Shri Shivaji Education Society, Amravati's

SCIENCE COLLEGE

Congress Nagar, Nagpur - 440 012 (M.S.) INDIA

'A+' Grade with 3.51 CGPA in 3rd Cycle
College with Potential for Excellence
Recognised Centre for Higher Learning & Research
Institutional Member of APQN
A Mentor College under UGC PARAMARSH Scheme
An ISO 21001:2018 Certified Institution
NIRF 2024 Rank-band : 201-300

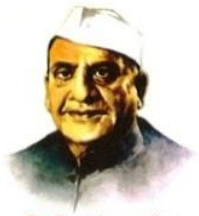
E-mail: shivajiscience_ngp@yahoo.com Web : www.sscnagpur.ac.in

Students Performance and Learning Outcomes

(PO, PSO and CO's)

Shri Shivaji Education Society, Amravati's
SCIENCE COLLEGE
Congress Nagar, Nagpur- 440 012 (M.S.) INDIA
• Tel : +91-712 - 2423432 (O) • Telefax : +91-712 - 2440955
• E-mail : shivajiscience_ngp@yahoo.com
• Web : www.sscnagpur.ac.in
Shri Harshvardhan P. Deshmukh
President
Dr. Omraj S. Deshmukh
Principal

- **'A+' Grade** with 3.51 CGPA (3rd Cycle) Reassessment College by NAAC, Bangalore
- **A College with Potential for Excellence** identified by UGC, New Delhi
- **Member, APQN** (Asia Pacific Quality Network)
- Recognized Centre for Higher Learning & Research
- Mentor College under 'Paramarsh Scheme' UGC, New Delhi
- An ISO 21001 : 2018 Certified Institution



Dr. Panjabrao alias Bhausaheb Deshmukh
Founder President

Program Outcomes, Program Specific Outcomes and Course Outcomes

For M.Sc. & MCA NEP (Effective from 2024-25)

Programme Outcomes (POs) and Course Outcomes (COs) for Computer Science Programmes offered by the institution

Shri Shivaji Education Society Amravati's

Science College, Congress Nagar, Nagpur

DEPARTMENT OF COMPUTER SCIENCE

PG COURSE

MASTER IN COMPUTER APPLICATIONS (MCA)

(2 Years)(CBCS)

Program Specific Outcomes: MCA

https://www.nagpuruniversity.ac.in/links/Syllabus/Faculty_of_Science/Notification_Direction_Syllabus_and_Program_Outcome_of_MCA_28122020.pdf

Department of Computer Science

After successful completion of two years MCA PG degree program, the students are able to:

Targeted Graduate Attributes: Disciplinary Knowledge, Critical Thinking, Problem Solving, Analytical Reasoning, Communication Skills, Teamwork, Moral and Ethical Awareness

Program Specific Outcomes

PSOl: Computational Knowledge: The students will be able to apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualisation of computing models from defined problems and requirements

PSO2: Problem Analysis: The students will be able to think critically for Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines

PSO3: Design /Development of Solutions: The students will be able to design and evaluate solutions for complex computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

PSO4: Conduct Investigations of Complex Computing Problems: The students will be able to use research-based knowledge and research methods including design of experiments, analysis and

interpretation of data, and synthesis of the information to provide valid conclusions, maintenance and its implementation

PSO5: Modern Tool Usage: The students will be able to create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.

PSO6: Professional Ethics: The students will be able to understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.

PSO7: Project management and finance: The students will be able to demonstrate knowledge and understanding of the computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Course Outcomes: Master in Computer Applications

MCA Semester-I

Course Name: Advanced Java Programming	CO1: Facilitates in understanding the concepts of object oriented programming. Skill Enhancing through concepts like multithreading, abstraction , platform independence
	CO2: Effective to implement platform independence, Applet programming
	CO3: JDBC Architecture and RMI programming
	CO4: Design Programs for JAVA Beans and Servlets
Course Name: Data Communication and Network	CO1: To understand and master the fundamentals of data communications through the knowledge of data transmission concepts, media used for data communication
	CO2: To know the different layer of OSI reference model
	CO3: To know the different network security algorithms
	CO4: To know the intrusion detection techniques and Authentication
Course Name: Open source Web Programming using PHP	CO1: To become familiar with client server architecture and able to develop a web application using various technologies.
	CO2: To understand and develop a web-based application using a framework concept
	CO3: To gain the skills and project-based experience needed for entry into web application and development careers

	CO4:	Web page development using PHP
Course Name: Advanced DBMS and Administration	CO1:	Can explore efficient method for handling multiple types of data
	CO2:	Have a detailed view of handling parallel and distributed database
	CO3:	Ability to normalize the database & understand the internal data structure
	CO4:	Deep visualization of realistic data into physical structure
Course Name: Software Engineering	CO1:	To Get detailed knowledge of role of software in daily basis
	CO2:	Student will be identifying different models and find out the best
	CO3:	Test the developed software for high performance and maintainability
	CO4:	Study the software measure parameters for software quality
Course Name:1P1 Practical-1	CO1:	Design and program stand-alone Java Applications
	CO2:	Useful in designing web and desktop applications
	CO3:	Analyse And Setup Protocol Designing Issues For Communication Networks
	CO4:	Web development using PHP
Course Name:1P2 Practical-2	CO1:	Facilitates in creation of Data Structures and effective management of Database
	CO2:	Ability to normalize the database & understand the internal data structure
	CO3:	To implement Software prototyping for better software development
	CO4:	To acquire skills to think about problems and solution using appropriate method

Course Outcomes: Master in Computer Applications

MCA Semester-II

Course Name: C# and ASP .NET	CO1:	To study simple C# program structure
	CO2:	To write C# program for classes, arrays, struct, array of objects
	CO3:	To understand ASP.NET structure
	CO4:	Error handling, Component based programming
Course Name: Cloud Computing	CO1:	To become familiar with Cloud Computing and its ecosystem and learn basics of virtualization and its importance.

	CO2:	To evaluate in-depth analysis of Cloud Computing capabilities and give technical overview of Cloud Programming and Services.
	CO3:	To understand security issues in cloud computing and exposed to Ubiquitous Cloud and Internet of Things
	CO4:	To understand emerging trends in cloud computing.
Course Name: Computer Graphics	CO1:	Provides user interfaces, data visualization, television commercials, motion pictures
	CO2:	Hardware devices and algorithms which are necessary for improving the effectiveness, realism, and speed of picture generation
	CO3:	Three dimensional graphic algorithm are incorporated in various streams to better simulate complex interactions
	CO4:	3-d transformations, b-spline surfaces, curves, and hidden surfaces can be explored
Course Name: CE1-1 (Elective) Computer Architecture and Organization	CO1:	To explore the fundamentals of Computer Architecture and Organization
	CO2:	To understand the design of control unit
	CO3:	To study the concepts of memory organization and to understand various memory technologies
	CO4:	To understand the concepts of input output processing to interface various I/O devices
Course Name: CE1-2 (Elective) Operation Research	CO1:	Understand LPP
	CO2:	Understand Transportation problem, assignment problem
	CO3:	Study of decision theory, CPM/PERT
	CO4:	Study of queuing Theory
Course Name: CE1-3 (Elective) Cyber Forensics	CO1:	Understand the different types of vulnerability scanning
	CO2:	To know the different network defense tools and web application tools
	CO3:	To understand the different types of cybercrimes and laws
	CO4:	To understand the different tools for cybercrime investigation
Course Name: Android Programming	CO1	Able to develop apps based on different types of menus
	CO2	Make decision to solve a problem using package, library and threads Handling Errors and Exceptions
	CO3	Ability to design and develop database applications

	CO4	Able to design and develop mobile applications works with internet applications
Course Name: 2P1 Practical-1	CO1:	To write C# program for classes, arrays, struct, array of objects
	CO2:	To write ASP.NET Programs and Component based programming
	CO3:	Study the common elements in user interfaces, data visualization, television commercials, motion pictures, and many other applications
	CO4:	Explore the algorithms necessary for basic transformation with respect to computer graphics
Course Name: 2P2 Practical-2	CO1:	Would gain the knowledge about inside of computer
	CO2:	Transportation problem, LPP problem, Inventory problem
	CO3:	To develop apps based on different types of menus
	CO4:	Design and develop mobile applications works with internet applications
Course Name: Project	CO1:	Select the topic for software development
	CO2:	Analysis and design of proposed system
	CO3:	Apply the known language for project programs
	CO4:	Combine the small program to make the integrated software

Course Outcomes: Master in Computer Applications

MCA Semester-III

Course Name: Big Data Analytics	CO1:	To know the structuring the big data, technology for handling the big data, Hadoop, Map Reduce.
	CO2:	To understand the big data technology foundation, Storing data in databases and data warehouses.
	CO3:	To get a basic understanding of R and the various ways to create scripts and programs in R and understand some of the key constructs in R for data handling.
	CO4:	To understand and appreciate how to summarize large volumes of data effectively by appropriate use of charts of different types.
Course Name: Data Mining	CO1:	To introduce the students, the basic concepts and techniques of Data mining and Warehousing and data pre-processing.
	CO2:	Understand association mining algorithms for discovery of frequent item patterns in large data sets and their Visualizations

	CO3:	Understand classification analysis algorithms for discovery and generation of rules in large data sets and their Visualizations
	CO4:	Understand basic and advanced clustering analysis algorithms and Visualizations in Data Mining.
Course Name: Python Programming	CO1:	Understand the data types and structures in python
	CO2:	Ability to understand object oriented programing concepts and write programs in python. Handling Errors and Exceptions
	CO3:	Ability to design and develop database applications
	CO4:	Web development using Python
Course Name: CE2-1 (Elective) Artificial Intelligence	CO1:	Understand the various underlying concepts in Artificial Intelligence. Acquire the knowledge of search techniques used in Artificial Intelligence
	CO2:	Acquire the concepts of knowledge representation
	CO3:	Analyze and design a real-world problem for implementation and understand the dynamic behavior of a system.
	CO4:	To understand NLP and Distributed reasoning system

Course Name: CE2-2 (Elective) Mobile Computing	CO1: Helps to understand the fundamental requirements for initiating an online business CO2: Helps in process of initiating and funding a start-up, e-Business or large projects CO3: Necessary to describe the issue and methods of transforming an organization into an e-business CO4: Provides deeper knowledge of mobile handheld devices, wireless mediums, palm OS, MANNET
Course Name: CE2-3 (Elective) Machine Learning	CO1: To understand the different machine learning methods CO2: To understand the Multilayer Perceptron, Back Propogation algorithm, Support Vector Machine CO3: To understand the machine learning with trees, different classifier CO4: To understand the concept of dimensionality reduction, Graphical Methods
Course Name: Soft Computing	CO1: To know the soft computing methodology, heuristic search techniques CO2: To understand the Neural Network structure, different types of leaning methods CO3: To understand the different methods of unsupervised learning CO4: To understand the concept of Fuzzification and defuzzification
Course Name: 3P1 Practical-1	CO1: Programs in R for data analysis and visualization CO2: Programming on classification, association and clustering algorithm CO3: Programming in python to design and develop database applications CO4: Programming in python for Web development
Course Name: 3P2 Practical-2	CO1: Programming for AI search techniques CO2: Programs on Mobile Computing CO3: Programs on Neural Network CO4: Programs on Fuzzification and defuzzification
Course Outcomes: Master in Computer Applications	
MCA Semester-IV	
Course Name: Project Work	CO1: To use the working knowledge in industry. CO2: To develop software in industry for various clients CO3: To gain awareness about ethical aspects and development work. CO4: Ability to plan and use adequate methods for software development

Head
Department of Computer Science
Professor & Head
Department of Computer Science
S.S.E.S. Amt's Science College,
Congress Nagar, Nagpur

Dr. A. A. Halder
IQAC Coordinator
S.S.E.S.A's
Science College, Nagpur

SEAL

Dr. O. S. Deshmukh
Principal
S.S.E.S. Amravati's
Science College, Nagpur.

Shri Shivaji Education Society Amravati's

Science College, Congress Nagar, Nagpur

PG COURSES

MASTER OF SCIENCE (M.Sc.) (CBCS)

❖ M.Sc. Computer Science

Program Outcomes: Master of Science (Computer Science) (CBCS)

https://www.nagpuruniversity.ac.in/pdf/Naac_Reports/programs_outcomes/MSc_Computer_Science_compressed_150620.pdf

M.Sc. Semester-I

Targeted Graduate Attributes: Disciplinary Knowledge, Critical Thinking, Problem Solving, Analytical Reasoning, Communication Skills, Teamwork, Moral and Ethical Awareness

	Program Outcomes
PSO1	The students will be able to develop aptitude to manifest a wide and extensive knowledge in the field of computer science.
PSO2	Ability to think critically for solving various problems and recent trends in computer softwares.
PSO3	The students will be capable of working effectively in diverse conditions as a team.
PSO4	The students will be able to develop skills in software design and its implementation.
PSO5	The students will be able to apply knowledge of computer science in academic and corporate sectors.
PSO6	The students will be able to develop self sustainability as well as competitiveness and employability.
PSO7	The students will be able to plan and write a research paper or proposal and assignment in computer science.

Course Outcomes: Master of Science (Computer Science) (CBCS)

Program Matrix

Name of Program: M.Sc. (Computer Science)

(Low Correlation = L/1 ; Moderate Correlation = M/2 ; High Correlation = H/3)

Course Outcomes (COs)		Program Outcomes (POs)						
		Domain Specific (PSO)				Domain Independent (PO)		
	Course Name: M.Sc.(Computer Science) - Semester I	1	2	3	4	5	6	7
	DISCRETE MATHEMATICAL STRUCTURE							
CO1	To able to specify and manipulate basic mathematical object	M	M	L	M	M	M	H
CO2	Very important to develop logic for the problem solving in the field of computer science.	H	H	M	H	M	M	H
CO3	Understand the basics of probability and number theory which is very important in problem solving.	M	H	M	H	M	M	H
CO4	Use effectively algebraic techniques to analyse basic discrete structures and algorithms	M	M	L	H	H	M	H
	PROGRAMMING IN JAVA							
CO1	Facilitates in understanding the concepts of object oriented programming	M	H	M	M	M	M	H
CO2	Effective to implement platform independence	H	H	H	H	H	H	H
CO3	Design Programs for RMI and JAVA Beans and Swings	H	M	M	M	H	H	H
CO4	Skill Enhancing through concepts like multithreading, abstraction , platform independence	H	H	H	H	H	H	H
	DIGITAL ELECTRONICS AND MICROPROCESSOR							
CO1	Learning to design various applications based on digital electronics	M	M	H	M	H	M	H
CO2	Developing assembly language programming skills	M	H	H	H	H	H	H
CO3	Learning to design various applications based on digital electronics	M	H	H	H	H	H	H

CO4	Developing assembly language programming skills	M	M	M	H	H	H	H
	ADVANCED DBMS & ADMINISTRATION							
CO1	Can explore efficient method for handling multiple types of data	M	M	H	H	H	H	M
CO2	Have a detailed view of handling parallel and distributed database	M	M	M	H	H	H	H
CO3	Ability to normalize the database & understand the internal data structure	M	H	H	M	H	H	H
CO4	Deep visualization of realistic data into physical structure	M	H	H	H	H	H	H
	PRACTICAL I							
CO1	Solve problems in theoretical computer science as it relies heavily on graphs and logic	M	H	H	H	M	M	H
C02	The students can imbibe the idea of proving programs correct through the use of discrete mathematic structure	M	H	M	M	M	M	H
C03	Useful in designing web and desktop applications	H	H	H	H	M	M	H
CO4	Design and program stand-alone Java Applications	H	H	M	H	M	M	H
	PRACTICAL II							
CO1	Learning to design various applications based on digital electronics	M	H	H	M	H	H	H
CO2	Developing assembly language programming skills	H	H	H	H	H	H	H
CO3	Facilitates in creation of Data Structures and effective management of Database	H	H	H	H	H	H	H
CO4	Ability to normalize the database & understand the internal data structure	H	H	H	H	H	M	H
	Course Name: M.Sc.(Computer Science) - Semester II							
	WINDOWS PROGRAMMING USING VC++							
CO1	Provides many tools for coding and debugging visual codes	M	H	H	M	M	M	H
CO2	Facilitates as a lightweight tool to edit your C++ files	H	M	H	M	M	M	H
CO3	Provides add-on features such as smart pointers, New Container, Polymorphism, Exception Handling etc	H	H	M	M	M	M	H
CO4	Encapsulates multiple applications and hence can make use of the package with installing it once	H	H	H	M	M	M	H
	THEORY OF COMPUTATION AND COMPILER CONSTRUCTION							

CO1	Analyze the behaviour of machines and how they solve a problem	M	H	H	H	M	H	H
CO2	Problems solving in many fields beside computer science such as physics, economy, biology etc	M	H	H	H	M	H	H
CO3	Would know program execution using lexical and syntactical analysis	M	H	H	H	H	H	H
CO4	Can correlate the working of compiler in program execution	M	H	H	H	H	H	H
	COMPUTER ARCHITECTURE AND ORGANIZATION							
CO1	To explore the fundamentals of Computer Architecture and Organization	H	H	M	H	H	H	H
CO2	To understand the design of control unit	M	H	M	H	H	M	H
CO3	To study the concepts of memory organization and to understand various memory technologies	H	M	M	H	H	M	H
CO4	To understand the concepts of input output processing to interface various I/O devices	H	M	M	H	H	H	H
	COMPUTER GRAPHICS							
CO1	Provides user interfaces, data visualization, television commercials, motion pictures	H	M	H	H	H	H	H
CO2	Hardware devices and algorithms which are necessary for improving the effectiveness, realism, and speed of picture generation	H	M	H	H	H	H	H
CO3	Three dimensional graphic algorithm are incorporated in various streams to better simulate complex interactions	H	H	H	H	M	H	H
CO4	3-d transformations, b-spline surfaces, curves, and hidden surfaces can be explored	H	H	H	H	H	M	H
	Practical I							
CO1	Helps to understand the nature of efficient computation	H	H	H	H	M	H	H
CO2	Facilitates in efficient problem solving	H	H	H	H	M	H	H
CO3	To understand the nature of efficient computation	H	M	M	H	H	M	H
CO4	Apply and redistribute runtime packages mostly installed for standard libraries that many applications use	M	M	M	H	H	H	M
	Practical II							
CO1	Would gain the knowledge about inside of computer	H	M	M	M	M	H	H
CO2	Develop the design concepts of latest processors	M	M	M	M	M	M	M

CO3	Study the common elements in user interfaces, data visualization, television commercials, motion pictures, and many other applications	H	H	H	H	H	H	H
CO4	Explore the algorithms necessary for basic transformation with respect to computer graphics	H	M	M	M	M	H	H
	COURSE NAME: M.SC.(COMPUTER SCIENCE) - SEMESTER III							
	DATA COMMUNICATION AND NETWORK							
CO1	To understand and master the fundamentals of data communications through the knowledge of data transmission concepts, media used for data communication	H	M	M	M	H	H	H
CO2	To compress the data, different compression algorithms used to optimize data transfer even if the network is congested	H	M	M	H	H	H	H
CO3	Various network routing algorithms, data link layer protocols are necessary to be understood while working on networking concepts	H	H	H	H	H	H	H
CO4	Exploring frequency and time division multiplexing techniques to share network bandwidth among multiple users are very necessary to be learnt	M	M	H	H	H	H	H
	SOFTWARE ENGINEERING							
CO1	To Get detailed knowledge of role of software in daily basis	H	H	H	H	H	H	H
CO2	Student will be identifying different models and find out the best	H	H	H	H	H	H	H
CO3	Test the developed software for high performance and maintainability	M	H	H	H	H	H	H
CO4	Study the software measure parameters for software quality	M	H	H	H	H	H	H
	CE1-1(ELECTIVE 1) NEURAL NETWORK							
CO1	Provides an understanding of underlying geometry of foundation Neural Network models	H	H	H	H	H	H	H
CO2	Helps in Neural Network algorithm along with an approach to neuro-science findings	H	H	H	H	H	H	H
CO3	Necessary for the research community around the world to realize the biological fidelity	H	H	H	H	H	H	H
CO4	Develop powerful computational models that has applications to vast number of disciplines	H	M	L	H	H	H	H
	CE1-2(ELECTIVE -2)MOBILE COMPUTING							
CO1	Helps to understand the fundamental requirements for initiating an online business	M	M	M	M	M	H	H

CO2	Helps in process of initiating and funding a start-up, e-Business or large e-projects	H	H	H	M	H	H	H
CO3	Necessary to describe the issue and methods of transforming an organization into an e-business	H	H	H	H	H	H	H
CO4	Provides deeper knowledge of mobile handheld devices, wireless mediums, palm OS, MANNET	H	M	M	H	H	H	H
	CE1-3 MULTIMEDIA TECHNOLOGIES							
CO1	Define multimedia to potential clients	M	M	M	M	M	H	H
CO2	Identify the basic components of a multimedia project	M	H	H	H	H	H	H
CO3	Identify the basic hardware and software requirements for multimedia development and playback	H	H	M	H	H	H	H
CO4	Identify and describe the function of the general skill sets in the multimedia industry	M	M	M	M	M	M	H
	CE1-4 ASP.NET							
CO1	Helps to create web form with server control	H	M	M	M	M	M	H
CO2	Separate page code from content by using code-behind pages, page controls, and Components	M	H	H	H	H	H	H
CO3	Display dynamic data from a data source by using Microsoft ADO.NET	M	M	M	M	M	H	H
CO4	Debug ASP.NET Pages by using trace	M	M	H	H	H	H	H
	CE1-5 DIGITAL AND CYBER FORENSICS							
CO1	Cite and adhere to the highest professional and ethical standards of conduct, including impartiality and the protection of personal privacy	M	M	H	M	H	H	H
CO2	Identify and document potential security breaches of computer data that suggest violations of legal, ethical, moral, policy	M	M	H	M	H	H	H
CO3	Work collaboratively with law enforcement to advance digital investigations or protect the security of digital resources	M	M	H	M	H	H	H
CO4	Access and critically evaluate relevant technical and legal information and emerging industry trends	H	M	H	M	H	H	H
	PRACTICAL V							
CO1	Analyse And Setup Protocol Designing Issues For Communication Networks	H	M	M	H	H	H	H

CO2	Estimate The congestion Control Mechanism to improve Quality Of Service of Networks	M	M	H	H	H	H	H
CO3	To implement Software prototyping for better software development	H	M	M	H	H	H	H
CO4	To acquire skills to think about problems and solution using appropriate method	H	H	H	H	H	H	H
	Practical VI							
CO1	To design neuro-biologically oriented models	H	M	M	H	H	H	H
CO2	To implement deep learning for solving real world problems	M	M	H	H	H	H	H
CO3	To train through hands-on on m-computing for ease of use	H	M	M	H	H	H	H
CO4	To secure digital documents through data hiding, water marks etc	H	H	H	H	H	H	H
	Course Name: M.Sc.(Computer Science) - Semester IV							
	DATA MINING							
CO1	Necessary to deal with explosive growth of the stored and transient data	H	M	H	M	H	H	H
CO2	Introduces new techniques and automated tools useful in transforming data into knowledge	H	M	H	H	H	H	H
CO3	Provides basic Techniques for OLAP & Data generalization	H	M	H	H	H	H	H
CO4	Helps to identify different cluster analysis techniques and advanced data mining techniques	H	M	H	H	H	H	H
	ARTIFICIAL INTELLIGENCE & EXPERT SYSTEM							
CO1	Explore AI problem solving techniques	H	M	H	M	H	H	H
CO2	Explore techniques knowledge representation in Machine	H	M	H	H	H	H	H
CO3	Helps in a deeper knowledge towards natural language processing, robotics	H	M	H	H	H	H	H
CO4	Necessary in decision making, problem solving, perception and understanding human communication	H	M	H	H	H	H	H
	CE2-1 DESIGN & ANALYSIS OF ALGORITHM							
CO1	Ability to analyze performance of algorithms	M	H	H	M	H	H	H
CO2	Choose appropriate algorithm for problem solving	M	H	H	M	H	H	H
CO3	Analyze worst-case running times of algorithms using asymptotic analysis	M	H	H	M	H	H	H
CO4	Analyze greedy algorithm and its applications, divide and conquer strategy	M	H	H	M	H	H	H
	CE2-2 EMBEDDED SYSTEM							
CO1	Helps to addresses the issue of the response time constrain of various tasks	M	H	H	H	H	H	H

CO2	Necessary for designing high performance response time constrained sophisticated systems	H	H	H	H	H	H	H
CO3	Helps to develop the systems that make optimum use of the available system resources: processor, memory	H	H	H	H	H	H	H
CO4	Employ the key concepts of embedded systems like sensors and actuators	M	H	H	H	H	H	H
	CE2-3 PATTERN RECOGNITION							
CO1	Apply performance evaluation methods for pattern recognition, and critique comparisons of techniques made in the research literature	H	M	H	M	H	H	H
CO2	Apply pattern recognition techniques to real-world problems such as document analysis and recognition	H	M	H	H	H	H	H
CO3	Implement simple pattern classifiers, classifier combinations, and structural pattern recognizers	H	M	M	M	H	H	H
CO4	Summarize, analyze, and relate research in the pattern recognition area verbally and in writing	M	L	M	M	M	M	H
	CE2-4 PARALLEL COMPUTING							
CO1	Introduces to various models of parallelism such as shared and distributed memory	H	H	H	M	M	H	H
CO2	Develop parallel computing solutions with respect to different mapping techniques	M	M	H	M	H	H	H
CO3	Helps in developing and implementing various routing mechanism necessary for parallel computing	M	M	H	M	H	H	H
CO4	Contribute as driving force in development of faster computers	H	M	H	M	H	H	H
	CE2-5 MOBILE & CYBER FORENSICS							
CO1	Introduces to Computer Forensics Fundamentals	H	H	H	H	H	H	H
CO2	Helps to analyze and explore different forensic technologies	H	M	H	H	M	H	H
CO3	Helps to identify methods of digital evidence preservation	H	M	H	H	M	H	H
CO4	Helps in exploring data recovery in mobile forensics	H	M	H	H	M	H	H
	PRACTICAL VII							
CO1	To implement standard data mining techniques and methods such as association rules, clustering techniques	H	H	H	H	H	H	H
CO2	To apply data mining techniques on datasets for realistic sizes using	H	H	H	H	H	M	h

	modern data analysis frameworks							
CO3	Implement microcontroller interfacing	H	H	M	M	M	H	H
CO4	To implement real time operating system using embedded	H	M	M	M	M	H	H
	PROJECT							
CO1	To display the working knowledge and skills to the industry	H	H	H	H	H	H	H
CO2	Deeper knowledge of methods in major field of study	H	H	H	H	H	H	H
CO3	To gain a consciousness of ethical aspects of research and development work	H	H	H	H	H	H	H
CO4	Capability to plan and use adequate methods to conduct qualified tasks in given frameworks and evaluate the work	H	H	H	H	H	H	H

Head
Department of Computer Science
Professor & Head
Department of Computer Science
S.S.E.S. Amt's Science College,
Congress Nagar, Nagpur

Dr. A. A. Halder
IQAC Coordinator
S.S.E.S.A's
Science College, Nagpur

SEAL

Dr. O. S. Deshmukh
Principal
S.S.E.S. Amravati's
Science College, Nagpur.

Shri Shivaji Education Society Amravati's

Science College, Congress Nagar, Nagpur

PG COURSES

MASTER OF SCIENCE (M.Sc.) (NEP) (Effective from 2023-24)

❖ M.Sc. Computer Science

Program Outcomes, Course Objectives & Outcomes:
M.Sc. Computer Science
(NEP) (Effective from 2023-24)

https://nagpuruniversity.ac.in/writereaddata/fckimagefile/MSC_Computer_Science_Syllabus_NEP_2020.pdf

Department of Computer Science	After successful completion of two year degree PG program in Computer Science, the students are able to:

PROGRAMME SPECIFIC OUTCOMES (PSOs)

1. The ability to apply theoretical foundations of Computer Science and problem-solving skills through programming techniques for complex real time problems using appropriate data structures and algorithms.
2. The ability to design/develop hardware and software interfaces along with database management to meet the needs of industry.
3. The ability to demonstrate personal, organizational and entrepreneurship skills through critical thinking, engage themselves in life-long learning by following innovations in business, science & technology
4. Ethics on Profession, Environment and Society: Exhibiting professional ethics to maintain the integrality in a working environment and also have concern on societal impacts due to computer-based solutions for problems.

M. Sc. (Computer Science)
Semester I

MCS1T01
Paper I : ARTIFICIAL INTELLIGENCE

Hours/Week : 4
Credits : 4

Course Objectives:
1. To impart artificial intelligence principles, techniques and its history.
2. To assess the applicability, strengths, and weaknesses of the basic knowledge representation, problem solving, and learning methods in solving engineering problems.
3. To develop intelligent systems by assembling solutions to concrete computational problems

Course Outcomes:
1. Evaluate Artificial Intelligence (AI) methods and describe their foundations.
2. Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation and learning.
3. Demonstrate knowledge of reasoning and knowledge representation for solving real world problems.
4. Analyze and illustrate how search algorithms and planning play vital role in problem solving.

M. Sc. (Computer Science)
Semester I

MCS1T02
Paper II : COMPILER CONSTRUCTION

Hours/Week : 4
Credits : 4

Course Objectives :
1. To gain knowledge on Language Processor.
2. Distinguish different computing models and classify their respective types
3. Show a competent understanding of the basic concepts of Syntax Analysis.

Course Outcomes :
1. Demonstrate the knowledge of Lexical Analysis
2. Derive an appropriate model of code generation.

M. Sc. (Computer Science)
Semester I

Elective 1 : MCS1T03
Paper III : COMPUTER ARCHITECTURE AND ORGANIZATION

Hours/Week : 4
Credits : 4

Course Objectives:
1. To provide knowledge on overview of IAS computer function and addressing modes.
2. Hardware and software implementation of arithmetic unit to solve addition, subtraction, multiplication and division.
3. To provide knowledge of memory technologies, interfacing techniques and sub system devices.

Course Outcomes:
1. Provide fundamentals on machine instructions and addressing modes.
2. Comprehend the various algorithms for computer arithmetic.
3. Analyse the performance of various memory modules in memory hierarchy.
4. Compare and contrast the features of I/O devices and parallel processors.
5. Outline the evaluation of memory organization.
6. Analyse the performance of Arithmetic logic unit, memory and CPU.

M. Sc. (Computer Science)
Semester I

Elective 1 : MCS1T03
Paper III : DISCRETE MATHEMATICAL STRUCTURE

Hours/Week : 4
Credits : 4

Course Objectives:
1 To cover certain sets, functions, relations and groups concepts for analyzing problems that arise in engineering and physical sciences.
2 To imparting to analyze the problems connected with combinatorics and Boolean algebra.
3 To solve calculus and integral calculus problems.

Course Outcomes:
1. Observe the various types of sets, functions and relations.
2. Understand the concepts of group theory.
3. Understand the concepts of combinatorics.
4. Understand the concepts of graph theory and its applications.
5. Learning logic and Boolean algebra. Using these concepts to solve the problems

M. Sc. (Computer Science)
Semester I

MCS1T04

Paper IV : RESEARCH METHODOLOGY

Hours/Week : 4
Credits : 4

Course Objectives:

1. To study and understand the research issues & challenges, research goals, scientific methods
2. To study processing and analysis of data, Quantitative and Qualitative data analysis.
3. Reviewing Literature and research papers, writing research papers, Thesis reports.

Course Outcomes:

1. The basic concept of research and its methodologies, Identify appropriate research topics, select and define appropriate research problem and parameters.
2. Prepare a project (to undertake a project)
3. Organize and conduct research in a more appropriate manner, writing research report and thesis.

M. Sc. (Computer Science)
Semester II

MCS2T05

Paper I : CLOUD COMPUTING

Hours/Week : 4
Credits : 4

Course Objectives:

1. To Understand fundamentals of cloud computing
2. To acquire good working knowledge of the essentials of Cloud Micro Services
3. To implement business specific cloud applications

Course Outcomes:

1. Analyze the trade-offs between deploying applications in the cloud and over the local infrastructure.
2. Compare the advantages and disadvantages of various cloud computing platforms.
3. Program data intensive parallel applications in the cloud.
4. Analyze the performance, scalability, and availability of the underlying cloud technologies and software.
5. Identify security and privacy issues in cloud computing.

M. Sc. (Computer Science)
Semester II

MCS2T06
Paper II : MACHINE LEARNING

Hours/Week : 4
Credits : 4

Course Objectives:
1. Ability to comprehend the concept of supervised and unsupervised learning techniques
2. Differentiate regression, classification and clustering techniques and to implement their algorithms.
3. To analyze the performance of various machine learning techniques and to select appropriate features for training machine learning algorithms.

Course Outcomes:
1. Understand the concepts of various machine learning strategies.
2. Handle computational data and learn ANN learning models.
3. Solve real world applications by selecting suitable learning model.
4. Boost the performance of the model by combining results from different approaches.

M. Sc. (Computer Science)
Semester II

Elective 2 : MCS2T07
Paper III : R PROGRAMMING

Hours/Week : 4
Credits : 4

Course Objectives:
1. This course introduces R, which is a popular statistical programming language.
2. The course covers data reading and its manipulation using R, which is widely used for data analysis. It also covers different control structures and design of user-defined functions. Loading, installing and building packages .

Course Outcomes :
1. Develop an R script and execute it
2. Install, load and deploy the required packages, and build new packages for sharing and reusability
3. Extract data from different sources using API and use it for data analysis
4. Visualize and summarize the data
5. Design application with database connectivity for data analysis

M. Sc. (Computer Science)
Semester II

Elective 2 : MCS2T07
Paper III : NEURAL NETWORK

Hours/Week : 4
Credits : 4

Course Objectives:

1. To introduce the foundations of Artificial Neural Networks
2. To learn various types of Artificial Neural Networks

Course Outcomes:

1. Ability to understand the concepts of Neural Networks.
2. Ability to select the Learning Networks in modeling real world systems

Head
Department of Computer Science

Professor & Head
Department of Computer Science
S.S.E.S. Amt's Science College,
Congress Nagar, Nagpur

Dr. A. A. Halder
IQAC Coordinator
S.S.E.S.A's
Science College, Nagpur

Dr. O. S. Deshmukh
Principal
S. S. E. S. Amravati's
Science College, Nagpur.