**INFORMATION TECHNOLOGY**

**COURSE OBJECTIVE AND OUTCOME**

**CO-1 Programming fundamental using C**  
(Credits: Theory-04, Practical- 02)  
Theory: 40 Classes (1 hr duration)

**Objective**  
The purpose of this course is to introduce to students to the field of programming using C language. The students will be able to enhance their analyzing and problem solving skills and use the same for writing programs in C.

**Outcome**  
- Understand the fundamentals of C programming.  
- Choose the loops and decision making statements to solve the problem.  
- Implement different Operations on arrays.  
- Use functions to solve the given problem.  
- Understand pointers, structures and unions.  
- Implement file Operations in C programming for a given application.

**CO-2 Computer System Architecture**  
(Credits: Theory-06)  
Theory: 53 Classes (1 hr duration)

**Objective**  
Student will become familiar with these different topics:

- digital circuits  
- processor instruction sets  
- processor architecture  
- runtime environment  
- memory hierarchy  
- operating systems and processes

**Outcome**  
- Explain the organization of basic computer, its design and the design of control unit.  
- Demonstrate the working of central processing unit and RISC and CISC Architecture.  
- Describe the operations and language of the register transfer, micro operations input output organization.  
- Understand the organization of memory and memory management hardware.  
- Elaborate advanced concepts of computer architecture, Parallel Processing, inter processor communication and Synchronization.
CO-3 Data Structure
(Credits: Theory-04, Practical- 02) Theory: 40 Classes (1 hr duration)

Objective
- Be familiar with basic techniques of algorithm analysis.
- Be familiar with writing recursive methods.
- Master the implementation of linked data structures such as linked lists and binary trees
- Be familiar with advanced data structures such as balanced search trees, hash tables, priority queues and the disjoint set union/find data structure
- Be familiar with several sub-quadratic sorting algorithms including quick sort, merge sort and heap sort.
- Be familiar with some graph algorithms such as shortest path and minimum spanning tree.

Outcome
- Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.
- Understand basic data structures such as arrays, linked lists, stacks and queues.
- Describe the hash function and concepts of collision and its resolution methods
- Solve problem involving graphs, trees and heaps
- Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.

CO-4 : Data Communication and Networking
(Credits: Theory-06) Theory: 53Classes (1 hr duration)

Objective
The main objective of data communication and networking is to enable seamless exchange of data between any two points in the world. This exchange of data takes place over a computer network. Data refers to the raw facts that are collected while information refers to processed data that enables us to take decisions.

Outcome
- Understand computer network basics, network architecture, TCP/IP and OSI reference models.
- Identify and understand various techniques and modes of transmission
- Describe data link protocols, multi-channel access protocols and IEEE 802 standards for LAN
- Describe routing and congestion in network layer with routing algorithms and classify IPV4 addressing scheme.
- Discuss the elements and protocols of transport layer.
- Understand network security and define various protocols such as FTP, HTTP, Telnet, DNS.
Objective

- To understand how C++ improves C with object-oriented features.
- To learn how to write inline functions for efficiency and performance.
- To learn the syntax and semantics of the C++ programming language.
- To learn how to design C++ classes for code reuse.
- To learn how to implement copy constructors and class member functions.
- To understand the concept of data abstraction and encapsulation.
- To learn how to overload functions and operators in C++.
- To learn how containment and inheritance promote code reuse in C++.
- To learn how inheritance and virtual functions implement dynamic binding with polymorphism.
- To learn how to design and implement generic classes with C++ templates.
- To learn how to use exception handling in C++ programs.

Outcome

- Describe the procedural and object oriented paradigm with concepts of streams classes, functions, data and objects.
- Understand dynamic memory management techniques using pointers, constructors, destructors etc.
- Describe the concept of function overloading, operator overloading, virtual functions and polymorphism.
- Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.
- Demonstrate the use of various OOPs concepts with the help of programs.

CO-6: Operating System

(Credits: Theory-06)  Theory: 53 Classes (1 hr duration)

Objective

To make the computer system convenient to use in an efficient manner. To provide users a convenient interface to use the computer system. To act as an intermediary between the hardware and its users, making it easier for the users to access and use other resources.

Outcome

- Understand the basics of operating systems like kernel, shell, types and views of operating systems
- Describe the various CPU scheduling algorithms and remove deadlocks.
- Explain various memory management techniques and concept of thrashing
- Use disk management and disk scheduling algorithms for better utilization of external memory.
- Recognize file system interface, protection and security mechanisms.
CO-7: Internetworking
(Credits: Theory-06) Theory: 53 Classes (1 hr duration)

Objective
Internetworking is "the concept of interconnecting different types of networks to build a large, global network” such that any pair of connected hosts can exchange packets. To build an internetwork, the following are needed. A standardized scheme to address packets to any host on any participating network; a standardized protocol defining format and handling of transmitted packets; components interconnecting the participating networks by routing packets to their destinations based on standardized addresses.

Outcome
- State the fundamentals related to network security and basics of IPv6 and IPsec.
- Explain various protocols related to internet key exchange.
- Study Adhoc network and its protocols.
- Define various examples of wireless communication system, standards related to 2G and 3G wireless networks.

CO-8: E-Commerce
(Credits: Theory-06) Theory: 53 Classes (1 hr duration)

Objective
The objectives of the course are to introduce the concept of electronic commerce, and to understand how electronic commerce is affecting business enterprises, governments, consumers and people in general. In addition, we will study the development of websites using relevant software tools.
- Acquaint students with a fundamental understanding of the environment and strategies in the New Economy.
- Provide analytical tools to understand opportunities in unserved or underserved New Economy markets.
- Provide a fundamental understanding of the different types and key components on business models in the New Economy.

Outcome
- Explain the components and roles of the Electronic Commerce environment.
- Explain how businesses sell products and services on the Web.
- Describe the qualities of an effective Web business presence.
- Describe E-Commerce payment systems.
Objective

The program will prepare our students to be successful professionals in the field with solid fundamental knowledge of software engineering. Be successful professionals in the field with solid fundamental knowledge of software engineering. Utilize and exhibit strong communication and interpersonal skills, as well as professional and ethical principles when functioning as members and leaders of multi-disciplinary teams. Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes.

Outcome

- Plan a software engineering process life cycle, including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements.
- Analyze and translate a specification into a design, and then realize that design practically, using an appropriate software engineering methodology.
- Know how to develop the code from the design and effectively apply relevant standards and perform testing, and quality management and practice.
- Able to use modern engineering tools necessary for software project management, time management and software reuse.

CO-10: Database Management System

(Credits: Theory-04, Practical-02) Theory: 40 Classes (1 hr duration)

Objective

Mass Storage. DBMS can store a lot of data in it. Removes Duplicity. If you have lots of data then data duplicity will occur for sure at any instance. Multiple Users Access. Data Protection. Data Backup and recovery, Everyone can work on DBMS, Integrity, Platform Independent.

Outcome

- Describe DBMS architecture, physical and logical database designs, database modeling, relational, hierarchical and network models.
- b) Identify basic database storage structures and access techniques such as file organizations, indexing methods including B-tree, and hashing.
- c) Learn and apply Structured query language (SQL) for database definition and database manipulation.
- d) Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
- e) Understand various transaction processing, concurrency control mechanisms and database protection mechanisms.
CO-11: Web Technology
(Credits: Theory-06) Theory: 53 Classes (1 hr duration)

Objective

Give the distinguishing characteristic of scripting language. Discuss the reasons for and effects of nonstandard client-side scripting language characteristics, such as limited data types, dynamic variable types and properties, and extensive use of automatic type conversion. Develop event-driven programs that use HTML intrinsic event attributes, DOM event listeners, and DOM-generated events. Use the DOM to modify a document's attributes and style properties as well as to modify its parse-tree representation.

Outcome

- Explain the history of the internet and related internet concepts that are vital in understanding web development.
- Discuss the insights of internet programming and implement complete application over the web.
- Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style Sheet.
- Utilize the concepts of JavaScript and Java
- Use web application development software tools i.e. Ajax, PHP and XML etc. and identify the environments currently available on the market to design web sites.

CO-12: Java Programming
(Credits: Theory-04, Practical-02) Theory: 40 Classes (1 hr duration)

Objective

Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc. Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms. Understand the principles of inheritance, packages and interfaces. Create a software application using the Java programming language. Test a software application written in the Java programming language.

Outcome

Review of Java and object-oriented programming
- Describe Java encapsulation, class creation and creating objects.
- Write statements using class static variables and static methods and Applets.
- Describe usage of the this keyword and describe Java class inheritance
- Explain the difference between primitive and reference data types & Event handling.
CO-13  Programming in Visual Basic
(Credits: Theory-04, Practical- 02) Theory: 40 Classes (1 hr duration)

Objective

This course introduces computer programming using the Visual BASIC programming language with object-oriented programming principles. Emphasis is on event-driven programming methods, including creating and manipulating objects, classes, and using object-oriented tools such as the class debugger.

Outcome

- Upon completion of this course, the student will be able to:
- Design, create, build, and debug Visual Basic applications.
- Explore Visual Basic’s Integrated Development Environment (IDE).
- Implement syntax rules in Visual Basic programs.
- Explain variables and data types used in program development.
- Apply arithmetic operations for displaying numeric output.

CO-14  Data Warehousing and Data Mining
(Credits: Theory-06) Theory: 53 Classes (1 hr duration)

Objective

- This course focuses on the fundamentals of data warehousing and their associated problem areas.
- Data pre-processing and preparation, outlier detection, data warehouse design, On-line analytical.
- Processing are the major areas of coverage of this course. This course also deals with the fundamentals of data mining and algorithms associated with the same.

Outcome

On successful completion of this course, the learner will be able to
- Describe the fundamental concepts, benefits and problem areas associated with data warehousing.
- Describe the various architectures and main components of a data warehouse.
- Design a data warehouse, and be able to address issues that arise when implementing a data warehouse.
- Compare and contrast OLAP and data mining as techniques for extracting knowledge from a data warehouse.
IT-DSE (Discipline Specific Elective): (4 papers including the Project)
DSE-1 to DSE-4 (6 Credits each)

DSE-1: Information Security
(Credits: Theory- 06) Theory: 53 Classes (1hr duration)

Objective
This introductory course is aimed at giving basic understanding about system security. This entry-level course covers a broad spectrum of security topics and is based on real-life examples to create system security interest in the students. A balanced mix of technical and managerial issues makes this course appealing to attendees who need to understand the salient facets of information security basics and the basics of risk management.

Outcome
At the end of the course, the students have firm understanding on basic terminology and concepts related to network and system level security, basics of computers and networking including Internet Protocol, routing, Domain Name Service, and network devices. They are also exposed to basic cryptography, security management, and network security techniques. They also look at policies as a tool to effectively change an organization's culture towards a better secure environment.

DSE-2: Artificial Intelligence
(Credits: Theory- 06) Theory: 53 Classes (1hr duration)

Objective
This course provides an introduction to the fundamentals of artificial intelligence. It contains a theory component about the concepts and principles that underlie modern AI algorithms, and a practice component to relate theoretical principles with practical implementation. The course divides into four parts. The first part of the course discusses search algorithms (BFS, DFS, UCS, A*, Min-Max trees). The second part of the course discusses probability as a mathematical tool, Bayesian networks and hidden Markov models.

Outcome

- List the objectives and functions of modern Artificial Intelligence.
- Categorize an AI problem based on its characteristics and its constraints.
- Understand and implement search and adversarial (game) algorithms.
- Understand mathematical models such as belief networks and Markov decision processes and apply them to a range of AI problems.
- Have a glance at machine learning algorithms and extracting knowledge models from data.
- Learn different logic formalisms and decision taking in planning problems.
- Learn how to analyze the complexity of a given problem and come with suitable optimizations.
DSE-3: Cloud Computing
(Credits: Theory - 06) Theory: 53 Classes (1hr duration)

Objective

This course focuses on learning emerging issues related to Cloud computing technology. The objectives are:

- Understand various basic concepts related to cloud computing technologies
- Understand the architecture and concept of different cloud models: IaaS, PaaS, SaaS
- Understand big data analysis tools and techniques
- Understand the underlying principle of cloud virtualization, cloud storage, data management and data visualization.
- Understand different cloud programming platforms and tools.

Outcome

- Develop and deploy cloud application using popular cloud platforms,
- Design and develop highly scalable cloud-based applications by creating and configuring virtual machines on the cloud and building private cloud.
- Explain and identify the techniques of big data analysis in cloud.
- Compare, contrast, and evaluate the key trade-offs between multiple approaches to cloud system design, and Identify appropriate design choices when solving real-world cloud computing problems.
- Write comprehensive case studies analyzing and contrasting different cloud computing solutions.
- Make recommendations on cloud computing solutions for an enterprise.

DSE-4: Software Development Project Work
Credits - 06

Students will acquire the ability to make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task.