# Centre for Artificial Intelligence

# Islamic University of Science & Technology

# Bachelor of Science (B.Sc.) in Artificial Intelligence (FYUGP)


## Curriculum for Undergraduate Programme 4 Years (FYUGP) 2025 Onwards

# Programme Description

The B.Sc. in Artificial Intelligence is a four-year undergraduate programme designed in accordance with the National Education Policy (NEP) 2020 under the Four-Year Undergraduate Programme (FYUGP) model. The programme provides students with a strong foundation in computer science, mathematics, and core AI domains.

# Program Educational Objectives (PEOs)

**PEO 1**
Focuses on building foundational skills in core areas such as mathematics, statistics, and programming languages.

**PEO 2**
Aims to provide deep understanding and hands-on skills in Data Science, Machine Learning, Computer Vision, and Natural Language Processing.

**PEO 3**
Concentrates on the use of state-of-the-art tools and high-performance computing platforms for problem-solving in AI.

**PEO 4**
Empowers students to tackle AI challenges with a rigorous and analytical mindset, promoting creativity and interdisciplinary collaboration, aligned with NEP 2020.

**PEO 5**
Inculcates professionalism and ethical foundations, encouraging contributions to societal challenges through AI in line with NEP 2020.

**PEO 6**
Equips students with industry-relevant skills and expertise to meet the evolving demands of the professional industry.

# Intake Capacity, Eligibility Criteria and Mode of Selection

**Intake Capacity: 30**

**Eligibility Criteria**

Candidates must have passed 10+2 or an equivalent examination from a recognized board. A minimum of 50% aggregate marks (or as prescribed by the university from time to time) is required for eligibility.

**Mode of Selection**

Candidates will be primarily selected through Common University Entrance Test (CUET) conducted by NTA.

# Program Structure

The proposed BSC AI program would span for four years. The course curriculum is developed in accordance with the AICTE Model Curriculum in consultation with industry experts. It shall be regularly updated to align with the latest advancements and industry requirements. It comprises core concepts, practical skills, and hands-on experience in a balanced blend of theoretical coursework, laboratory exercises, and industry-oriented projects.

# Course Outline

| Semester I | | | | | | | |
|---|---|---|---|---|---|---|---|
| S NO | Course Title | Course Code | Hours Per Week | | | | Credits |
| | | | L | T | P | S | |
| 1 | Programming with Python | CAI101MJ | 3 | 0 | 1 | 0 | 4 |
| 2 | Digital Electronics and Office Automation | - | 4 | 0 | 0 | 0 | 4 |
| 3 | Value Added Course | - | 3 | 0 | 0 | 0 | 3 |
| 4 | Ability Enhancement Course | - | 3 | 0 | 0 | 0 | 3 |
| 5 | Multidisciplinary Course | - | 3 | 0 | 0 | 0 | 3 |
| 6 | Skill Course | - | 3 | 0 | 0 | 0 | 3 |
| 7 | Basic Mathematics for FYUGP (Audit) | - | - | - | - | - | - |
| **Total Credits** | | | | | | | **20** |

| Semester II | | | | | | | |
|---|---|---|---|---|---|---|---|
| S NO | Course Title | Course Code | Hours Per Week | | | | Credits |
| | | | L | T | P | S | |
| 1 | Concepts of Programming using C and C ++ | CAI151MJ | 3 | 0 | 1 | 0 | 4 |
| 2 | Computer Organization and Architecture | - | 4 | 0 | 0 | 0 | 4 |
| 3 | Value Added Course | - | 4 | 0 | 0 | 0 | 3 |
| 4 | Ability Enhancement Course | - | 3 | 0 | 0 | 0 | 3 |
| 5 | Skill Course | - | 3 | 0 | 0 | 0 | 3 |
| 6 | Multidisciplinary Course | - | 3 | 0 | 0 | 0 | 3 |
| **Total Credits** | | | | | | | **20** |

| Semester III | | | | |
|---|---|---|---|---|
| S NO | Course Title | Course Code | Hours Per Week | Credits |

| | | | L | T | P | S | |
|---|---|---|---|---|---|---|---|
| 1 | Principles of AI | CAI201M | 3 | 1 | 0 | 0 | 4 |
| 2 | Operating System Concepts with Practical Shell Scripting | CAI202M | 3 | 0 | 1 | 0 | 4 |
| 3 | Data Structures | DSC201M | 3 | 0 | 1 | 0 | 4 |
| 4 | Ability Enhancement Course | - | 3 | 0 | 0 | 0 | 3 |
| 5 | Multidisciplinary Course | - | 3 | 0 | 0 | 0 | 3 |
| 6 | Skill Course | - | 3 | 0 | 0 | 0 | 3 |
| **Total Credits** | | | | | | | **20** |

| Semester IV | | | | | | | |
|---|---|---|---|---|---|---|---|
| S NO | Course Title | Course Code | Hours Per Week | | | | Credits |
| | | | L | T | P | S | |
| 1 | Design and Analysis of Algorithms | CAI251M | 3 | 0 | 1 | 0 | 4 |
| 2 | Foundations of Machine Learning | CAI252M | 3 | 0 | 1 | 0 | 4 |
| 3 | Database Management Systems | CAI253M | 3 | 0 | 1 | 0 | 4 |
| 4 | Computer Networks | CAI254M | 3 | 1 | 0 | 0 | 4 |
| 5 | Internet and Web Technologies | - | 3 | 0 | 1 | 0 | 4 |
| **Total Credits** | | | | | | | **20** |

# Guidelines for choosing courses from other Departments

1. **Ability Enhancement:** Choose communication skills offered under ability enhancement courses.
2. **Value Added:** Choose both the courses offered under value added courses.
3. **Multidisciplinary:** Choose any one course from open basket, Humaities & Scicial Sciences basket or Management basket
4. **Skill**: Choose any one course from the list of skill courses

| S. No. | Name of the Course | Department offering the Course |
|---|---|---|
| Skill Courses: | | |
| 1 | Fruit and Vegetable Processing Technologies | Department of Food Technology |
| 2 | Multimedia Editing | Department of Journalism and Mass Comm. |
| 3 | Workshop Technologies | Central Workshop |
| 4 | Refrigeration AC Conditioning | Department of Mechanical Engineering |
| 5 | Health Care Skills | Centre for Ayush Science |
| Value Added Courses: | | |
| 1 | Digital and Technological Solutions | Department of Computer Science |
| 2 | Health and Wellness | B.Voc |
| Ability Enhancement Courses: | | |
| 1 | Communication Skills | Department of English |
| Multidisciplinary Courses: | | |
| A) Open Basket | | |
| 1 | Statistics | Department of Mathematical Scineces |
| 2 | Generative AI | Centre for AI |
| 3 | Exploring Neighbourhood with Space Technologies | Department of Planning and Geomatics |
| B) Sciences Basket | | |
| 1 | Molecules of Life | B.Voc |
| 2 | Disaster-proof Future: Innovative Strategies | Centre for Disaster Risk Reduction |
| C) Humanities & Social Sciences Basket | | |
| 1 | | |
| 2 | Lessons from History | Department of Political Sciences/IR |
| D) Business School Basket | | |
| 1 | Principles of Economics | Department of Managemnet Studies |

# Detailed Syllabus
## Core Courses

# Python Programming Language

## Semester I

## Course Code

**CAI 101MJ**

## 4 Credits

| L | T | P |
|---|---|---|
| 3 | 0 | 2 |

**Course Outcomes**

- ✔ Write, debug, and execute Python programs.
- ✔ Apply control structures and data structures effectively.
- ✔ Use Python modules and libraries.
- ✔ Perform file operations and error handling.

# Course Content

**UNIT I**

Introduction to Development Environments: Familiarization with Jupyter Notebooks and Python IDEs like PyCharm and Visual Studio Code. Python Basics: Syntax, Keywords, Identifiers, Variables, Data Types, Operators (arithmetic, relational, logical, assignment, bitwise), Type conversion and input/output functions

(8 hours)

**UNIT II**

Conditional statements (if, if-else, elif), Loops (for, while, break, continue, else), Functions: defining, calling, arguments, return values, Lambda functions, recursion, Variable scope, default and keyword arguments

(8 hours)

**UNIT III**

Lists: creation, indexing, slicing, methods, Tuples and sets, Dictionaries: keys, values, operations, List comprehension, nested structures, Iterators and generators, Strings: operations, formatting, methods, slicing

(8 hours)

**UNIT IV**

Errors and exceptions, built-in exceptions, try, except, finally, raise, Creating and importing modules, Built-in modules: math, random, datetime, os, File I/O: reading/writing text and CSV files, Working with with, open, file modes, File exceptions and context managers

(8 hours)

**UNIT V**

Introduction to OOP Concepts, Classes and Objects, Attributes and Methods, Constructors (__init__ method), Encapsulation, Inheritance, Polymorphism, Special Methods (like __str__ and __repr__), Class and Static Methods

(8 hours)

## Text Books

1. Downey, A. (2012). Think python. " O'Reilly Media, Inc.".

## Reference Books

1. Shaw, Z. A. (2024). Learn Python The Hard Way. Addison-Wesley Professional.
2. Sweigart, A. (2016). Invent your own computer games with python.
3. Barry, P. (2016). Head first Python: A brain-friendly guide. " O'Reilly Media, Inc.".
4. Matthes, E. (2023). Python crash course: A hands-on, project-based introduction to programming.

## Web References

1. Code with Mosh
   Python Tutorial - Python Full Course for Beginners
   By Mosh Hamedani

2. Harvard University
   CS50
   Introduction to Computer Science
   By David J. Malan

# Python Programming Language Lab

# LIST OF PRACTICAL EXPERIMENTS

1. **Basic Syntax and Script Writing**
   Experiment: Write a simple Python script that takes user input, processes it, and outputs a result, such as a script that calculates the area of a circle given its radius.
2. **Data Types and Variables**
   Experiment: Create variables of different data types (integer, float, string, list, tuple, dictionary) and perform basic operations on them, like adding numbers or concatenating/joining strings.
3. **Control Flow**
   Experiment: Write programs that use if, elif, and else statements to make decisions, and use for and while loops to iterate over sequences or repeat actions until a condition is met.
4. **Functions and Modules**
   Experiment: Define functions to perform specific tasks. Also, learn to use Python modules by importing and using functions from the standard library.
5. **File Handling**
   Experiment: Read from and write to files in Python. Create a script that reads a text file and counts the frequency of each word in the file.
6. **Error Handling and Exceptions**
   Experiment: Write a program that handles different types of exceptions, such as handling division by zero or handling file operations when a file does not exist.
7. **Classes and Object-Oriented Programming**
   Experiment: Create a class representing a simple concept, such as a Book with attributes like title and author, and methods to display book info.
8. **List Comprehensions**
   Experiment: Use list comprehensions to create lists in a single line of code. For example, create a list of squares of the first 10 natural numbers.
9. **Strings and String Operations**
   Experiment: Count vowels and consonants in a string and Check whether a string is a palindrome
10. **Modules and Packages**
    Experiment: Use random to simulate a dice throw or number guessing game and Display current date and time using datetime

## Text Books

1. Downey, A. (2012). Think python. " O'Reilly Media, Inc.".

## Reference Books

1. Shaw, Z. A. (2024). Learn Python The Hard Way. Addison-Wesley Professional.
2. Sweigart, A. (2016). Invent your own computer games with python.
3. Barry, P. (2016). Head first Python: A brain-friendly guide. " O'Reilly Media, Inc.".
4. Matthes, E. (2023). Python crash course: A hands-on, project-based introduction to programming.

# Semester II

# Concepts of Programming using C and C ++

Semester II

Course Code
CAI151MJ
4 Credits

| L | T | P | S |
|---|---|---|---|
| 3 | 0 | 2 | 0 |

**Course Outcomes**

- ✔ Understand basic programming concepts and problem-solving techniques.
- ✔ Write simple programs using C language.
- ✔ Use functions, arrays, and pointers in C programs.
- ✔ Understand the basics of Object-Oriented Programming (OOP) in C++.

# Course Content

**UNIT I**

Problem-solving concepts; algorithms and flowcharts; Structure of a C program; constants, variables, and data types; Operators and expressions; input and output functions in C.

(10 hours)

**UNIT II**

Control statements – if, if-else, switch, for, while, do-while; Break and continue statements; Functions – declaration, definition, and calling; Function arguments and return values; recursion basics.

(8 hours)

**UNIT III**

Arrays – one-dimensional and two-dimensional; String handling and string library functions; Pointers – declaration and operations; Pointer to arrays; introduction to structures and unions.

(10 hours)

**UNIT IV**

Introduction to C++; Difference between C and C++; Basic structure of a C++ program;
Classes and objects; data members and member functions; Constructors, destructors, and function overloading.

(8 hours)

## Text Books

1. E. Balagurusamy. Programming in ANSI C. McGraw Hill.
2. E. Balagurusamy. Object Oriented Programming with C++. McGraw Hill.

# Semester III

# Principles of Artificial Intelligence

Semester III

Course Code
CAI201MJ
4 Credits

| L | T | P |
|---|---|---|
| 3 | 1 | 0 |

**Course Outcomes**

- ✔ Explain AI foundations and applications.
- ✔ Analyze agents and problem-solving.
- ✔ Apply propositional logic in AI.
- ✔ Implement basic machine learning methods.
- ✔ Evaluate ethical and responsible AI practices.

## Course Content

**UNIT I**

AI vs. Human Intelligence, Definition of Artificial Intelligence, Characteristics of AI Systems, Narrow AI vs. General AI, Subfields of AI (Natural Language Processing, Computer Vision, Robotics, Expert Systems), History and Evolution of AI, Applications of AI in Various Domains, Limitations and Challenges of Current AI Systems

(10 hours)

**UNIT II**

Agents and Environments, Concept of Rationality, Nature of Environments (deterministic vs stochastic, static vs dynamic, discrete vs continuous), Structure of Agents (simple reflex, model-based, goal-based, utility-based)

(8 hours)

**UNIT III**

Introduction to Machine Learning, Types of Learning (Supervised, Unsupervised, Semi-Supervised, Reinforcement Learning), Generative and Discriminative Algorithms, Regression – Concepts and Linear Regression, Classification – Logistic Regression, Naïve Bayes Classifier, Bias-Variance Trade-off, Overfitting and Underfitting, Clustering – Euclidean Distances, K-Means Algorithm

(10 hours)

**UNIT IV**

Knowledge Representation – Importance and Approaches, Logical Representation, Propositional Logic – Syntax, Semantics, Truth Tables, Inference Rules, Normal Forms (CNF, DNF), Applications of Propositional Logic in AI

(8 hours)

**UNIT V**

Introduction to AI Ethics, Importance of Ethical AI, Key Ethical Principles – Fairness, Accountability, Transparency, Integrity, Sustainability, Human Control, Democracy, Interoperability, Privacy Concerns and Data Protection, Legal and Social Implications of AI, Responsible AI Practices

(6 hours)

### Text Books

1. Russell, S. J., & Norvig, P. (2010). Artificial Intelligence: A Modern Approach (3rd ed.). Chapters on Knowledge Representation.

### Reference Books

1. Ertel, W. (2018). Introduction to artificial intelligence. Springer.
2. Coeckelbergh, M. (2020). AI ethics. The MIT press essential knowledge series.
3. Wooldridge, M. (2021). A brief history of artificial intelligence: what it is, where we are, and where we are going. Flatiron Books.

## Web References

1. SWAYAM NPTEL
   An Introduction to Artificial Intelligence
   By Prof. Mausam

2. MIT OpenCourseWare
   Artificial Intelligence
   By Patrick Henry Winston

# OPERATING SYSTEM CONCEPTS WITH PRACTICAL SHELL SCRIPTING

Semester III

Course Code
CAI202MJ
4 Credits

| L | T | P | S |
|---|---|---|---|
| 3 | 0 | 2 | 0 |

**Course Outcomes**

- ✔ Understand the fundamental concepts, structure, and functions of operating systems.
- ✔ Analyze process management techniques including scheduling, synchronization, and inter-process communication.
- ✔ Evaluate CPU scheduling algorithms and deadlock handling mechanisms used in modern operating systems.

## Course Content

**UNIT I**

Introduction to the purpose and functions of operating systems. Types of operating systems including batch, time-sharing, distributed, and real-time systems. Structure and components of an operating system, system calls, operating system services, design and implementation aspects, and the system boot process. Concept of a process, process states, and process control block, Process creation, scheduling, and termination

(12 hours)

**UNIT II**

CPU scheduling concepts and criteria. Scheduling algorithms including First Come First Serve, Shortest Job First, Shortest Remaining Time First, Longest Job First, Longest Remaining Time First, Round Robin, Priority Scheduling, Multilevel Queue Scheduling, and Multilevel Feedback Queue Scheduling. System model and deadlock characterization. Necessary conditions for the occurrence of deadlock. Methods for handling deadlocks.

(10 hours)

**UNIT III**

Concepts of memory management including contiguous memory allocation, swapping, paging, multilevel paging, inverted paging, and segmentation. Virtual memory, demand paging, page replacement algorithms such as First In First Out, Least Recently Used, and Optimal. Allocation of frames, thrashing, and memory-mapped files. Concept of concurrency, the critical section problem, race conditions, and mutual exclusion. Process synchronization mechanisms, Peterson's solution, semaphores, classical synchronization problems, monitors, and condition variables.

(12 hours)

**UNIT IV**

Introduction to the UNIX/Linux environment. Basic Linux commands and file handling. Introduction to Shell and types of shells. Writing and executing shell scripts. Variables and command-line arguments. Conditional statements (if, case). Looping constructs (for, while, until). Functions in shell scripts and simple menu-driven programs.

(10 hours)

## Text Books

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne (2006), Operating System Principles, 7th Edition, Wiley India Private Limited, New Delhi.
2. Yashavant P. Kanetkar (2008), UNIX Shell Programming, BPB Publications, New Delhi.

## Reference Books


1. Stallings (2006), Operating Systems: Internals and Design Principles, 5th Edition, Pearson Education, India.
2. Andrew S. Tanenbaum (2007), Modern Operating Systems, 2nd Edition, Prentice Hall of India, India.
3. Deitel & Deitel (2008), Operating Systems, 3rd Edition, Pearson Education, India.
4. B.M. Harwani (2012), Unix and Shell Programming, Oxford University Press, India.


## Web References

1. NPTEL
   Operating System Fundamentals
   By Prof. Santanu Chattopadhyay | IIT Kharagpur

2. GeeksforGeeks
   Operating System Tutorials
   By GeeksforGeeks Team

# Semester IV

# Design and Analysis of Algorithms

Semester IV

Course Code
CAI251M
4 Credits

| L | T | P | S |
|---|---|---|---|
| 3 | 0 | 2 | 0 |

**Course Outcomes**

- ✔ Ability to comprehend the basics in algorithms and data structures.
- ✔ Ability to solve problems that involve these concepts/similar problems
- ✔ Ability to provide algorithmic solutions/approaches to new problems

## Course Content

**UNIT I**
Introduction: Algorithm Design paradigms- motivation, Concept of algorithmic efficiency, Run time analysis of algorithms, Asymptomatic Notations.
Divide & Conquer: Structure of divide and conquer algorithms: examples, Binary search, Merge Sort, Quick sort, Analysis of divide and conquer run time. Recurrence Relations, Master Theorem for solving Recurrence Relations.

(10 hours)

**UNIT II**
Greedy Method: Overview of the greedy paradigm, examples of exact optimization solution (minimum cost spanning tree), approximate solution (Knapsack problem), Huffman coding, Single source shortest path.
Dynamic Programming: Overview, difference between dynamic programming and divide and conquer, applications: Shortest Path in Multistage Graph, Non-fractional (0/1) Knapsack problem, Matrix Chain Multiplication, Travelling salesman problem, Longest common sequence.

(8 hours)

**UNIT III**
Data structures for disjoint sets, Path compression, union by rank, Prim's and Kruskal's algorithms, Huffman coding, LZW coding, shortest paths, greedy activity selection.

(10 hours)

**UNIT IV**
Dynamic Programming basics, matrix chain multiplication, DP solution for traveling salesman and 0/1 Knapsack problems, least common subsequences, independent sets and backtracking algorithm, Breadth/depth-first algorithms.

(8 hours)

### Text Books

T.Cormen, C.Lieserson, R.Rivest, and C.Stein, "Introductions to Algorithms", Prentice-Hall/India, 3rd edition, 2009

# Foundations of Machine Learning

Semester IV

Course Code
CAI252M
4 Credits

| L | T | P | S |
|---|---|---|---|
| 3 | 0 | 2 | 0 |

**Course Outcomes**

- ✔ Explain fundamental statistical concepts including measures of central tendency, dispersion, and probability distributions.
- ✔ Distinguish between different types of machine learning paradigms and understand generative and discriminative approaches.
- ✔ Apply model selection techniques and evaluate models using bias-variance trade-off, cross-validation, and regularization methods.

## Course Content

**UNIT I**

Measures of Central Tendency: Mean, Median, and Mode. Measures of Dispersion: Range, Quartile, Mean Deviation, Standard Deviation, Coefficient of Variance, Skewness, Kurtosis.

(10 hours)

**UNIT II**

Probability Distribution, Sample Spaces and Events, Conditional Probability, Random Variables, Introduction to Machine Learning. Types of Learning. Generative and Discriminative algorithms.

(8 hours)

**UNIT III**

Model selection and feature selection. Bias-variance trade-off, overfitting and underfitting. Training, validation and test split. Cross-validation. Regularization.

(10 hours)

**UNIT IV**

Linear Regression, Logistic Regression, SoftMax Regression, Perceptron. Decision Trees, Support Vector Machines. Clustering: K-means.

(8 hours)

### Text Books

1. Machine Learning. Tom Mitchell. McGraw- Hill, 2010.
2. Aurelien Geron, Hands-On Machine Learning with Scikit-Learn and TensorFlow, Oreilly, March 2017.

### Reference Books

1. Alpaydin, Ethem. Introduction to machine learning. MIT press, 2020
2. Kevin P. Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press
3. Christopher Bishop, “Pattern Recognition and Machine Learning” Springer, 2007.

## Web References

1. Coursera DeepLearning.AI
   Machine Learning Specialization
   By Andrew Ng, Geoff Ladwig,
   Aarti Bagul

2. Google for Developers
   Google Machine Learning Education
   By Google

# Database Management System Design

Semester IV

Course Code
CAI-253M
4 Credits

| L | T | P | S |
|---|---|---|---|
| 3 | 0 | 2 | 0 |

**Course Outcomes**

- ✔ Explain the purpose, characteristics, and architecture of database systems.
- ✔ Design ER models and relational schemas for real-world applications.
- ✔ Apply SQL for data definition, manipulation, and control.
- ✔ Understand normalization, transaction management, and concurrency.
- ✔ Use databases practically for AI-related data handling and analytics.

## Course Content

**UNIT I**

Introduction to databases: data, information, and database concepts. Advantages of DBMS over file systems, three-level architecture, Data models, and DBMS components.

(8 hours)

**UNIT II**

Entity–Relationship model: entities, attributes, relationships, ER diagrams, and conversion to relational model. Relational algebra and basic operations.

(10 hours)

**UNIT III**

SQL: data definition, manipulation, constraints, and joins. Subqueries, views, and aggregate functions. Introduction to PL/SQL – procedures, triggers, and cursors.

(12 hours)

**UNIT IV**

Normalization: 1NF to BCNF, anomalies and dependencies. Transactions, concurrency control, and recovery. Overview of NoSQL databases and applications in AI data storage.

(10 hours)

### Text Books

1. A. Silberschatz, H. F. Korth, and S. Sudarshan, Database System Concepts, 7th ed. New Delhi, India: McGraw Hill Education, 2019.
2. R. Elmasri and S. B. Navathe, Fundamentals of Database Systems, 7th ed. Noida, India: Pearson Education, 2016.

### Reference Books

1. C. J. Date, An Introduction to Database Systems, 8th ed., Noida, India: Pearson Education, 2004.
2. R. Ramakrishnan & J. Gehrke, Database Management Systems, 3rd ed., New York, NY: McGraw Hill, 2003.
3. C. Zaniolo, S. Ceri, C. Faloutsos, R. T. Snodgrass & V. S. Subrahmanian, Advanced Database Systems, San Francisco, CA: Morgan Kaufmann, 1997.
4. S. Wagner Dietrich & S. Urban, An Advanced Course in Database Systems: Beyond Relational Databases, Upper Saddle River, NJ: Prentice Hall, 2005.

# Internet and Web Technologies

Semester V

Course Code

4 Credits

| L | T | P | S |
|---|---|---|---|
| 3 | 0 | 2 | 0 |

**Course Outcomes**

- ✔ Explain the architecture and working of the Internet and World Wide Web.
- ✔ Develop client-side and server-side web applications.
- ✔ Demonstrate use of HTML, CSS, JavaScript, and web frameworks.
- ✔ Implement dynamic and database-connected websites.
- ✔ Apply web development for societal or AI-based mini projects.

# Course Content

**UNIT I**

Overview of Internet and WWW: history, protocols (HTTP, FTP, SMTP), domain name system, IP addressing, and web servers.
Introduction to web browsers and web standards.

(8 hours)

**UNIT II**

HTML5 and CSS3: structure of HTML documents, forms, multimedia elements, tables, and responsive design using CSS.

(10 hours)

**UNIT III**

Client-side scripting using JavaScript: variables, functions, DOM manipulation, event handling, and form validation. Introduction to AJAX and JSON.

(10 hours)

**UNIT IV**

Server-side scripting using Python (Flask/Django) or PHP: server configuration, dynamic pages, database connectivity, and deployment basics.
Mini project – design a small web app for social purpose.

(12 hours)

## Text Books


1. A. S. Godbole and A. Kahate, Web Technologies: TCP/IP to Internet Application Architectures, 5th ed., New Delhi, India: McGraw Hill Education, 2021.
2. H. M. Deitel, P. J. Deitel, and A. Deitel, Internet and World Wide Web: How to Program, 5th ed., Noida, India: Pearson Education, 2018.


## Reference Books


1. R. Nixon, Learning PHP, MySQL, JavaScript, and CSS: A Step-by-Step Guide to Creating Dynamic Websites, 5th ed., Sebastopol, CA: O'Reilly Media, 2021.
2. I. Bayross, Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP, 6th ed., Mumbai, India: BPB Publications, 2020.
3. C. Xavier, Web Technology and Design, New Delhi, India: New Age International Publishers, 2013.
4. R. Kamall, Internet and Web Technologies, New Delhi, India: Tata McGraw Hill, 2007.
5. J. Duckett, HTML and CSS: Design and Build Websites, Indianapolis, IN: Wiley, 2011.

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