Programme Outcomes and Course Outcomes

Bachelor of Science in Computer Science (B.Sc.CS)

UTTAR BHARATIYA SANGH'S

MAHENDRA PRATAP SHARADA PRASAD SINGH COLLEGE OF ARTS, COMMERCE AND SCIENCE

(Affiliated to University of Mumbai) (COLLEGE CODE - 729)

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PROGRAMME NAME: B.Sc. Computer Science

B.Sc. Computer Science – PROGRAMME OUTCOMES

PO1. Develop a strong foundation in fundamental computer science concepts, algorithms, and programming languages.
PO2. Acquire proficiency in software engineering principles, including design, development, and testing of computer systems.
PO3. Demonstrate critical thinking and problem-solving skills in analysing and solving complex computing problems.
PO4. Gain expertise in database management, networking, and cybersecurity. Apply theoretical knowledge to practical situations through hands-on projects, fostering creativity and innovation in computing solutions.

B.Sc. Computer Science– PROGRAMME SPECIFIC OUTCOMES

PSO 1: Develop and analyse quality computer applications by applying knowledge of software engineering, algorithms, programming, databases, mathematical models, Artificial Intelligence and networking.

PSO 2: An ability to use current techniques, skills and tools for programming practically.

PSO 3: Capability of the students to apply design and development principles in the construction of software systems.

PSO 4: Ability to provide socially acceptable technical solutions in the domains of Information Security, Internet of Things and Embedded System, Infrastructure Services as specializations.

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COURSE OUTCOME FOR BACHELOR OF COMPUTER SCIENCE

F.Y.B.Sc. Computer Science – SEMESTER I

After completing the course, the learner will be able to:

COURSE NAME	COURSE CODE	COURSE OUTCOME
Digital System and Architecture	T - USCS101 P - USCSP101	CO 1. To learn about how computer systems work and underlying principles. CO 2. To understand the basics of digital electronics needed for computers CO 3. To understand the basics of instruction set architecture for reduced and complex instruction sets CO 4. To understand the basics of processor structure and operation and understand how data is transferred between the processor and I/O devices
Introduction to Programming with Python	P- USCS102 T- USCSP102	CO 1. To understand why Python is a useful scripting language for developers. CO 2. To learn how to design and program Python applications. CO 3. Analyse and Experiment to use lists, tuples, and dictionaries in Python programs. CO 4. Applying indexing and slicing to access data in Python.
LINUX Operating System	T- USCS103 P- USCPS103	CO 1. To learn use of various shell commands with regular expressions. CO 2. To set Linux Environment variables and learn setting file permissions to maintain Linux security implementation. CO 3. To learn various editors available in Linux OS. CO 4. To learn shell scripting.

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Open-Source Technologies	T-USCS104 P-USCSP104	CO 1. To Learn & Understand difference between open- source software and commercial software. CO 2. Evaluate the fundamental elements of policies, licensing procedures and ethics of FOSS. CO 3. To learn basic concepts of open-source philosophy, methodology and ecosystem. CO 4. Awareness with Open-Source Technologies CO 5. To learn installation of compilers and programming using C and Python languages on Linux platform
Discrete Mathematics	T- USCS105 P- USCSP105	CO 1. Solve problems in the engineering domain rule of discrete objects, starting with relations ordered sets. CO 2. Analysing and solving recurrence relations function and operations on them CO 3. Understanding of graphs and trees, which are widely software. CO 4. Solve engineering problems using automata theory and the corresponding formal languages.

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Descriptive Statistics	T- USCS106 P- USCSP106	CO 1. Understand how to describe the data with available. CO 2. Lew to present the data with a sun Main diagram. CO 3. Apply probability in real time situations and identify randomness in experiments. CO 4. Differentiate between types of random variables and its distributions. CO 5. Study the standard distributions and its properties.
Soft Skills Development	T- USCS107	CO 1. To know about various aspects of soft skills and learn ways to develop personality CO 2. Understand the importance and type of communication in personal and professional environment. CO 3. To provide insight into much needed technical and non-technical qualities in career planning. CO 4. Learn about Leadership, team building, decision making and stress management

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F.Y.B.Sc. Computer Science – SEMESTER II

After completing the course, the learner will be able to:

COURSE NAME	COURSE CODE	COURSE OUTCOME
Design & Analysis of Algorithms	T- USCS201 P- USCSP201	CO 1. To have a good working knowledge of the basic principles of algorithm design. CO 2. To give idea to students about the theoretical background of the basic data structures. CO 3. To familiarize the students with fundamental problem-solving strategies like searching, sorting, selection, recursion and help them to evaluate efficiencies of various algorithms. CO 4. To give knowledge of algorithm design paradigms and how they can be used to solve various real-world problems.
Advanced Python Programming	T- USCS202 P- USCSP202	CO 1. To understand how to read/write to files using python. CO 2. To catch their own errors that happen during execution of programs. CO 3. An introduction to the concept of pattern matching. CO 4. To get familiar with the concepts of GUI controls and designing GUI applications.
Introduction to OOPS using C++	T- USCS203 P- USCSP203	CO 1. To know about how to writeable to write, compile and debug programs in C++ language. CO 2. Understand how touse different data types in a computer program. CO 3. Understand the importance of OOP approach over procedural language and how to model classes relationships using UML.

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Database Systems	T- USCS204 P- USCSP204	CO 1. To appreciate the importance of database design. CO 2. Analyse database requirements and determine the entities involved in the system and their relationship to one another. CO 3. Write simple queries to MySQL related to String, Maths and Date Functions. Create tables and insert/update/delete data, and query data in a relational DBMS using MySQL commands. CO 4. Understand the normalization and its role in the database design process.
Calculus	T- USCS205 P- USCSP205	CO 1. Understanding of Mathematical concepts limit, continuity, derivative, integration of function. CO 2. Ability to appreciate real world applications uses these concepts. CO 3. Skill to formulate a problem through Mathematics modelling and simulation.
Statistical Methods	T- USCS206 P- USCSP206	CO 1. To make learner aware about basic probability axioms and rules and its application CO 2. To understand the concept of conditional probability and Independence of events. CO 3. To make learner familiar with discrete and continuous random variables as well as standard discrete and continuous distributions. CO 4. To learn computational skills to implement various statistical inferential approaches. CO 5. Calculate probability, conditional probability and

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		independence. Apply the given discrete and continuous distributions whenever necessary.
E-Commerce & Digital Marketing	T- USCS207	CO 1. To understand increasing significance of E- Commerce and its applications in Business and Various Sectors. CO 2. To provide an insight on Digital Marketing activities on various Social Media platforms and its emerging significance in Business. CO 3. To understand Latest Trends and Practices in E- Commerce and Digital Marketing, along with its Challenges and Opportunities for an Organization.

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S.Y.B.Sc. Computer Science – SEMESTER III

After completing the course, the learner will be able to:

Principles of Operating Systems	T- USCS301 P- USCSP301	CO 1. To learn basic concepts and structure of operating systems CO 2. To learn about process and synchronization in operating system level. CO 3. To learn CPU scheduling algorithms. CO 4. To learn Memory and File system management. CO 5. To get knowledge of to handle threads, processes, process synchronization.
Linear Algebra	T- USCS302 P- USCSP302	CO 1. To offer the learner the relevant Linear Algebra concepts through Computer Science applications. CO 2. To interpret existence and analyse the solution set of a system of linear equations. CO 3. To formulate, solve, apply, and interpret properties of linear systems. CO 4. To learn about the concept of linear independence of vectors over a field, and the dimension of a vector space
Data Structures	T- USCS303 P- USCSP303	CO 1. To introduce data abstraction and data representation in memory. CO 2. To describe, design and use of elementary data structures such as stack, queue, linked list, tree and graph.

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		CO 3. How and why different data structures are used for different types of problems.
Advance Database Concepts	T- USCS304 P- USCSP304	CO 1. To develop understanding of concepts and techniques for data management and learn about widely used systems for implementation and usage. CO 2. To develop understanding of Transaction management and crash recovery. CO 3. To develop concepts of programming concepts of database. CO 4. Learn about using PL/SQL for data management. CO 5. Understand concepts and implementations of transaction management and crash recovery.
Java Based Application Development	T- USCS305 P- USCSP305	CO 1. To provide insight into java-based applications using OOP concepts. CO 2. To provide understanding of developing GUI based desktop applications in java. CO 3. To provide knowledge of web-based applications through servlet and jsp. CO 4. To provide understanding and implementation of basic JSON.
Web Technologies	T- USCS306 P- USCSP306	CO 1. To Understand of Hyper Test Markup Language and Cascading

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		Style Sheets. CO 3. To learn JavaScript for dynamic website. CO 3. To learn various operations performed on data among web application using XML. CO 4. To learn Server-Side Programming using PHP.
Green Technologies	T- USCS307	CO 1. To Understand about Green IT Fundamentals: Business, IT, and the Environment, Green IT Strategies and Significance of Green IT Strategies. CO 2. To Understand Green Enterprise Architecture and Green Information Systems. CO 3. To Understand Sociocultural Aspects of Green IT and Green Compliance.

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S.Y.B.Sc. Computer Science – SEMESTER IV

After completing the course, the learner will be able to:

Theory of Computation	T- USCS401 P- USCSP401	CO 1. To give an overview of the theoretical foundations of computer science from the perspective of formal languages. CO 2. To illustrate finite state machines to solve problems in computing. CO 3. To explain the hierarchy of problems arising in the computer sciences. CO 4. Understand Grammar and Languages and learn about Automata theory and its application in Language Design. CO 5. Understand Linear Bound Automata and its applications
Computer Networks	T- USCS402 P- USCSP402	CO 1. To Understand Basic Concepts of Networking. CO 2. Give knowledge of introduction of computer networks, with a special focus on the Internet architecture and protocols. CO 3. To Understand Working of Network Layer Architecture. CO 4. To Learn Practical Implementation of Basic Routing Algorithms
Software Engineering	T- USCS403 P- USCSP403	CO 1. To learn and understand the Concepts of Software Engineering.

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		CO 2. To learn and understand Software Development Life Cycle. CO 3. To apply the project management and analysis principles to software project development. CO 4. To apply the design & testing principles to software project development.
IOT Technologies	T- USCS404 P- USCSP404	Understand the design & testing principles to software project development. 2. Interfacing various types of devices using different protocols with IOT. 3. Understand practical applications of IoT in real life world.
Android Application Development	T- USCS405 P- USCSP405	CO 1. To create robust mobile applications on simulators and physical devices. CO 2. Understanding how to create intuitive, reliable mobile apps using the android services and components. CO 3. To handle data local and remote data storage and create a seamless user interface that works with different mobile screens.
Advanced Application Development	T- USCS406 P- USCSP406	CO 1. To understand all the necessary and important technologies such as MongoDB, Express, AngularJS, and Node.js.

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		CO 2. To learn and understand Software Development Life Cycle. CO 3. To apply the project management and analysis principles to software project development. CO 4. To apply the design & testing principles to software project development.
IOT Technologies	T- USCS404 P- USCSP404	Understand the design & testing principles to software project development. 2. Interfacing various types of devices using different protocols with IOT. 3. Understand practical applications of IoT in real life world.
Android Application Development	T- USCS405 P- USCSP405	CO 1. To create robust mobile applications on simulators and physical devices. CO 2. Understanding how to create intuitive, reliable mobile apps using the android services and components. CO 3. To handle data local and remote data storage and create a seamless user interface that works with different mobile screens.
Advanced Application Development	T- USCS406 P- USCSP406	CO 1. To understand all the necessary and important technologies such as MongoDB, Express, AngularJS, and Node.js

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T.Y.B.Sc. Computer Science – SEMESTER V

After completing the course, the learner will be able to:

Artificial Intelligence	T- USCS501 P- USCSP501	CO 1. Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations. CO 2. Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning. CO 3. Demonstrate awareness and a fundamental understanding of various applications of AI.
Information and Network Security	T- USCS502 P- USCSP502	CO 1. Understand the principles and practices of cryptographic techniques. CO 2. Understand a variety of generic security threats and vulnerabilities, and identify & analyse particular security problems for a given application. CO 3. Understand various protocols for network security to protect against the threats in a network.
Software Testing & Quality Assurance	T- USCS5032 P- USCSP5032	CO 1. Understand various software testing methods and strategies. CO 2. Understand a variety of software metrics, and identify defects and managing those defects for improvement in quality for

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		given software. CO 3. Design SQA activities, SQA strategy, formal technical review report for software quality control and assurance.
Cyber Forensics	T- USCS5041 P- USCSP5041	CO 1. To understand Computer Forensics, Data encryption, Automated Search Techniques. CO 2. To know about Network Forensics and tracking network traffic. CO 3. To learn about Cell phone and Mobile Forensics. CO 4. To get to know about Internet Forensics, E-mail Forensics, Messenger Forensics: Yahoo Messenger, Social Media Forensics: Social Media Investigations Browser Forensics.
Project Management	T- USCS5051 P- USCS5051	CO1. Understand the fundamental concepts and characteristics of project management, including project selection, initiation, and project governance. CO 2. Develop skills in scope management, time management, cost management, quality management, and risk management to effectively plan and control projects. CO 3. Acquire knowledge of human resource management techniques, including team development.

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		conflict resolution, and communication management. CO 4. Gain insight into agile project management methodologies and tools, enabling the successful management of iterative and incremental development. CO 5. Explore advanced topics such as stakeholder management, project leadership, project governance, and the role of technology in project management.
Project Work-1	P- USCSP505	CO 1. To understand the building of real time projects. the actual work environment, CO 2. To understand the real time problems and problem-solving techniques of real time projects. CO 3. To build and develop deeper knowledge, understanding, capabilities and attitudes in the context of the programme of study.

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T.Y.B.Sc. Computer Science – SEMESTER VI

After completing the course, the learner will be able to:

Data Science	P- USCS601 T- USCSP601	CO 1. Understand the foundations and scope of Data Science, including its applications and comparison to related fields like Business Intelligence and Artificial Intelligence. CO 2. Develop skills in data preprocessing, including cleaning, transforming, selecting, and merging data, to ensure data quality and suitability for analysis. CO 3. Gain knowledge of machine learning algorithms and techniques, such as regression, classification, clustering, and ensemble learning, to build predictive models and make data-driven decisions.
Cloud Computing and Web Services	P- USCS602 T- USCSP602	CO 1. Understand the basics of cloud computing, including types of clouds, deployment models, and essential characteristics of cloud platforms. CO 2. Explore web services technologies such as SOAP and REST and understand their role in distributed computing and parallel computing. Gain proficiency in utilizing virtualization technologies, including creating virtual machines and managing virtualized environments using tools like KVM and Virt. CO 3. Explore and utilize popular cloud computing platforms, including OpenStack and AWS, to architect

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		deploy, and manage cloud-based applications and services. CO 4. Learn about cloud security fundamentals, including confidentiality, integrity, availability, and secure development practices.
Information Retrieval	T- USCS6032 P- USCSP6032	CO 1. To understand the fundamental principles and components of information retrieval systems. CO 2. To explore various techniques for document indexing, storage, and retrieval. CO 3. To analyse and compare different retrieval models and understand their strengths and limitations. CO 4. To gain practical experience in implementing and evaluating information retrieval systems.
Ethical Hacking	T- USCS6042 P- USCSP6042	CO 1. Understand the terminology and concepts related to ethical hacking and penetration testing. CO 2. Explore various hacking technologies and the skills required to become an ethical hacker. CO 3. Learn the different phases involved in ethical hacking and the methodologies used in penetration testing. CO 4. Gain knowledge of common hacking techniques, such as foot printing, scanning, enumeration, and session hijacking.
Customer Relationship Management	T- USCS6051 P- USCSP6051	CO 1. To understand the comprehensive understanding of CRM

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		concepts, theories, and models. CO 2. To equip students with the knowledge and skills to manage the customer journey, including customer acquisition and retention. CO 3. To explore the factors that contribute to customer-perceived value and the role of CRM in enhancing the customer experience. CO 4. To familiarize students with strategic and operational CRM approaches, including customer portfolio management and marketing automation.
Project Work – II	P- USCSP605	CO 1. To understand the building of real time projects. the actual work environment, real time problems and problem-solving techniques of real time projects. CO 2. To build and develop deeper knowledge, understanding, capabilities and attitudes in the context of the programme of study. CO 3. Evaluate different types of allocations on different platforms in different areas.

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