Marathwada Mitramandal's College of Commerce

BSc (Computer Science)

Revised Syllabus from the Academic Year 2019 (New Syllabus) Choice Based Credit System.

PEO1 - PROFESSIONAL DEVELOPMENT
PEO2 - CORE PROFICIENCY
PEO3 - TECHNICAL ACCOMPLISHMENTS
PEO4 - PROFESSIONALISM
PEO5 - LEARNING ENVIRONMENT

Program outcomes (PO)

PO1 - To acquire knowledge of mathematics, statistics, electronics and computer science for analysing and solving real world problems under choice based credit system
PO2 - To build the necessary skill set for problem analysis.
PO3 - To develop designing skills and solutions as per requirement
PO4 - To learn the usability of techniques and skills of modern tools / software
PO5 - To inculcate professional and social responsibilities
PO6 - To understand the application of computer science in environment and sustainable development
PO7 - To apply professional ethics in work environment
PO8 - To gain inter disciplinary knowledge for entrepreneurship development
PO9 - To develop business communication skills for working with teams
PO10 - To prepare the necessary knowledge base for research and development in Computer Science

Program Specific outcome (PSO)

PSO1- Understand fundamentals of computer science like electronics, mathematics and statistics.
PSO2- Implement programming language and database concepts.
PSO3- Understand computer networks and security concepts
PSO4- Design and develop interdisciplinary software projects by applying concepts of software engineering
PSO5- To practice ability enhancement skills through web application development, mobile application development, analytical tools etc
PSO5-To be aware of communication and environmental sustainability.
PSO6-To develop skills required for electronics and software projects in multidisciplinary areas

Course Outcomes

> **Semester I :** This semester has Computer, Statistics, Mathematics and Electronics subjects. The course outcomes are given below.

Computer Subjects

CS111 : Problem Solving Using Computer and 'C' Programming - I

1. Explore algorithmic approaches to problem solving.
2. Develop modular programs using control structures and arrays in 'C'.

CS112 : Database Management Systems

1. Solve real world problems using appropriate set, function, and relational models.
2. Design E-R Model for given requirements and convert the same into database tables.
3. Use SQL.

CS113 : Practical course on Problem Solving using Computer and 'C' programming and Database Management Systems

1. Devise pseudo codes and flowchart for computational problems.
2. Write, debug and execute simple programs in 'C'.
3. Create database tables in postgreSQL.
4. Write and execute simple, nested queries.

Statistics Subjects

CSST111 : Statistics I - Descriptive Statistic
1. To learn about raw data and methods of handling it to get information
2. To understand data behavior and its relation to other data
3. To implement various techniques on data in real life situations

CSST112 : Statistics II - Mathematical Statistics
1. To review theory of probability and learn advanced theory of probability
2. To understand Continuous Random Variable and probability distributions
3. To learn Concepts and definitions related to standard discrete distribution

CSST113 : Statistics III - Statistics Practical
1. To tabulate and make frequency distribution of the given data.

2. To use various graphical and diagrammatic techniques and interpret.
3. To compute various measures of central tendency, dispersion, Skewness and kurtosis.
4. To fit the Binomial and Poisson distributions.
5. To compute the measures of attributes.
6. The process of collection of data, its condensation and representation for real life data.
7. To study free statistical softwares and use them for data analysis in project

Mathematics Subject

MTC111: Matrix Algebra

1. To get familiar with Matrix Operations
2. To know the system of Linear Equations
3. To get the basic knowledge of linear transformation
4. To learn the concept of determinants

MTC112: Discrete Mathematics

1. To revise the concepts of propositional Logic.
2. To learn the rules of Inference and validity
3. Indirect methods) Rules of Inference for Propositional Logic, Building Arguments.
4. To get more knowledge about Predicates and Quantification.

MTC113: Mathematics Practical based on the applications of articles in MTC-111 and MTC - 112)
3 written practical and 3 practical on maxima software for each paper MTC - 111 and MTC - 112.

Electronics Subject

ELC111 : Electronics I - Semiconductor Devices and Basic Electronic Systems

1. To study various types of semiconductor devices
2. To study elementary electronic circuits and systems

ELC112 : Electronics II - Principles of Digital Electronics

1. To get familiar with concepts of digital electronic
2. To learn number systems and their representation
3. To understand basic logic gates, Boolean algebra and K-maps
4. To study arithmetic circuits, combinational circuits and sequential circuits

ELC113 : Electronics III - Practical Course

The practical course consists of 10 experiments out of which two will be preparatory experiments.

Semester II

Computer Subjects

CS121 : Advanced 'C' Programming

1. Develop modular programs using control structures, pointers, arrays, strings and
2. structures
3. Design and develop solutions to real world problems using C.

CS122 : Relational Database Management Systems

1. Design E-R Model for given requirements and convert the same into database tables.
2. Use database techniques such as SQL & PL/SQL.
3. Explain transaction Management in relational database System.
4. Use advanced database Programming concepts

CS123 : Practical Course on Advanced 'C' Programming and Relational Database Management Systems

1. Write, debug and execute programs using advanced features in 'C'.
2. To use SQL & PL/SQL.
3. To perform advanced database operations.

Statistics Subjects

CSST121 : Statistics II - Methods of Applied Statistics
1. To study correlation for ungrouped data with its type and numerical problems.
2. To study concept of linear and non linear regression, multiple regression, partial correlation.
3. To study components, models and methods related to time series.

CSST122: Statistics II - Continuous Probability Distributions and Testing of Hypotheses
1. To study Standard Continuous Probability Distributions(uniform,normal,exponential)
2. To study Concepts and definitions related to testing of hypothesis.
3. To study parametric tests and simulation.

CSST123: Statistics II - Statistics Practical

1. To understand the relationship between two variables using scatter plot.
2. To compute coefficient of correlation, coefficient of regression.
3. To fit various regression models and to find best fit.
4. To fit the Normal distribution.
5. To understand the trend in time series and how to remove it.

Electronics Subject

ELC121: Electronics - Instrumentation System

1. To study Instrumentation System
2. To learn Sensors ,Actuators and their working
3. To study Smart Instrumentation System, Smart Sensors and OPAMP as signal Conditioner

ELC122 : Electronics - Basics of Computer Organisation

1. To study flip flop shift registers and counters.
2. To study basics of computer system and memory organization.

ELC123 : Electronics - Practical Course

The practical course consists of 10 experiments out of which one will be activity equivalent to practical.

Mathematics Subject

MTC121: Linear Algebra

1. To know the concepts about Vector spaces and subspaces
2. To get the knowledge of Null spaces, column spaces and linear transformations.
3. To get familiar with eign values and eigen vectos.
4. Learn the concepts of Geometry of vector spaces

MTC122: Graph Theory

1. To get familiar with the concepts of Graph Theory. Definitions Basic terminologies and properties of graph, Graph models.
2. To learn the concepts of connected graph, basic terminologies, properties and examples of directed graphs and types of diagraphs.
3. Some applications of special types of graph.
4. To know the concepts Tress and its real time applications.

MTC123: Mathematics Practical

4 written practical and 2 practical on maxima software for each paper MTC-121 and MTC-122.

Semester III

Computer Subjects

CS231 : Data Structures andAlgorithms – I
1. To use well - organized data structures in solving various problems.
2. To differentiate the usage of various structures in problem solutions.
3. Implementing algorithms to solve problems using appropriate data structures.

CS232 : Software Engineering
1. Compare and choose a process model for a software project development.
2. Identify requirements, analyze and prepare models.
3. Prepare the SRS, Design document, Project plan of a given software system.

CS233 : Practical course on CS 231 and CS 232
Programs should be done individually by the student using Linux editor like gedit and gcc

Mathematics Subject

MTC231 : Groups and Coding Theory

1. To study Euclid's Lemma
2. To study group theory

MTC232 : Numerical Techniques

1. To study Algebraic and Transcendental Equation
2. To study Calculus of Finite Differences and Interpolation
3. To study Numerical Integration

MTC233 : Mathematics Practical: Python Programming Language - I

1. To study Python and its features
2. To study numerical methods in Python

Electronics Subject

ELC231 : Microcontroller Architecture & Programming
1. To write programs for 8051 microcontroller
2. To interface I/O peripherals to 8051 microcontroller

3. To design small microcontroller based projects

ELC232 : Digital Communication and Networking

1. Define and explain terminologies of data communication
2. Understand the impact and limitations of various digital modulation techniques
3. To acknowledge the need of spread spectrum schemes.
4. Identify functions of data link layer and network layer while accessing communication link
5. To choose appropriate and advanced techniques to build the computer network

ELC233 : Practical Course I

1. To design and build his/her own microcontroller based projects.
2. To acquire skills of Embedded C programming
3. To know multiplexing and modulation techniques useful in developing wireless application
4. Do build and test own network and do settings.

AEC : English

1. To acquaint the students with the language skills in multivalent contexts
2. To acquaint and familiarize the students with soft skills
3. To minimize the gap between the existing communicative skills of the students and the skills they require at professional level

AECC : Environmental Science

1. To understand the multidisciplinary nature of environmental studies;
2. To acquire knowledge on ecosystems and natural resources
3. To learn the importance of biodiversity and conservation

Computer Subjects

CS241 : Data Structures and Algorithms – II
1. Implementation of different data structures efficiently
2. Usage of well - organized data structures to handle large amount of data
3. Usage of appropriate data structures for problem solving

CS242 : Computer Networks - I
1. Have a good understanding of the OSI and TCP/IP Reference Models and in particular have a good knowledge of Layers.
2. Understand the working of various protocols.
3. Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies

CS243 : Practical course on CS 241 and CS 242
Programs should be done individually by the student using Linux editor like gedit and gcc

Mathematics Subjects

MTC241 : Computational Geometry Paper II

1. To study one and two dimensional transformations
2. To study projection and curves

MTC242 : Operations Research Paper III

1. To study Linear Programming Problem I
2. To study assignment and transportation models

MTC243 Mathematics Practical: Python Programming Language - II

1. To study graph theory using Python
2. To study computational geometry using Python

Electronics Subjects

ELC241 : Embedded System Design

1. To understand the difference between general computing and the Embedded systems.
2. To know the fundamentals of embedded systems.

3. Understand the use of Single board Computer (Such as Raspberry Pi) for an embedded system application.
4. Familiar with the programming environment to develop embedded systems and their interfaces with peripheral devices.
5. To develop familiarity with tools used to develop in an embedded environment

ELC242 : Wireless Communication and Internet of Things

1. Know working of wireless technologies such as Mobile communication, GSM, GPRS
2. Become familiar with 3G and 4G Cellular Network Technologies for Data Connections.
3. Understand working principles of short range communication application
4. Get introduce to upcoming technology of Internet of Things
5. Explore themselves and develop new IoT based applications

ELC243 : Practical Course II

1. To design and develop own smart applications using Raspberry-Pi
2. To write Python program for simple applications
3. To build own IoT based system

AEC : English

1. To acquaint the students with the language skills in multivalent contexts
2. To acquaint and familiarize the students with soft skills
3. To minimize the gap between the existing communicative skills of the students and the skills they require at professional level

AECC : Environmental Science

1. To understand the multidisciplinary nature of environmental studies;
2. To acquire knowledge on ecosystems and natural resources
3. To learn the importance of biodiversity and conservation

Computer Subjects

CS-351 : Operating Systems – I

1. Processes and Thread Scheduling by operating system
2. Synchronization in process and threads by operating system
3. Memory management by operating system using with the help of various schemes

CS-352 : Computer Networks – II

1. Students will understand the different protocols of the Application layer.
2. Develop understanding of technical aspect of Multimedia Systems
3. Develop various Multimedia Systems applicable in real time.
4. Identify information security goals.
5. Understand, compare and apply cryptographic techniques for data security.

CS-353 : Web Technologies - I
1. Understand how to develop dynamic and interactive Web Page

CS-354 : Foundations of Data Science

1. Perform Exploratory Data Analysis Obtain, clean/process, and transform data.
2. Detect and diagnose common data issues, such as missing values, special values, outliers, inconsistencies, and localization.
3. Demonstrate proficiency with statistical analysis of data.
4. Present results using data visualization techniques.
5. Prepare data for use with a variety of statistical methods and models and recognize how the quality of the data and the means of data collection may affect conclusions.

CS - 355 : Object Oriented Programming using Java - I
1. Understand the concept of classes, object, packages and Collections.
2. To develop GUI based application.

CS - 356 : Theoretical Computer Science
1. Understand the use of automata during language design.

2. Relate various automata and Languages.

CS - 357 : Practical Course based on CS - 351

1. Process synchronization
2. Processes and Thread Scheduling by operating system
3. Memory management by operating system using with the help of various schemes

CS - 358 : Practical Course based on CS - 353 and CS - 354

1. Understand how to develop dynamic and interactive Web Page
2. Prepare data for use with a variety of statistical methods and recognize how the quality of the data may affect conclusions.
3. Perform exploratory data analysis

CS - 359 : Practical Course based on CS - 355

1. Use an integrated development environment to write, compile, run, and test simple object - oriented Java programs.
2. Read and make elementary modifications to Java programs that solve real - world problems.
3. Validate input in a Java program.

CS - 3510 : Python Programming

1. Develop logic for problem solving
2. Determine the methods to create and develop Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.
3. To be familiar with the basic constructs of programming such as data, operations, conditions, loops, functions etc.
4. To write python programs and develop a small application project

CS - 3511 : Blockchain Technology

1. Learn the fundamentals of Blockchain Technology.
2. Learn Blockchain programming
3. Basic knowledge of Smart Contracts and how they function.

Semester V

CS - 361 : Operating Systems - II

1. Management of deadlocks and File System by operating system

2. Scheduling storage or disk for processes
3. Distributed Operating System and its architecture and the extended features in mobile OS.

CS - 362 : Software Testing
1. To understand various software testing methods and strategies.
2. To understand a variety of software metrics, and identify defects and managing those defects for improvement in quality for given software.
3. To design test cases and test plans, review reports of testing for qualitative software.
4. To understand the latest testing methods used in the software industries.

CS - 363 : Web Technologies - II
1. Build a dynamic website using MVC based framework
2. To design and handle the errors in dynamic websites.

CS - 364 : Data Analytics
1. Use appropriate models of analysis, assess the quality of input, and derive insight from results.
2. Analyze data, choose relevant models and algorithms for respective applications
3. Understand different data mining techniques like classification, prediction, clustering and association rule mining
4. Apply modeling and data analysis techniques to the solution of real world business problems

CS - 365 : Object Oriented Programming using Java – II
1. To access open databases through Java programs using Java Data Base Connectivity (JDBC) and develop the application.
2. Understand and Create dynamic web pages, using Servlets and JSP.
3. Work with basics of framework to develop secure web applications.

CS - 366 : Compiler Construction
1. Understand the process of scanning and parsing of source code.
2. Learn the conversion code written in source language to machine language.
3. Understand tools like LEX and YACC.

CS - 367 : Practical Course based on CS - 361
1. Management of deadlocks by operating system
2. File System management
3. Disk space management and scheduling for processes

CS - 368 : Practical Course based on CS - 363 and CS - 364
1. Build a dynamic website using MVC based framework
2. To design and handle the errors in dynamic websites.

CS - 369 : Practical Course based on CS - 365
1. To Learn database Programming using Java

2. Understand and Create dynamic web pages using Servlets and JSP.
3. Work with basics of framework to develop secure web applications

CS - 3610 : Software Testing Tools
1. To understand various software testing methods and strategies.
2. To understand a variety of software metrics and identify defects and manage those defects for improvement in quality for given software.
3. To design test cases and test plans, review reports of testing for qualitative software.
4. To understand the latest testing tools used in the software industries.

CS - 3611 : Project
1. To apply software engineering, database concepts considering real world problems
2. To work as a team member for the successful completion of the project.