Karmaveer Bhaurao Patil University, Satara

Yashavantrao Chavan Institute of Science, Satara

(An Autonomous College)

M. Sc. (Computer Science)

Programme and Credit Structure as per NEP2020

Semester I

Course I

MCST411: Design & Analysis of Algorithms

Course Objectives: Student should able to...

1. To learn the algorithms and to learn basic analysis techniques and understand the use of asymptotic notation.
2. To understand different design strategies and greedy method.
3. To identify classical problem and solutions and learn a variety of useful algorithms
4. To understand classification of problems

Course Outcomes: Students should be able to...

1. Explain Algorithmic complexity and analysing the same
2. Develop an understanding of various techniques and methods to design algorithms
3. Make and apply the algorithm and solve real-world problems
4. Analyze traditional algorithms and apply to various problems.

Course II

MCST 412: Principles of Programming

Language Learning Course Objectives: Student will be able to...

1. To introduce and compare programming language designs
2. To learn new languages more quickly
3. To understand basic language implementation techniques
4. To learn small programs in different programming Languages

Course Outcomes: Students should be able to...

1. design and get knowledge of, and ability to use, language features used in current programming languages.
2. prepare student to think about programming languages analytically:
3. evaluate key concepts in the implementation of common features of programming languages.
4. implement object-oriented Programming concepts.

Semester I
Course III
MCST413: Advanced Database Management System

Course Objectives: Student will be able to...

1. To learn different types of databases.
2. To study of query languages and active databases.
3. To be familiar with the indexing techniques.
4. To learn how to solve complex and recursive queries.

Course Outcomes: Students should be able to...

1. Demonstrate the basics of query evaluation and heuristic query optimization techniques.
2. Apply concurrency control and recovery mechanisms for the desirable database problem.
3. Elaborate purpose of security details to database.
4. Design and implement the database system with the fundamental concepts of DBMS.

Semester I
Course IV
MCST414:E1: Advanced Computer Networks

Course Objectives: Student will be able to...

1. To understand the concept of security and its applications
2. To study of various detection and prevention techniques in diversified environments
3. To learn various vulnerabilities, threats and attacks
4. To introduce globally competent post graduates with enhanced domain knowledge and skills attaining professional excellence

Course Outcomes: Students should be able to...

1. Design and choose appropriate security model
2. Specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols.
3. Use specific frameworks as per applications need.
4. Evaluate working knowledge of datagram and internet.

Semester I
Course IV
MCST414:E2: Blockchain Technology

Course Objectives: Student will be able to...

1. To understand the history, types and applications of Blockchain
2. To acquire knowledge about cryptography and consensus algorithms.
3. To study of how to deploy projects using Web3
4. To identify the design blockchain based applications.

Course Outcomes: Students should be able to...

1. Discuss and describe the history, types and applications of Blockchain.
2. Explain familiarity with cryptography and Consensus algorithms.
3. Create and deploy projects using Web3j.
4. Implement an ICO on Ethereum

MCST 415: RESEARCH METHODOLOGY

Course Objectives: Student will be able to…

1. To study the basic knowledge on the fundamentals of research methodology.
2. To understand to present research in scientific manner.
3. To get acquainted with different statistical tools in modern research.
4. To understand the relationship between computational research.

Course Outcomes: Students should be able to...

1. Design a research plan.
2. Present research in scientific language.
3. Analyse research data employing computational tools.
4. Statistically signify the importance of research data.

M.Sc. Part-I, Sem.I
MCSP 416 Practical
(Based on MCST 411,412,413 courses)

Course Objectives: Student will be able to...

1. understand how to implement different algorithms.
2. use the basics of SQL and construct queries using SQL.
3. study the basics of Computer Networks
4. understand implementation of Object-Oriented concepts.

Course Outcomes: Students should be able to...

1. understand and implement different algorithms.
2. apply cryptographic algorithms of encryption and description
3. perform the programs on Classes and Objects to implement Object Oriented concepts.
4. study of cursor, trigger and database.

SEMESTER II
Course V
MCST 202: Python Programming

Course Objectives: Student will be able to...

1. understand of programming language paradigm.
2. introduce the file operations in python.
3. identify object oriented programming language python.
4. learn and implement database concepts in python

Course Outcomes: Students should be able to...

1. explain and use basics of Python
2. solve problems by using Python language.
3. evaluate projects by using Python Framework.
4. create application with help of python libraries.

Semester II
Course VI
MCST 422: Cloud Computing

Course Objectives: Student will be able to...

1. To study to appreciate the role of virtualization technologies
2. To identify design and deploy cloud infrastructure
3. To understand cloud security issues and solutions

Course Outcomes: Students should be able to...

1. Explain the fundamental principles of distributed computing.
2. Evaluate the distributed computing environments built from lower level services.
3. Design the importance of virtualization in distributed computing and enabled the development of cloud computing.
4. Analyse the performance of cloud computing.

Semester II
Course VII
MCST 423: Cyber Security and Laws

Course Objectives: Student will be able to …

1. study the concepts of Cyber Security
2. understand and defend computer systems and networks from cyber security attacks
3. introduce the cyber law and Rights in Cyberspace
4. identify Cyber Torts and Dispute Resolution in Cyberspace

Course Outcomes: Students should be able to...

1. realize the need for Cyber Security
2. explain the need for Security in day to day communications
3. analyze the cyber law and rights in cyberspace
4. evaluate Cyber Torts and Dispute Resolution in Cyberspace

SEMESTER -II
Course VIII
MCST 424: E1:Digital Image Processing

Course Objectives: Student will be able to…

1. learn the fundamental concepts of digital image processing.
2. study basic image processing operations.
3. understand image analysis algorithms.
4. identify current applications in the field of digital image processing.

Course Outcomes: Students should be able to...

1. evaluate fundamentals of Image Processing
2. analyse image segmentation and morphological operations.
3. develop and implement algorithms for digital image processing.
4. apply image processing algorithms for practical object recognition applications.

Semester II
Course IX
MCST424:E2: Mathematical and Statistical Foundation

Course Objectives: Student will be able to...

1. To introduce the notion of vector space.
2. To study of to work out algebra of linear transformations.
3. To identify the connection between linear transformation and matrices.
4. To learn eigen values, eigen vectors and its connection with real life situation.

Course Outcomes: Students should be able to...

1. Explain the concepts of basis and dimension of a vector space.
2. Designeigen values, eigen functions, characteristic polynomial of a matrix.
3. Analyse real world engineering problems by applying various statistical modeling techniques.
4. Implement model and solve computing problem using correlation, and resampling using appropriate statistics algorithms.

Semester II
MCSP 426- Practical Course
(Based on MCST 421,422,423 courses)

Course Objectives: Student will be able to...

1. To identify, read and write files in Python and use libraries of Python.
2. To understand the basics of images, image transforamtions,ImageColor Processing.
3. To learn system behavior based on the mathematical model of that system where the model may be expressed in time or frequency domain.
4. To study of the principles of best practice in cloud application design and management

Course Outcomes: Students should be able to...

1. Evaluate the fundamental principles of distributed computing.
2. Explain modelling of discrete systems in state space.
3. Predicts value of one variable when other is known by using technique of regression analysis.
4. Implement object-oriented concepts, implement database and GUI applications.

Semester III
MCST 531: Emerging Technologies

Course Objectives: Student should able to...

1. Learn the algorithms and to learn basic analysis techniques and understand the use of asymptotic notation.
2. Understand different design strategies and greedy method.
3. Identify classical problem and solutions and learn a variety of useful algorithms understand classification of problems.

Course Outcome: After completion of syllabus, student will be able to…

1. Get familiar with client-side JavaScript frameworks and the Angular framework.
2. Use various Angular features including directives, components, and services.
3. Implement a functional front-end web application using Angular.
4. Increase your rental capacity through innovative and independent learning

Semester III
MCST 532: Data Mining

Course Objectives: Student will be able to...

1) Understand the basics of Data Mining programming
2) Study facilities for performing data mining with Python packages
3) Learn python functionalities and features used for data mining
4) Explore Data analysis and Data Visualization using Python

Course Outcome: After completion of syllabus, student will be able to…

1. Implement data mining tasks using Python
2. Use the python packages to carry out data mining tasks.
3. Perform data analysis and data visualization using python packages.
4. Perform Cluster Analysis using python packages.

Semester III
MCST 533: Data Visualization using Tools

Course Objectives: Student will able to…

1) Understand and critically apply the concepts and methods of business analytics
2) Identify, model, and solve decision problems in different settings
3) Interpret results/solutions and identify appropriate courses of action for a given managerial situation whether a problem or an opportunity
4) Create viable solutions to decision making problems

Course Outcome: After completion of syllabus, student will be able to…

1. Identify and describe complex business problems in terms of analytical models.
2. Apply appropriate analytical methods to find solutions to business problems that achieve stated objectives.
3. Demonstrate ethical decision-making in structured or unstructured and ambiguous situations.
4. Communicate technical information to both technical and non-technical audiences in speech, in writing, and graphically.

Semester III
MCSET 534: Elective I Artificial Intelligence

Course Objectives: Student will able to…

1. Gain a historical perspective of AI and its foundations.
2. Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
3. Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
4. Experience AI development tools such as an „AI language", expert system shell, and/or data mining tool.

Course Outcome: After completion of syllabus, student will be able to…

1. Apply problem solving by intelligent search approach.
2. Represent knowledge using AI techniques.
3. Design Machine learning solution to real life problems and solutions to Uncertainty using Fuzzy Theory.
4. Define a NLP problem and find a suitable solution to it and to develop a good understanding of all.

Semester III
MCST 534: EII Fundamentals of IOT

Course Objectives: Student will be able to…

1. Study fundamental concepts of IoT
2. Understand roles of sensors in IoT
3. Study of different protocols used for IoT design
4. Understand data handling and analytics tools in IoT

Course Outcome: After completion of syllabus, student will be able to:

1. Understand the various concepts, terminologies, and architecture of IoT systems.
2. Use sensors and actuators for design of IoT.
3. Understand and apply various protocols for design of IoT systems
4. Use various techniques of data storage and analytics in IoT

Semester III
MCSP 535 Practical III
Emerging Technologies, Data Mining, Data Visualization using Tools
(Based on MCSP 531, 532, 533 courses)

Course Objectives: Student will be able to...

1. Understand how to implement different algorithms.
2. Use the basics of SQL and construct queries using SQL.
3. Study the basics of Computer Networks
4. Understand implementation of Object-Oriented concepts.

Course Outcomes: After completion of syllabus, student will be able to:

1. Understand and implement different algorithms.
2. apply cryptographic algorithms of encryption and description
3. Perform the programs on Classes and Objects to implement Object Oriented concepts.
4. Study of cursor,trigger and database

Semester IV

MCST 541: Big Data Analytics

Course Objectives: Student will be able to…

1. Understand the Big Data challenges & opportunities, its applications
2. study of concepts of map and reduce and functional programming
3. Understand conceptual understanding of Hadoop Distributed File System.
4. Understand the gap between academics and industry needs.

Course Outcomes: After completion of syllabus, student will be able to:

1. Understand the characteristics, applications of big data that make it useful to real-world problems.
2. Study of data using big data tools hadoop file system and predict outcomes to solve given problem.
3. Design various case studies using big data tools/commands andanalyse it.
4. Evaluate business cases.

Semester IV
MCST 542: Machine Learning

Course Objectives: Student will able to…

1. Understand the basic theory underlying machine learning.
2. Study of machine learning problems corresponding to different applications. 3. Understand a range of machine learning algorithms along with their strengths and weaknesses.
4. Study of machine learning algorithms to solve problems of moderate complexity.

Course Outcome: After completion of syllabus, student will be able to:

1. Analyse the basic principles, techniques, and applications of Artificial Intelligence.
2. Implement machine learning techniques and AI computing environment that are suitable for the applications under consideration.
3. Understand and apply scaling up machine learning techniques and associated computing techniques and technologies.
4. Use different machine learning techniques to design AI machine and enveloping applications for real world problems.

Semester IV
MCST 543: Deep Learning

Course Objectives: Student will be able to…

1. Understand the context of neural networks and deep learning
2. Study of how to use a neural network
3. Understand the data needs of deep learning
4. Study of working knowledge of neural networks and deep learning

Course Outcome: After completion of syllabus, student will be able to:

1. Understand the fundamental techniques and principles of Neural Networks
2. Apply the different models in ANN and their applications
3. Understand the concepts of deep learning with Convolution Neural Network case studies and Apply deep learning mechanisms to various learning problems. 4. Understand the open issues in deep learning, and have a grasp of the current research directions.

Semester IV
MCST 544 EI: Control Systems

Course Objectives: Student will be able to…

1. Study of systems theory to complex real-world problems to obtain models that are expressed using differential equations, transfer functions, and state space equations.
2. Understand system behavior based on the mathematical model of that system where the model may be expressed in time or frequency domain.
3. Study of the behavior of closed loop systems using various methods.
4. Understand controllers using classical PID methods, root locus methods, and frequency domain methods.

Course Outcome: After completion of syllabus, student will be able to:

1. Understand the modelling of discrete systems in state space
2. apply programming strategies in the domain of control systems
3. Understand the systems in Time and frequency domain.
4. Design modern control systems with computer simulation

Semester IV
MCST 544: EII: Microcontrollers and IOT

Course Objective: Student will be able to…

1. Understand hands-on experience using different IoT architectures.
2. Study of skills for interfacing sensors and actuators with different IoT architectures.
3. Study of data collection and logging in the cloud.
4. Understand Arduino Uno boards and programming

Course Outcome: After completion of syllabus, student will be able to:

1. Use Arduino Uno, NODE MCU 8266.
2. Use Raspberry PI along with critical protocols and its communication to cloud.
3. Apply commonly used IOT protocols such as REST API, MQTT through IOT based demonstration.
4. Solve analog sensor and digital sensor interfacing with IOT devices

MCSP 545: On Job Training (OJT) (4 Credits)

OJT will provide the opportunities for internship with local/regional industries,business organization, health and allied areas, local government, etc. so that students may actively engaged with the employability opportunities. Students will undergo 4 credit work based learning/OJT/internship. of Instrumental Analysis

Semester IV
MCSP 546 Practical IV
Big Data Analytics, Machine Learning and Deep Learning
(Based on MCSP 541, 542, 543 courses)

Course Objectives: Student will be able to…

1. Understand the context of neural networks and deep learning
2. Study of working knowledge of neural networks and deep learning
3. Understand the Big Data challenges & opportunities, its applications
4. Study of conceptual understanding of Hadoop Distributed File System.

Course Outcome: After completion of syllabus, student will be able to:

1. Understand the fundamental techniques and principles of Neural Networks
2. Study of different models in ANN and their applications
3. Apply deep learning mechanisms to various learning problems.
4. Understand the characteristics, applications of big data that make it useful toreal-world problems.