PROGRAMME OUTCOMES
PROGRAMME SPECIFIC OUTCOMES
COURSE OUTCOMES

M.Sc Computer Science

Outcomes

At the end of Post Graduate Program at St. Thomas College (Autonomous), a student will have obtained:

PO1	Attained profound Expertise in Discipline
PO2	Acquired Ability to function in multidisciplinary domains
PO3	Attained ability to exercise Research Intelligence in investigations and Innovations
PO4	Learnt Ethical Principles and be committed to Professional Ethics
PO5	Incorporated Self-directed and Life-long Learning
PO6	Obtained Ability to maneuver in diverse contexts with Global Perspective
PO7	Attained Maturity to respond to one's calling

Program Specific Outcomes

At the end of M.Sc. Computer Science at St. Thomas College (Autonomous), Thrissur, a student will have developed:

PSO1	Evaluate complex real world problems by applying principles of theoretical computing, engineering and mathematical models.
PSO2	Understand concepts and applications in the field of Computer Sciences *viz.* Web Technology, Data Mining, Data Warehousing, Security, Network and communication technologies.
PSO3	Identify, analyse, and synthesize scholarly literature relating to the field of computer science to design, analyze and interpret data to find solutions
PSO4	Conceive Project Management capabilities to solve real world problems in accordance to the need of the industry, in a stipulated time frame

Course Outcomes

M.Sc. Computer Science

CSS1C01- Discrete Mathematical Structures

At the end of this course, a student will have developed ability to:

CO1	Apply operations on set and propositional calculus.
CO2	Verify the validity of an argument using propositional and predicate logic.
CO3	Apply operations of relations and functions in discrete structures.
CO4	Understand concepts of Lattices and Boolean Algebra
CO5	Understand applications of Lattices and Boolean algebra in computer science domain.
CO6	Identify Group, Ring and Field in Group Theory
CO7	Understand concepts of tree, graph theory and applications in computer science domain.
CO8	Apply the concepts of graph theory and trees to formulate problem solving

M.Sc. Computer Science

CSS1C02- Advanced Data Structures

At the end of this course, a student will have developed ability to:

CO1	Understand basic and advanced data structures dealing with algorithm development
CO2	Apply search and sort techniques concord with real-time computational problems
CO3	Analyse advanced data structures dealing with algorithm development *viz.* stacks, queues, lists, trees and graphs
CO4	Develop algorithmic approaches in real time computational environment
CO5	Calculate the performance of algorithm using time and space complexity
CO6	Evaluate the role of Hashing and Hash tables
CO7	Analyse non-linear data structure tree
CO8	Understand representation, operations and traversal mechanisms to implement the concept of a graph.

M.Sc. Computer Science

CSS1C03- Theory of Computation

At the end of this course, a student will have developed ability to:

CO1	Understand basic concepts in the theory of computation
CO2	Understand types of formal languages viz. Type 0, Type 1, Type 2 and Type 3 and its machine equivalence
CO3	Construct automation and grammar for all formal languages
CO4	Differentiate strings using formal language class
CO5	Understand real time applications using 'types of grammar'
CO6	Develop mathematical view towards general computation.
CO7	Understand machines hierarchy with respect to the capabilities using Chomsky hierarchy.
CO8	Classify NP and P problems

M.Sc. Computer Science

CSS1C04- The art of programming methodology

At the end of this course, a student will have developed ability to:

CO1	Illustrate various notions of flowchart and algorithm.
CO2	Design flowchart and algorithm for a given problem.
CO3	Determine the data representation formats for a specific problem domain.
CO4	Analyze user defined data types *viz*. Structures and Union.
CO5	Evaluate the merits and demerits of various programming constructs to choose an appropriate problem.
CO6	Implement the basic operations in file handling.
CO7	Implement the concept of dynamic memory allocation.
CO8	Construct a program by evaluating the computational requirements.

M.Sc. Computer Science

CSS1C05- Computer Organization and Architecture

At the end of this course, a student will have developed ability to:

CO1	Understand number system concepts.
CO2	Design sequential circuit and combinational circuit.
CO3	Understand the functional architecture of a computer system.
CO4	Understand principles of I/O through viable mechanism specifically for secondary storage organisation.
CO5	Evaluate the impact of memory elements on computer performance.
CO6	Memorize computations with functional units of processor.
CO7	Compare standards and guidelines towards selecting the appropriate microprocessor and microcontroller.
CO8	Construct assembly language program.

M.Sc. Computer Science

CSS1L01 - Practical I

At the end of this course, a student will have developed ability to:

CO1	Construct programs relating to the theory portions covered in CSS1C04 The Art of Programming Methodology
CO2	Construct programs relating to the theory portions covered in CSS1C02 Advanced Data Structures

M.Sc. Computer Science

CSS1A01- Introduction to Research (Ability Enhancement Audit Course)

At the end of this course, a student will have developed ability to:

CO1	Understand research terminology.
CO2	Understand ethical principles of research.
CO3	Identify the components of a literature review process.
CO4	Critically analyse published research.
CO5	Introduce research methods in the field of computer Science.

M.Sc. Computer Science

CSS2C06- DESIGN AND ANALYSIS OF ALGORITHMS

At the end of this course, a student will have developed ability to:

CO1	Understand algorithm design and model of computation
CO2	Analyze time and space complexity of algorithms while solving recurrences
CO3	Argue the correctness of algorithms using inductive proofs and invariants
CO4	Describe the divide-and-conquer, Brute Force and Branch-and-Bound techniques to explain when an algorithmic design situation calls for it.
CO5	Analyse the complexity of Greedy approach and Dynamic Programming
CO6	Describe classes P, NP, and NP- Complete.
CO7	Familiar with certain problem of NP-Complete
CO8	Analyze parallel algorithms and techniques to deal with hard problems.

M.Sc. Computer Science

CSS2C07- Operating System Concepts

At the end of this course, a student will have developed ability to:

CO1	Describe major responsibilities of a contemporary operating system
CO2	Understand the most fundamental subsystems of an OS and the functions that each subsystem is responsible of
CO3	Analyse the concept of a process, thread, mutual exclusion and Deadlock.
CO4	Understand various scheduling algorithms to choose the most suitable one for a given application scenario
CO5	Understand the concept of IPC
CO6	Analyse the concepts of memory management and associated techniques.
CO7	Evaluate the performance of memory allocation and replacement techniques.
CO8	Familiarize client/server computing, IOS and Android.

M.Sc. Computer Science

CSS2C08- Computer Networks

At the end of this course, a student will have developed ability to:

CO1	Study the basic taxonomy and terminology of Computer Networking and enumerate the layers of OSI model and TCP/IP model.
CO2	Remember the concepts of data communication at physical layer
CO3	Compare ISO - OSI model with TCP/IP model.
CO4	Identify protocols at Application layer
CO5	Analyze transport layer protocols and congestion control algorithms.
CO6	Analyze various routing algorithms and protocols at network layer.
CO7	Understand different networking protocols at data link layer.
CO8	Analyze different network security methods

M.Sc. Computer Science

CSS2C09- Computational Intelligence

At the end of this course, a student will have developed ability to:

CO1	Understand the basics of Artificial Intelligence and its application.
CO2	Formalize the problem as a state space or graph
CO3	Apply search and game based techniques to solve state space problem assigned with heuristics.
CO4	Understand basic issues of knowledge representation and represent viz. rules, logical reasoning and ISA relationship.
CO5	Introduce Planning system and components in AI
CO6	Familiarize on expert system and its lifecycle in AI
CO7	Compare various machine learning methods.
CO8	Understand basics of genetic algorithm and ANN.
CO9	Comprehend advanced machine learning techniques such as fuzzy logic and genetic algorithms
CO10	Introduce Rational Intelligent Agent and types of Agents designed for problem solving

M.Sc. Computer Science

CSS2C10- Principles of Software Engineering

At the end of this course, a student will have developed ability to:

CO1	Understand principles and practices of software engineering
CO2	Identify software models for different nature of projects
CO3	Familiarize tools for software design process.
CO4	Understand the concepts of process planning and scheduling
CO5	Identify the risk associated with projects.
CO6	Develop strategies for testing.
CO7	Understand processes on product survey.
CO8	Familiarize the methods of report writing.

M.Sc. Computer Science

CSS2L02- Practical I

At the end of this course, a student will have developed ability to:

CO1	Construct programs relating to the theory portions covered in CSS2C07 Operating System Concepts
CO2	Construct programs relating to the theory portions covered in CSS2C08 Computer Networks

M.Sc. Computer Science

CSS2A02- Term Paper (Professional Competency Audit Course)

At the end of this course, a student will have developed ability to:

CO1	Understand the techniques of literature survey.
CO2	Understand the process of presenting the research work through seminars and technical reports.

M.Sc. Computer Science

CSS3C01- Advanced Database Management System

At the end of this course, a student will have developed ability to:

CO1	Recall the basic concepts in database management system
CO2	Understand the relational database design (normalization)
CO3	Recall and memorize structured query language , PL/SQL
CO4	Understand transaction , concurrency control in database
CO5	Understand the concepts in object oriented database management system

M.Sc. Computer Science

CSS3C12- Object Oriented Programming Concepts

At the end of this course, a student will have developed ability to:

CO1	Understand object oriented programming concepts and formulate Java programs that include basic constructs
CO2	Develop java program using packages and interfaces.
CO3	Understand exception handling, multithreaded applications, synchronizations and I/O
CO4	Understand socket programming, JDBC architecture and connectivity
CO5	Develop GUI and applets for web based applications and Familiarize object oriented modeling and design patterns in UML.

M.Sc. Computer Science

CSS3C12- Principles of Compilers

At the end of this course, a student will have developed ability to:

CO1	Understand the process of translating a high-level language to an executable code.
CO2	Familiarize the function and complexity of modern compilers.
CO3	Understand the machine dependent code
CO4	Apply flow graph for the intermediate codes.
CO5	Apply optimization techniques to have a better code for code generation

M.Sc. Computer Science

CSS3L03- Practical III

At the end of this course, a student will have developed ability to:

CO1	Construct programs relating to the theory portions covered in CSS3C11 Advanced Database Management System
CO2	Construct programs relating to the theory portions covered in CSS3C12 Object Oriented Programming Concepts

M.Sc. Computer Science

CSS3E01a - Computer Graphics

At the end of this course, a student will have developed ability to:

CO1	Understand the working of different display devices.
CO2	Understand the fundamentals of computer graphics
CO3	Interpret line drawing algorithms and 2D transformations
CO4	Understand the viewport transformations, different clipping algorithms
CO5	Analyze the working of OpenGL Programming

M.Sc. Computer Science

CSS3E01b- Introduction to Soft Computing

At the end of this course, a student will have developed ability to:

CO1	Develop fundamental knowledge on soft computing theories
CO2	Understand basics of computing paradigm known as genetic algorithms
CO3	Remember various network paradigms and its applications
CO4	Analyze the applications of fuzzy set theories to different branches
CO5	Introduce EC algorithms and understand the swarm intelligence

M.Sc. Computer Science

CSS3E01c- Web Technology

At the end of this course, a student will have developed ability to:

CO1	Familiarize SGML features.
CO2	Understand operators, identifiers, variables, arrays, control structures, functions and objects in JavaScript.
CO3	Develop basic knowledge about the Apache web server.
CO4	Develop hands on experience using PHP.
CO5	Understand the concepts of content management systems (CMS).

M.Sc. Computer Science

CSS3E01d- Bioinformatics

At the end of this course, a student will have developed ability to:

CO1	Understand basic concepts of Bioinformatics and its significance with respect to Biological data
CO2	Identify the methods to manage the different types of Biological data.
CO3	Understand the types of data found at NCBI and EBI resources.
CO4	Analyze various Biological databases on nucleic acids and protein.
CO5	Identify the major steps in pair wise and multiple sequence alignment.

M.Sc. Computer Science

CSS3E01e-Computer Optimization Techniques

At the end of this course, a student will have developed ability to:

CO1	Formulate a real-world problem into a mathematical problem.
CO2	Apply specialized linear programming methods like transportation, assignment and network problems.
CO3	Understand the theoretical knowledge of different linear programming methods and iterations.
CO4	Understand integer linear programming and algorithms to solve it.
CO5	Develop the basic knowledge of dynamic programming and nonlinear Programming

M.Sc. Computer Science

CSS3E01f- Numerical & Statistical Methods

At the end of this course, a student will have developed ability to:

CO1	Recognize the error in the number generated
CO2	Apply different methods of interpolation for prediction
CO3	Understand the concepts of solving integrals numerically.
CO4	Learn different definitions of probability and its properties.
CO5	Solve specialized linear programming problem like the transportation and assignment problems.

M.Sc. Computer Science

CSS3E02a- Pattern Recognition

At the end of this course, a student will have developed ability to:

CO1	Understand the basic concept of a pattern and pattern recognition algorithms.
CO2	Recognize the principles of Bayesian parameter estimation
CO3	Analyze variety of pattern classification, structural pattern recognition, and pattern classifier combination techniques.
CO4	Apply methods for pre-processing, feature extraction, and feature Selection to multivariate data.
CO5	Understand supervised and unsupervised classification methods to detect and characterize patterns in real-world data.

M.Sc. Computer Science

CSS3E02b-

At the end of this course, a student will have developed ability to:

CO1	Understand the fundamental concepts of wireless and mobile networks.
CO2	Identify wireless application Protocols to develop mobile content development.
CO3	Analyze various programming methodologies in wireless mobile environment.
CO4	Understand security aspects of wireless networks.
CO5	Apply knowledge of TCP/IP extensions for mobile and wireless networking

CSS3E02c- **Cryptography And Network Security**

At the end of this course, a student will have developed ability to:

CO1	Understand the fundamentals of Cryptography
CO2	Familiarize Data integrity, Authentication, Digital Signatures.
CO3	Analyze various network security applications, IPSec, Firewall, IDS, Web security, Email security, and malicious software.
CO4	Familiarize standard algorithms used to provide confidentiality, integrity and authenticity.
CO5	Design security applications in the field of Information technology

CSS3E02d- Advanced Web Technology

At the end of this course, a student will have developed ability to:

CO1	Understand the concepts of Web 2.0
CO2	Understand the concepts of web services and web service architecture.
CO3	Analyze various server side programming using Python.
CO4	Analyze various server side programming using Python.
CO5	Develop the ability to Python SQLite integration.

CSS3E02e- Virtualisation And Cloud Computing

At the end of this course, a student will have developed ability to:

CO1	Understand the basics of cloud computing and virtualization
CO2	Identify cloud infrastructure and the key application features delivered on virtual infrastructures
CO3	Analyze programming model and programming paradigms
CO4	Understand the security and security challenges in cloud
CO5	Understand mapping applications and Hadoop

M.Sc. Computer Science

CSS3E02f- Data Warehousing And Data Mining

At the end of this course, a student will have developed ability to:

CO1	Identify the scope and necessity of Data Mining and Warehousing for the society
CO2	Understand data quality and methods and techniques for preprocessing of data.
CO3	Analyze the patterns that can be discovered by classification and clustering.
CO4	Understand data mining techniques clustering and association rule mining
CO5	Identify complex data types with respect to spatial and web mining.

M.Sc. Computer Science

CSS4P01- Project Work

At the end of this course, a student will have developed ability to:

CO1	Understand programming language concepts and software engineering principles to develop a medium sized software projects for industry or propose any new model for the selected field of research

M.Sc. Computer Science

CSS4E03a- Data Compression

At the end of this course, a student will have developed ability to:

CO1	Understand the importantance of data compression
CO2	Familiarise the basic techniques of compression
CO3	Familiarise the basic concepts of Information Theory
CO4	Analyze compression techniques for strings and images.
CO5	Apply different transforms for compression.
CO6	Understand video file formats , audio file formats and the compression techniques used in them
CO7	Analyze various compression algorithms for audio file formats
CO8	Analyze various compression algorithms for video file formats.

M.Sc. Computer Science

CSS4E03b-Pervasive Computing

At the end of this course, a student will have developed ability to:

CO1	Understand pervasive computing devices and interfaces.
CO2	Understand the application examples of pervasive computing
CO3	Familiarize the role of XML in pervasive computing.
CO4	Familiarize the role of WAP architecture and security.
CO5	Understand the role of speech based applications in pervasive computing.
CO6	Familiarize different voice standards.
CO7	Understand the Model-View-Controller pattern
CO8	Analyze pervasive web application architecture.

M.Sc. Computer Science

CSS4E03c - System Security

At the end of this course, a student will have developed ability to:

CO1	Identify computer and network security threats.
CO2	Identify the motive, nature and scope of cyber crime.
CO3	Understand the importance of Security in Information System
CO4	Understand important elements of security - Program Security and Operating system security,
CO5	Develop a security model to prevent, detect and mitigate the attacks.
CO6	Delineate various types of security policies
CO7	Understand important elements of Database security
CO8	Understand important elements of Administering Security Policy

M.Sc. Computer Science

CSS4E03d - Molecular Simulation And Modelling

At the end of this course, a student will have developed ability to:

CO1	Understand different molecular modelling methods.
CO2	Familiarize concept, principles of mathematical modeling and discrete system simulation.
CO3	Analyse different mapping techniques and Microarray technology
CO4	Analyse different prediction strategies of Structural Modelling.
CO5	Familiarize scientific literature in the basic operations and steps in molecular visualization

M.Sc. Computer Science

CSS4E03e - Fundamentals Of Big Data

At the end of this course, a student will have developed ability to:

CO1	Understand the basic concepts of big data and databases available in real-time
CO2	Familiarize data analytics using a tool - R.
CO3	Understand NOSQL databases and implement basic functions
CO4	Familiarize HADOOP
CO5	Understand the elementary concepts of mapreduce.

M.Sc. Computer Science

CSS4E03f- Web Engineering

At the end of this course, a student will have developed ability to:

CO1	Understand the basics and evolution of Web Engineering
CO2	Understand requirement engineering activities for web applications
CO3	Familiarize web application architecture
CO4	Demonstrate design principles in Web applications
CO5	Understand modeling concepts in web engineering
CO6	design and develop website using current Web technologies and model
CO7	Apply testing principles on web applications
CO8	Familiarize risks and change management to assure quality in web projects.

M.Sc. Computer Science

CSS4E04a - Digital Image Processing

At the end of this course, a student will have developed ability to:

CO1	Understand application of digital image processing.
CO2	Explore image processing fundamentals.
CO3	Familiarize with image sampling and quantization.
CO4	Understand image transformation techniques viz. Fourier transform, walsh Hadamard, DCT, and Hotelling transform.
CO5	Understand image enhancement techniques - histogram processing and various image filters viz.laplacian filter, smoothing and sharpening filters, spatial filters, and homomorphic filters.
CO6	Familiarize various noise models and filter techniques.
CO7	Understand concept of segmentation in images.
CO8	Understand lossy and lossless compression techniques.

M.Sc. Computer Science

CSS4E04b - Advanced Topics In Database Design

At the end of this course, a student will have developed ability to:

CO1	Understand the concepts of extended entity relationship model and object model.
CO2	Design and implement an Object-Oriented database schema for a given problem-domain
CO3	Familiarize RDBMS, OODBMS and ORDBMS.
CO4	Populate and query a database using SQL DML/DDL commands.
CO5	Understand parallel and distributed databases.
CO6	Understand the client server architecture.
CO7	Develop XML applications with object database.
CO8	Understand the data models *viz.* active, temporal, spatial, deductive, mobile databases and geographic information systems.

M.Sc. Computer Science

CSS4E04c - Software Development for Portable Devices

At the end of this course, a student will have developed ability to:

CO1	Introduce mobile web application development
CO2	Apply HTML 5 tags and attributes .
CO3	Use jQuery events and event handling methods.
CO4	Exemplify mobile application development using android.
CO5	Illustrate mobile database application using SQLite and content provider
CO6	Implement mobile application using audio and video, location based, and network connectivity services.

M.Sc. Computer Science

CSS4E04d - Storage Area Networks

At the end of this course, a student will have developed ability to:

CO1	Familiarize the concepts of storage area network.
CO2	Familiarize the topologies used in storage area network.
CO3	Understand the configuration and technology of storage area network
CO4	Understand the challenges in software management.
CO5	Understand the network architecture of storage network.
CO6	Implement strategies of backup software in storage area network.
CO7	Familiarize the management of storage area network.
CO8	Understand the concepts of designing and building of SAN.

M.Sc. Computer Science

CSS4E04e - Semantic Web

At the end of this course, a student will have developed ability to:

CO1	Understand the set of activities that concern the ontology development
CO2	Familiarize languages for semantic web and ontologies
CO3	Understand ontology-learning for semantic web
CO4	Introduce ontology management and familiarize to work with tools
CO5	Applications and security concepts of web services and semantic web services.

M.Sc. Computer Science

CSS4E04f - Advanced Java Programming

At the end of this course, a student will have developed ability to:

CO1	Understand the basics of RMI
CO2	Understand and Analyze Servlets
CO3	Familiarize JNDI and EJB architecture
CO4	Demonstrate JSP concepts and familiarize JSP technology
CO5	Familiarize Hibernate and ORM