DEPARTMENT OF COMPUTER SCIENCE

BACHELOR OF COMPUTER SCIENCE

PROGRAM OUTCOME

**B.Sc., Computer Science**

- To apply knowledge of computing, mathematics, and basic sciences that may be relevant and appropriate to the domain.

- To analyze a problem, identify and define the computing requirements, which may be appropriate to its solution.

- To design, implement, and evaluate computer-based system, process, component, or program to meet desired needs.

- To analyze the local and global impact of computing on individuals, organizations, and society.

**M.Sc., Computer Science**

- To identify current techniques, skills, and tools necessary for computing practices.

- To apply technical concepts and practices in the core development of solutions in the form of Computer Science.

- To analyze user needs and take them into account in the selection, creation, evaluation and administration of computer-based systems.

- To understand the best practices and standards to develop user interactive and abstract application

- To assist and manage the execution of an effective project plan.
**SEMESTER: I**

**PROGRAMMING IN C LANGUAGE**

**SUB CODE: 16SCCC1**

**Objectives:**

The course is designed to provide complete knowledge of C language. Students will be able to develop logics which will help them to create programs, applications in C. Also by learning the basic programming constructs they can easily switch over to any other language in future.

**Outcomes:**

After the completion of this subject, the students will be able to develop applications. They can get exposure to problem-solving through programming. The student is trained to the basic concepts of the C-programming language. This course involves a lab which is designed to give the student hands-on experience with the concepts.

**SEMESTER: II**

**PROGRAMMING IN C++**

**SUB CODE: 16SCCC2**

**Objectives:**

This course provides a knowledge to understand how C++ improves C with object-oriented features, how to write inline functions for efficiency and performance, the syntax and semantics of the C++ programming language, how to design C++ classes for code reuse.

**Outcomes:**

After the completion of this subject students can learn the fundamental programming concepts and methodologies which are essential to building good C++ programs. They can also learn the fundamental programming methodologies in the C++ programming language via laboratory experiences. Students will be trained to code, document, test, and implement a well-structured, robust computer program using the/C++ programming language and also to write reusable modules (collections of functions).
SEMESTER: III

PROGRAMMING IN JAVA

SUB CODE: 6SCCCS3

Objectives:

This course provides the knowledge to understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc. Also provides a knowledge to understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, applets, event handling etc.

Outcomes:

After the completion of this subject students can design desktop and web applications using object-oriented designs with Java. They can get sound knowledge about inheritance and dynamic binding, exception handling in Java applications. They can develop web applications using Applets.

SEMESTER: IV

DATABASE SYSTEMS

SUB CODE: 6SCCCS4

Objectives:

The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.

Outcomes:

Students can get knowledge about the fundamental elements of relational database management systems, basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL. They can design ER-models to represent simple database application scenarios. They can be familiar with basic database storage structures and access techniques: file and page organizations, indexing methods.
SEMESTER: V

DATA STRUCTURES AND ITS ALGORITHM SUB CODE: 16SCCCS5

Objectives:

To teach efficient storage mechanisms of data for an easy access to design and implementation of various basic and advanced data structures and also introduce various techniques for representation of the data in the real world. Students can develop application using data structures and understand the concept of protection and management of data.

Outcomes:

After the completion of this subject students can understand the basic concepts of data structures and algorithms, to understand concepts about searching and sorting techniques. Understand how data are stored into which order like stacks, queues, lists, trees and graphs. Students get knowledge about writing algorithms and step by step approach in solving problems with the help of fundamental data structures.

DIGITAL ELECTRONICS AND ITS MICROPROCESSOR

SUB CODE: 16SCCCS7

Objectives:

The objective of this subject is to enable the students to know basic concepts of digital electronics and familiarity with available chips. After undergoing this course the students will have the awareness of various arithmetic circuits, counter design, registers, A/D and D/A converters, semi-conductor memories, multiplexers and de-multiplexers.

Outcomes:

The students can get knowledge how to create a strong base in mathematics, science and engineering fundamentals required to solve Electronics and Telecommunication problems. To impart necessary applied engineering knowledge so as to comprehend, analyze, design and create modern products for real life complex engineering problems in the field of Electronics and Telecommunication. To impart
good communication skills, team work and leadership qualities and create ethical professionals concerned about the impact of engineering solutions on environment and society.

**COMPUTER NETWORKS**

**SUB CODE: 16SCCCS6**

**Objectives:**

To provide students with an overview of the concepts and fundamentals of data communication and computer networks and familiarize with the basic taxonomy and terminology of computer networking area. To experience the designing and managing of communication protocols while getting a good exposure to the TCP/IP protocol suite.

**Outcomes:**

At the successful completion of this course, students will be able to describe the general principles of data communication and how computer networks are organized with the concept of layered approach and also transfer data between nodes through signals. Students can get knowledge about how packets in the internet are delivered.

**SOFTWARE ENGINEERING**

**SUB CODE: 16SMBECS1:1**

**Objectives:**

This course goal is to provide a professionally guided education in software engineering that prepares graduates to transition into a broad range of career options: industry, government, computing graduate program, and professional education.

**Outcomes:**

An ability to identify, formulates, and solves complex engineering problems by applying principles of engineering, science, and mathematics

An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
SEMESTER: VI

PROGRAMMING IN PHP SUB CODE: 16SCCCS9

Objectives:

This course the students will learn how to make your pages dynamic based upon user interaction, interacting with HTML forms and store and retrieve information from local data sources which include a database. The stateless web (HTML, CSS and JavaScript) can only do so much without a dynamic language such as PHP to add the ability to interact with the web server. Understand how server-side programming works on the web.

Outcomes:

After the completion of this subjects students will know about the basic syntax for variable types and calculations, creating control structures and how to data stored in arrays using PHP built-in functions and creating custom functions and also understand POST and GET in form submission read and process data in MYSQL.

OPERATING SYSTEMS SUB CODE: 16SCCCS8

Objectives:

This course is framed to learn fundamentals of Operating Systems To gain knowledge on Distributed operating system concepts that includes architecture, Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols and also to gain insight on to the distributed resource management components the algorithms for implementation of distributed shared memory, recovery and commit protocols, students also know the components and management aspects of Real time.

Outcomes:

After finishing this course High-level understand what is an operating system and the role it plays. A high-level understanding of the structure of operating systems, applications, students get knowledge of the services provided by operating systems. Students can get exposure to some details of major OS concepts.
COMPUTER GRAPHICS                SUB CODE: 16SMBECS2:1

Objectives:

After completing this course, students will be able to identify and explain the core concepts of computer graphics. Apply graphics programming techniques to design, and create computer graphics scenes create effective OpenGL programs to solve graphics programming issues, including 3D transformation, objects modeling, color modeling, lighting, textures, and ray tracing.

Outcomes:

After successfully completing this course, students will demonstrate their ability to use modern 3D computer graphics techniques, models, and algorithms to solve graphics problems.
WEB TECHNOLOGIES

Objectives:

On completion of this course, a student will be familiar with client server architecture and able to develop a web application using java technologies.

Students will gain the skills and project-based experience needed for entry into web application and development careers.

Outcomes:

Students are able to develop a dynamic webpage by the use of java script and Students will be able to connect a java program to a DBMS and perform insert, Students will be able to write a well formed / valid XML document and DHTML.

DESIGN AND ANALYSIS OF ALGORITHMS

Objectives:

Analyze the asymptotic performance of algorithms.
Write rigorous correctness proofs for algorithms.
Demonstrate a familiarity with major algorithms and data structures.
Apply important algorithmic design paradigms and methods of analysis.
Synthesize efficient algorithms in common engineering design situations.

Outcomes:

Argue the correctness of algorithms using inductive proofs and invariants.
Analyze worst-case running times of algorithms using asymptotic analysis.
Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.

Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.

**DISTRIBUTED TECHNOLOGIES**  
**SUB CODE:** P16CS23P

**Objectives:**

Present the principles underlying the function of distributed systems and their extension to grid and cloud computing and virtualization techniques.

Create an awareness of the fundamental technical challenges in advanced distributed systems design and implementation;

Expose students to current technology used to build architectures to enhance distributed computing infrastructures with various computing principles and paradigms, including grid and cloud computing.

**Outcomes:**

*To learn* the working **knowledge** of hardware and software of computer.

To make students familiar with **Distributed computing** environment, RMI and DCOM architecture.

**DISTRIBUTED OPERATING SYSTEM**  
**SUB CODE:** P16CS14

**Objectives:**

This Subject provides students with an in-depth knowledge about the operating system. The former treats the standard principles of single processor system, including processes, synchronization, I/O, deadlocks, Memory Management, File Management systems, security and so on. This subject covers distributed operating system in detail, including communication process, file system and memory management synchronization and so on but this time in the context of distributed systems.
Outcomes:

By the end of the course the students should be able to

Describe the general architecture of computers.

Describe, contrast and compare differing structures for operating systems.

Understand and analyse theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files.

WEB TECHNOLOGIES LAB

SUB CODE: P16CS15P

Objectives:

This course is intended to teach the basics involved in publishing content on the World Wide Web. This includes the ‘language of the Web’ – HTML, the fundamentals of how the Internet and the Web function, a basic understanding of graphic production with a specific stress on creating graphics for the Web, and a general grounding introduction to more advanced topics such as programming and scripting. This will also expose students to the basic tools and applications used in Web publishing.

Outcomes:

The students will be able to:

Analyze a web page and identify its elements and attributes.

Create web pages using XHTML and Cascading Style Sheets.

Build dynamic web pages using JavaScript (Client side programming).
SEMESTER-II

OOD & UML SUB CODE: P16CS21

Objectives:

This course teaches students the basic principles of object orientation and OO analysis and design. We will use the Unified Process and the Unified Modeling Language (UML) as tools. Illustrative programming examples use the Java language, but Java programming experience is not required.

Outcomes:

Describe the three pillars of object-orientation and explain the benefits of each.
Create use case documents that capture requirements for a software system.
Create class diagrams that model both the domain model and design model of a software system.
Create interaction diagrams that model the dynamic aspects of a software system.
Explain the facets of the Unified Process approach to designing and building a software system.
Describe how design patterns facilitate development and list several of the most popular patterns.

DISTRIBUTED TECHNOLOGIES SUB CODE: P16CS22

Objectives:

Given the knowledge of operating systems and sequential program design, the students of the second semester M. Tech. CSE will be able to design and develop fault tolerant and efficient distributed algorithms to solve large problems where data and control is distributed over different nodes.
Outcomes:

The student will explain various architectures used to design distributed systems, such as client-server and peer-to-peer.

Student will build distributed systems using various interprocess communication techniques, such as remote method invocation, remote events, and tuple spaces.

The student will explain various distributed algorithms, such as logical clocks and leader election.

The student will analyze and explain current distributed systems research literature.

MOBILE COMMUNICATION  SUB CODE: P16CSE1A

Objectives:

It deals with the fundamental cellular radio concepts such as frequency reuse and handoff. ... Types of Services, Requirements for the services, Multipath propagation, Spectrum Limitations, Noise and Interference limited systems, Principles of Cellular networks, Multiple Access Schemes.

Outcomes:

It will analyse the Classification of mobile communication systems
Analyze the radio channel characteristics and the cellular principle
Analyze the measures to increase the capacity in GSM systems-sectorization and Spatial Filtering for Interference Reduction
Ability to analyze improved data services in cellular communication
ARTIFICIAL INTELLIGENCE  
SUB CODE: P16CSE2B

Objectives:

The **objective** of the course is to present an overview of artificial intelligence (AI) principles and approaches. Develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents: Search, Knowledge representation, inference, logic, and learning.

Outcomes:

Apply the basic principles, models, and algorithms of AI to recognize, model, and solve problems in the analysis and design of information systems.

Analyze the structures and algorithms of a selection of techniques related to searching, reasoning, machine learning, and language processing.

DISTRIBUTED TECHNOLOGIES  
SUB CODE: P16CS23P

Objectives:

Present the principles underlying the function of distributed systems and their extension to grid and cloud computing and virtualization techniques

Create an awareness of the fundamental technical challenges in advanced distributed systems design and implementation;

Expose students to current technology used to build architectures to enhance distributed computing infrastructures with various computing principles and paradigms, including grid and cloud computing;
Outcomes:

To learn the working knowledge of hardware and software of computer.

To make students familiar with Distributed computing environment, RMI and DCOM architecture.

SEMESTER-III

DATA MINING AND WAREHOUSING SUB CODE: P16CS31

Objectives:

To identify the scope and essentiality of Data Warehousing and Mining. To analyze data, choose relevant models and algorithms for respective applications. To study spatial and web data mining. To develop research interest towards advances in data mining.

Outcomes:

Understand Data Warehouse fundamentals, Data Mining Principles
Design data warehouse with dimensional modeling and apply OLAP operations.
Identify appropriate data mining algorithms to solve real world problems
Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining
Describe complex data types with respect to spatial and web mining.
Benefit the user experiences towards research and innovation, Integration
COMPILER DESIGN   SUB CODE:P16CS32

Objectives:

The Objectives of this course is to explore the principles, algorithms, and data structures involved in the design and construction of compilers. Topics include context-free grammars, lexical analysis, parsing techniques, symbol tables, error recovery, code generation, and code optimization.

Outcomes:

To identify the tokens
To describe the design of a compiler including its phases and components
To make the lexical analysis of program
To describe the role of the compiler in ensuring the security, privacy and integrity of data

ADVANCED COMPUTER ARCHITECTURE   SUB CODE:P16CSE3B

Objectives:

To study the basic organization and architecture of digital computers (CPU, memory, I/O, software). Discussions will include digital logic and microprogramming. Such knowledge leads to better understanding and utilization of digital computers, and can be used in the design and application of computer systems or as foundation for more advanced computer-related studies.

Outcomes:

To learn about Multi processors and multicomputers. Performance metrics and measures. Superscalar and vector processors Cache memory organization Superscalar pipeline design Multithread architecture Dataflow computer, static and dynamic flow
NETWORK SECURITY

Objectives:

Students are expected to demonstrate the ability to: Identify computer and network security threats, classify the threats and develop a security model to prevent, detect and recover from the attacks.

Outcomes:

Students are expected to demonstrate the ability to:

Identify computer and network security threats, classify the threats and develop a security model to prevent, detect and recover from the attacks.

Encrypt and decrypt messages using block ciphers, sign and verify messages using well known signature generation and verification algorithms.

Analyze existing authentication and key agreement protocols; identify the weaknesses of these protocols.

Download and install an e-mail and file security software, PGP, and efficiently use the code to encrypt and sign messages.

DATA MINING LAB

Objectives:

Practical exposure on implementation of well known data mining tasks.

Exposure to real life data sets for analysis and prediction. Learning performance evaluation of data mining algorithms in a supervised and an unsupervised setting.

Handling a small data mining project for a given practical domain.

Outcomes:

The data mining process and important issues around data cleaning, pre-processing and integration.

The principle algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction.
SEMESTER-IV

CLOUD COMPUTING SUB CODE: P16CS41

Objectives

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. to learn how to use Cloud Services. To implement Virtualization, to implement Task Scheduling algorithms, Apply Map-Reduce concept to applications, to build Private Cloud, Broadly educate to know the impact of engineering on legal and societal issues involved.

Outcomes:

After successfully completing this course students should be able to

Articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc. explain the core issues of cloud computing such as security, privacy, and interoperability. Choose the appropriate technologies, algorithms, and approaches for the related issues.

WIRELESS SENSOR NETWORKS SUB CODE: P16CS42

Objectives:

To Understand the basic WSN technology and supporting protocols, with emphasis placed on standardization basic sensor systems and provide a survey of sensor technology. Understand the medium access control protocols and address physical layer issues. Learn key routing protocols for sensor networks.
Outcomes:

To understand the basic WSN technology and supporting protocols, with emphasis placed on standardization basic sensor systems and provide a survey of sensor technology

Understand the medium access control protocols and address physical layer issues

Learn key routing protocols for sensor networks and main design issues

Learn transport layer protocols for sensor networks, and design requirements

Understand the Sensor management, sensor network middleware, operating systems.

BIG DATA ANALYTICS SUB CODE: P16CSE5A

Objectives:

The main goal of this course is to help students learn, understand, and practice big data analytics and machine learning approaches, which include the study of modern computing big data technologies and scaling up machine learning techniques focusing on industry applications. Mainly the course objectives are: conceptualization and summarization of big data and machine learning, trivial data versus big data, big data computing technologies, machine learning techniques, and scaling up machine learning approaches.

Outcomes:

The students learning outcomes are designed to specify what the students will be able to perform after completion of the course:

Ability to identify the characteristics of datasets and compare the trivial data and big data for various applications.
Ability to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.

Ability to solve problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues.

Ability to integrate machine learning libraries and mathematical and statistical tools with modern technologies like Hadoop and map reduce.

**DATA MINING LAB**

**SUB CODE:** P16CS33P

**Objectives:**

Practical exposure on implementation of well known data mining tasks. Exposure to real life data sets for analysis and prediction. Learning performance evaluation of data mining algorithms in a supervised and an unsupervised setting. Handling a small data mining project for a given practical domain.

**Outcomes:**

The data mining process and important issues around data cleaning, pre-processing and integration.

The principle algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction.