objectives of this course are to</p> <ol style="list-style-type: none"> To inculcate the knowledge on approaching and solving the problems using intelligent approach. To provide depth understanding on knowledge representation, inference and learning. To understand the control strategies in planning and production system. To motivate the students to develop models for AI with Expert systems for real world problems. 							
Course (Learning) Outcomes							
CO1 K1, K2	Understand the AI foundations, problem-solving strategies using agents and search strategies						
CO2 K1, K2	Present the search strategies for complex environment, game playing and different knowledge representations.						
CO3 K2, K4	Provide knowledge on knowledge reasoning and planning, handling uncertainty and knowledge inference methods.						
CO4 K2, K3, K4	Understand the production control strategies and algorithms for planning.						
CO5 K3, K4, K6	Design and Implement expert systems by building the knowledge base and the inferencing engine.						
K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create							
Detailed Syllabus							

UNIT – I	PROBLEM SOLVING	9 Hrs
Introduction to AI- Foundations of AI – Risks and benefits of AI – Agents and Environments – Structure of Agents – Uninformed Search Strategies- Informed Search Strategies- Heuristic functions – Local Search Algorithm.		
UNIT II	SEARCH IN COMPLEX ENVIRONMENT, GAMES AND KNOWLEDGE REPRESENTATION	9 Hrs
Introduction to Game Playing-Alpha Beta Pruning- Constraint Satisfaction Problems – Knowledge Representation using First order logic- Knowledge Engineering in First Order Logic-Proportional vs First Order Logic.		
UNIT-III	KNOWLEDGE REASONING AND PLANNING	9 Hrs
Inference- Forward and Backward Chaining-Unification-Uncertainty-Inference in Bayesian Network – Inference in Temporal models – Hidden Markov Models – Kalman Filters – Dynamic Bayesian Networks – Combining Beliefs and desires under uncertainty – Decision Networks		
UNIT -IV	PRODUCTION SYSTEM AND PLANNING	9 Hrs
Introduction to Production system-control strategies-Rete Algorithm-Planning-STRIPS- Planning with state space search-Partial Order Planning-Planning Graphs-Planning, acting in the real world.		
UNIT- V	EXPERT SYSTEM	9 Hrs
Expert System- Architecture and Roles of Expert System-Typical Expert System-MYCIN- XOON-DART Case Study-Construction of simple reflex agent with sensor and actuator using Arduino.		
UNIT-VI	Contemporary Issues	
Discussion on case study - Expert lectures - Online seminars –Webinars –Workshops		
Total Lecture Hours		
TEXT BOOK(S)		
1	Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", 3rd Edition, Pearson Education / Prentice Hall of India, 2010.	
2	Joseph C. Giarratano, Gary D. Riley," Expert Systems: Principles and Programming",4 th Edition, 2015.	
REFERENCE BOOKS:		
1	Nils J. Nilsson, "Artificial Intelligence: A new Synthesis", Harcourt Asia Pvt. Ltd., 2000.	
2	Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", Mc Graw Hill- 2008.	
3	W. Patterson, 'Introduction to Artificial Intelligence and Expert Systems', Prentice Hall of India, 2007	
4	Prateek Joshi, "Artificial Intelligence with Python", Packt Publishing, 2017.	
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]		
1	https://onlinecourses.swayam2.ac.in/cec21_cs08/preview	
2	https://www.tutorialspoint.com/artificial_intelligence/index.htm	
3	https://www.coursera.org/learn/introduction-to-ai	
4	https://www.udacity.com/course/intro-to-artificial-intelligence--cs271	

Mapping of Course Outcomes to Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	High	High	High	High	High	High
CO2	Medium	High	High	High	Medium	High
CO3	High	High	High	Medium	Low	High
CO4	High	High	High	Medium	High	Medium
CO5	High	Medium	Medium	High	Medium	High

Mapping of Course Outcomes to Programme Specific Outcomes

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	Medium	High	High	High	Medium	High
CO2	Medium	High	High	High	High	High
CO3	Medium	High	High	High	High	Low
CO4	High	High	High	High	High	High
CO5	Medium	High	High	Medium	Medium	High

2.6. PROBABILITY AND DISTRIBUTIONS

COURSE TITLE	PROBABILITY AND DISTRIBUTIONS	CREDITS			4
COURSE CODE	COURSE CATEGORY	Part - III			L
Semester - II	Core-IV			T	P
Prerequisite	Basic knowledge of Set theory, Real analysis and Calculus			4	0
			0	0	4
		Syllabus version		2023 - 2024	

Course Description:

Course Objectives

The main objectives of this course are to:

1. Inculcate knowledge on basic concepts of probability theory and probability distributions
2. Explore the concepts of random variable, distribution function and expectation
3. Enhance the ability of proving fundamental theorems related to convergence of sequences of random variables and distribution functions
4. Understand relationships among statistical distributions
5. Inculcate the students with the practice of solving problems related to characteristic function and convergence properties of sequences of random variables, distribution functions and inculcate the ability for carrying out statistical analysis of probability distributions.

Course (Learning) Outcomes

CO1 K1, K2	Understand the basic concepts of probability theory
CO2 K1-K3 and K5	Understand and obtain the CDF, Expectations, Moments and Inequalities.
CO3 K2, K3	Describe the concepts of convergence and their implications.
CO4 K2, K4	Understand and analyze the importance of Independence and Law of large numbers and Central Limit Theorems
CO5 K1-K4	Describe and analyze the properties of univariate discrete distributions and continuous distributions
CO6 K1 -K6	Develop computer programs for carrying out computations related to this course

K1: Remember K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create

Detailed Syllabus

UNIT - I	Probability	9 Hrs
Definition of probability - independent events - conditional probability - Bayes Theorem. Random variables: Discrete and continuous random variables - distribution function -properties - probability mass function and probability density function - discrete and continuous probability distributions.		

UNIT II	Multiple random variables	9 Hrs
Joint, marginal and conditional distribution functions - independence of random variables - transformation of random variables and their distribution functions. Mathematical expectation: Expectation - properties - conditional expectation and conditional variance. Moment generating function, characteristic function, probability generating function and their properties.		
UNIT-III	Limit Theorems	9 Hrs
Convergence in probability, weak law of large numbers - Bernoulli's theorem, Khintchine's theorem (statements only) - Central limit theorem.		
UNIT -IV	Discrete distributions	9 Hrs
Bernoulli, Binomial, Poisson, Geometric and Negative binomial distributions - Multinomial distribution. Moments - probability generating function, moment generating function, characteristic function and properties.		
UNIT- V	Continuous distributions	9 Hrs
Uniform, Normal, Cauchy and Lognormal distributions - concepts, moments, moment generating function, characteristic function and properties. Sampling distributions: Chi-square, t and F distributions.		
UNIT-VI	Contemporary Issues	
Expert lectures, online seminars - webinars. [2 hours]		
Note 1: Students will be trained to develop appropriate computer programmes in R and Python related to computations taught in this course.		
Note 2: Examination shall be conducted on contents of UNIT I through UNIT V only.		
Total Lecture Hours		
TEXT BOOK(S)		
1	Goon, A.M., M. K. Gupta and B. Das Gupta (2017) Fundamentals of Statistics- Vol. I., World Press, Ltd, Kolkata.	
2	Gupta, S.C. and V.K. Kapoor (2020) Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.	
REFERENCE BOOKS:		
1	Robert, V. Hogg, Joseph W. McKean and Allen T. Craig (2013) Introduction to Mathematical Statistics (Seventh Edition), Pearson Education, New York.	
2	Lipschutz, S. (2008) Probability Theory (Second Edition), Schaum's Outline Series, McGraw Hill, New York.	
3	Alexander, M. Mood, Franklin A. Graybill and Duane C. Boes (2017). Introduction to the Theory of Statistics (Third Edition), Mc Graw Hill Education, New Delhi.	
4	Bhuyan K.C. (2010), Probability Distribution Theory and Statistical Inference, New Central Book Agency (P) Ltd., New Delhi.	

5	Spiegel, M.R. and Ray, M. (1980) Theory and Problems of Probability and Statistics, Schaum's Outline Series, McGraw Hill, New York.
6	Bhat B.R. (2014) Modern Probability Theory, New Age International Publishers, NewDelhi.
7	Rohatgi, V. K.and A. K. Md. E. Saleh(2009). An Introduction to Probability Theory and Mathematical Statistics (Second Edition). John Wiley & Sons, New York.
Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]	
1	https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=+u3y6UdblvOJ97LFeSCmHQ==P-01.Probability I
2	https://nptel.ac.in/courses/111101004
3	https://nptel.ac.in/courses/111104079
4	https://swayam.gov.in/nd2_cec20_ma01/preview
5	https://nptel.ac.in/courses/111/104/111104032/

Mapping of Course Outcomes to Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	High	High	High	High	High	High
CO2	High	High	High	High	High	High
CO3	High	High	Medium	Medium	Low	High
CO4	High	High	High	Medium	Medium	High
CO5	High	Medium	Medium	High	High	High
CO6	Medium	High	High	High	High	High

Mapping of Course Outcomes to Programme Specific Outcomes

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	Medium	High	High	High	Medium	High
CO2	Medium	High	High	High	High	High
CO3	Medium	High	High	High	High	Low
CO4	High	High	High	High	High	High
CO5	Medium	High	High	Medium	Medium	High
CO6	High	High	High	High	High	Low

2.7 Computer fundamentals

COURSE TITLE	Computer fundamentals		CREDITS			4
COURSE CODE	COURSE CATEGORY	Part - III	L	T	P	C
Semester - II			4	0	0	4
Prerequisite	Basic with arithmetic operators		Syllabus version		2023 - 2024	

Course Description:

Course Objectives

The main objectives of this course are to:

Discuss the Introduction about Computer and its Components. Perform the Microsoft Word, Excel, PowerPoint and its operations, Knowledge about the Internet and Intranet, insert heading levels within a web page, Insert ordered and unordered lists within a web page. Create a web page

Course (Learning) Outcomes

CO	On completion of this course, students will
CO1[K1]	Understand the basics of Computer and its Generations. Be able to understand the components of computer.
CO2[K1]	To Understand the introduction about MS Word. Be able to perform the Elements of window, Text Formatting, Text Manipulating options in MS Word.
CO3[K2]	To Understand the introduction about MS Excel. Be able to inserting and sizing the cells Implementing formulas and inserting worksheet.
CO4[K4]	To Understand the introduction about MS PowerPoint Be able to perform the slides manipulation. Implementing Multimedia and templates.
CO5[K6]	To Understand the introduction about Internet and Intranet. Be able to access the browsers. To get knowledge about basic components of E-Mail and E-Commerce
K1: Remember K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create	

Detailed Syllabus

UNIT - I	Introduction to Computers	9 Hrs
Introduction to Computers - Generations of Computer - Data and Information - Components of Computer - Software - Hardware - Input Devices - Output Devices -- Types of Operating System.		
UNIT II	MS Word	9 Hrs
Introduction - Elements of Window - Files, Folders and Directories - Text Manipulating: Cut, Copy, Paste, Drag and Drop - Text Formatting: Font - Style, Size, Face and Colors (Both foreground and background) - Alignment - Bullets and Numbering - Header and footer-watermark - inserting objects (images, other application document) - Table creation - Mail merge.		
UNIT-III	Ms Excel	9 Hrs

Introduction – Inserting rows and columns – Sizing rows and columns – Implementing formulas – Generating series - Functions in excel – Creation of Chart – Inserting objects – Filter – Sorting – Inserting worksheet.

UNIT -IV	MS PowerPoint	9 Hrs
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Introduction – Slides Manipulation (Inserting new, Copy, paste, delete and duplicate slides) – Slide show– Types of Views – Types of Animations – Inserting Objects – Implementing multimedia (Video and Audio) – Templates (Built-in and User-Defined).

UNIT- V	Internet	9 Hrs
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Introduction to Internet and Intranet – Services of Internet - Domain Name – URL – Browser – Types of Browsers – Search Engine - E-Mail – Basic Components of E-Mail –How to send group mail. E-Commerce: Digital Signature– Digital Currency – Online shopping and transaction.

Total Lecture Hours		
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TEXT BOOK(S)

1	G. Manjunath, "Computer Basics", Vasan Publications, 2010.
2	Pradeep K. Sinha&PritiSinha, "Computer Fundamentals", 6th Edition, BPB Publications, 2004.

Web Resources

- | | |
|----|---|
| 1. | https://www.tutorialspoint.com/computer_fundamentals/index.htm |
| 2. | https://www.tutorialspoint.com/basics_of_computers/index.htm |
| 3. | https://www.tutorialspoint.com/word/index.htm |
| 4. | https://www.tutorialspoint.com/excel/index.htm |
| 5. | https://www.tutorialspoint.com/powerpoint/index.htm |

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	2	2	3	3	2
CO 3	2	3	3	3	3	3
CO 4	3	3	2	3	3	3
CO 5	3	3	3	3	2	3
Weightage of course contributed to each PSO	14	14	13	15	14	14

S-Strong-3

M-Medium-2

L-Low-1

2.8. Introduction to HTML

COURSE TITLE	Introduction to HTML		CREDITS			4
COURSE CODE	COURSE CATEGORY	Part - III	L	T	P	C
Semester - II	Introduction to HTML		4	0	0	4
Prerequisite	Basic knowledge about computer		Syllabus version		2023 - 2024	

Course Description:

Course Objectives

The main objectives of this course are to:

To insert a graphic within a web page, create a link within a web page, Create a table within a web page. Insert heading levels within a web page. Insert ordered and unordered lists within a web page. Create a web page.

Course (Learning) Outcomes

CO	On completion of this course, students will
CO1[K1]	Determine and learn the basic concept in HTML Concept of resources in HTML
CO2[K1]	To create Design concept, concept of Meta Data and understand the concept of save the files.
CO3 [K2]	To understand the page formatting and concept of list
CO4 [K3]	To Create Links and know the concept of creating link to email address
CO5 [K4]	To understand the table creation and concept of adding images.

Detailed Syllabus

UNIT - I	Introduction	9 Hrs
Introduction to Java-Features of Java-Object Oriented Concepts-Software Evolution - Software Development, SDLC Models - SDLC steps - Software Testing - Software Quality - Lexical Issues-Data Types - Variables - Arrays - Operators - Control Statements - Classes - Objects -Constructors - Overloading method - Access control - static and fixed methods - Inner classes -Inheritance-Overriding Methods-Using super-Abstract class.		
UNIT II	Packages & Threads	9 Hrs
Packages-Access Protection-Importing Packages-Interfaces-Exception Handling-Throw and Throws- Thread-Synchronization-Messaging- Runnable Interface-Inter thread communication-Deadlock-suspending, resuming and stopping threads-Multithreading.		
UNIT-III	Input / Output & Collection API	9 Hrs
I/O Streams-File Streams-String Objects-String Buffer-Char Array - Java Utilities-Collections interface - Collection classes-Enumeration - Vector -Stack -Hash tables - String class.		

UNIT -IV	Networking	9 Hrs
Networking –Networking basics – java and the Net – Internet Address- TCP/IP Client Sockets – URL- URL Connection – TCP/IP Server Sockets – Data grams.		
UNIT- V	Graphical User Interface in Java	9 Hrs
Working with windows using AWT Classes – Class Hierarchy of Window and Panel –AWT controls – Layout Managers – Menus- Menu bars – Dialog Boxes- File Dialog- Applets–Life cycle of Applet–Types of Applets–Event handling–Applet tags – JDBC and connecting to Databases – CRUD operations.		
Total Lecture Hours		
TEXT BOOK(S)		
1	“Mastering HTML5 and CSS3 Made Easy”, Teach U Comp Inc., 2014.	
2	Thomas Michaud, “Foundations of Web Design: Introduction to HTML & CSS”.	
Web Resources		
1.	https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf	
2.	https://www.w3schools.com/html/default.asp	

Mapping with Programme Outcomes:

CO/PSO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO 1	3	3	3	3	3	3
CO 2	3	3	2	3	3	3
CO 3	2	3	3	3	3	3
CO 4	3	3	3	3	3	3
CO 5	3	3	3	2	3	3
Weightage of course contributed to each PSO	14	15	14	14	15	15

S-Strong-3

M-Medium-2

L-Low-1

2.9. Ability Enhancement Compulsory Course (AECC 2)
