



J.S.M. COLLEGE, ALIBAG-RAIGAD

COMPUTER SCIENCE

**Programme outcome (POS)
Programme Specific Outcomes
(PSO)and Course Outcomes
(COS)**

Department of Computer Science

At the end of three year Bachelor of Computer Science, the students will be able:

PSO 1 To formulate, to model, to design solutions, procedure and to use software tools to solve real world problems.

PSO 2 To design and develop computer programs/computer -based systems in the areas such as networking, web design, security, cloud computing, IoT, data science and other emerging technologies.

PSO 3 To familiarize with the modern-day trends in industry and research based settings and thereby innovate novel solutions to existing problems.

PSO 4 To apply concepts, principles, and theories relating to computer science to new situations.

PSO 5 To use current techniques, skills, and tools necessary for computing practice

PSO 6 To apply standard Software Engineering practices and strategies in real-time software project development

PSO 7 To pursue higher studies of specialization and to take up technical employment.

PSO 8 To work independently or collaboratively as an effective team member on a substantial software project.

PSO 9 To communicate and present their work effectively and coherently.

PSO 10 To display ethical code of conduct in usage of Internet and Cyber systems.

PSO 11 To engage in independent and life-long learning in the background of rapid changing IT industry.

Course Outcomes

F.Y.B.Sc. C.S. Semester I		
Course Name	Course Number	Course Outcomes
Digital Systems & Architecture	C01	To learn about how computer systems work and underlying principles To understand the basics of digital electronics needed for computers
	C02	To understand the basics of instruction set architecture for reduced and complex instruction sets To understand the basics of processor structure and operation
	C03	To understand how data is transferred between the processor and I/O devices
Introduction to Programming with Python	C01	Ability to store, manipulate and access data in Python Ability to implement basic Input / Output operations in Python
	C02	Ability to define the structure and components of a Python program. Ability to learn how to write loops and decision statements in Python.

	C03	Ability to learn how to write functions and pass arguments in Python. Ability to create and use Compound data types in Python
LINUX Operating System	C01	Work with Linux file system structure, Linux Environment Handle shell commands for scripting, with features of regular expressions, redirections
	C02	Implement file security permissions Work with vi, sed and awk editors for shell scripting using various control structures
	C03	Install software like compilers and develop programs in C and Python programming languages on Linux Platform
Open Source Technologies	C01	Differentiate between Open Source and Proprietary software and Licensing.
	C02	Recognize the applications, benefits and features of Open-Source Technologies
	C03	Gain knowledge to start, manage open-source projects.
Discrete Mathematics	C01	Define mathematical structures (relations, functions, graphs) and use them to model real life situations. Understand, construct and solve simple mathematical problems.
	C02	Solve puzzles based on counting principles. Provide basic knowledge about models of automata theory and the corresponding formal languages.
	C03	Develop an attitude to solve problems based on graphs and trees, which are widely used in software.
Descriptive Statistics	C01	Organize, manage and present data.
	C02	Analyze Statistical data using measures of central tendency and dispersion. Analyze Statistical data using basics techniques of R.
	C03	4. Study the relationship between variables using techniques of correlation and regression.
Soft Skills	C01	Learners will be able to understand the importance and types soft skills
	C02	Learners will develop skills for Academic and Professional Presentations. Learners will able to understand Leadership Qualities and Ethics.
	C03	Ability to understand the importance of stress management in their academic & professional life.
F.Y.B.Sc. C.S. Semester II		
Design & Analysis of Algorithms	C01	Students should be able to understand and evaluate efficiency of the programs that they write based on performance of the algorithms used.

	C02	Students should be able to appreciate the use of various data structures as per need
	C03	To select, decide and apply appropriate design principle by understanding the requirements of any real life problems
Advanced Python Programming	C01	Ability to implement OOP concepts in Python including Inheritance and Polymorphism Ability to work with files and perform operations on it using Python.
	C02	Ability to implement regular expression and concept of threads for developing efficient program Ability to implement exception handling in Python applications for error handling.
	C03	Knowledge of working with databases, designing GUI in Python and implement networking in Python
Introduction to OOPs using C++	C01	Work with numeric, character and textual data and arrays.
	C02	Understand the importance of OOP approach over procedural language. Understand how to model classes and relationships using UML.
	C03	Apply the concepts of OOPS like encapsulation, inheritance and polymorphism. Handle basic file operations.
Database Systems	C01	To appreciate the importance of database design. Analyze database requirements and determine the entities involved in the system and their relationship to one another.
	C02	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
	C03	Understand the normalization and its role in the database design process. Handle data permissions. Create indexes and understands the role of Indexes in optimization search.
Calculus	C01	Develop mathematical skills and enhance thinking power of learners.
	C02	Understand mathematical concepts like limit, continuity, derivative, integration of functions, partial derivatives. Appreciate real world applications which uses the learned concepts.
	C03	Skill to formulate a problem through Mathematical modelling and simulation.
Statistical Methods	C01	Calculate probability, conditional probability and independence.

		Apply the given discrete and continuous distributions whenever necessary.
	C02	Define null hypothesis, alternative hypothesis, level of significance, test statistic and p value. Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases.
	C03	Apply non-parametric test whenever necessary. Conduct and interpret one-way and two-way ANOVA.
E-Commerce & Digital Marketing	C01	Understand the core concepts of E-Commerce. Understand the various online payment techniques
	C02	Understand the core concepts of digital marketing and the role of digital marketing in business. Apply digital marketing strategies to increase sales and growth of business
	C03	Apply digital marketing through different channels and platforms Understand the significance of Web Analytics and Google Analytics and apply the same.

S.Y.B.Sc. C.S. Semester III

Course Name	Course Number	Outcome
Principles of Operating Systems	C01	To provide a understanding of operating system, its structures and functioning
	C02	Develop and master understanding of algorithms used by operating systems for various purposes.
	C03	Understanding of algorithms used by operating systems for various purposes.
Linear Algebra	C01	Appreciate the relevance of linear algebra in the field of computer science.
	C02	Understand the concepts through program implementation
	C03	Install a computational thinking while learning linear algebra.
Data Structures	C01	To introduce data abstraction and data representation in memory graph
	C02	To describe, design and use of elementary data structures such as stack, queue, linked list, tree and
	C03	How and why different data structures are used for different types of problems.
Advanced Database Concepts	C01	To develop understanding of concepts and techniques for data management and learn about widely used systems for implementation and usage.
	C02	To develop understanding of Transaction management and crash recovery
	C03	To develop concepts of programming concepts of database.

Java based Application Development	C01	To provide insight into java based applications using OOP concepts. To provide understanding of developing GUI based desktop applications in java.
	C02	To provide knowledge of web based applications through servlet and jsp.
	C03	To provide understanding and implementation of basic JSON
Web Technologies	C01	To design valid, well-formed, scalable, and meaningful pages using emerging technologies.
	C02	Understand the various platforms, devices, display resolutions, viewports, and browsers that render websites To develop and implement client-side and server-side scripting language programs.
	C03	To develop and implement Database Driven Websites. Design and apply XML to create a markup language for data and document centric applications.
Green Technologies	C01	Know about Green IT Fundamentals: Business, IT, and the Environment
	C02	Green IT Strategies and Significance of Green IT Strategies Green Enterprise Architecture and Green Information Systems
	C03	Sociocultural Aspects of Green IT and Green Compliance
S.Y.B.Sc. C.S. Semester IV		
Theory of Computation	C01	Understand Grammar and Languages
	C02	Learn about Automata theory and its application in Language Design

	C03	Learn about Turing Machines and Pushdown Automata Understand Linear Bound Automata and its applications
Computer Networks	C01	Learner will be able to understand the concepts of networking, which are important for them to be known as a 'networking professionals'.
	C02	Useful to proceed with industrial requirements and International vendor certifications.
	C03	To learn network topologies
Software Engineering	C01	Plan a software engineering process life cycle, including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements
	C02	Analyze and translate a specification into a design, and then realize that design practically, using an appropriate software engineering methodology.
	C03	Know how to develop the code from the design and effectively apply relevant standards and perform testing, and quality management and practice Able to use modern engineering tools necessary for software project management, time management and software reuse.
IoT Technologies	C01	Enable learners to understand System On Chip Architectures.
	C02	Introduction and preparing Raspberry Pi with hardware and installation.
	C03	Learn physical interfaces and electronics of Raspberry Pi and program them using practical's Learn how to make consumer grade IoT safe and secure with proper use of protocols.
Android Application Development	C01	Understand the requirements of Mobile programming environment.
	C02	Learn about basic methods, tools and techniques for developing Apps Explore and practice App development on Android Platform

	C03	Develop working prototypes of working systems for various uses in daily lives.
Advanced Application Development	C01	To understand all the necessary and important technologies such as MongoDB, Express.js, AngularJS, and Node.js.
	C02	To understand modern app development using Flutter
	C03	Develop robust mobile applications using Flutter
Management & Entrepreneurship	C01	Understand the meaning of management, functions, administration and its process.
	C02	Understand the foundation of entrepreneurship and its theory, types and its process. Identify the steps involved in an entrepreneurial venture (SSI).
	C03	Understand an entrepreneur is converting his business ideas into running concern by selecting the project.

TYBSc CS Semm V		
USCS501 Artificial Intelligence	C01	After completion of this course, learner should get a clear understanding of AI and different search algorithms used for solving problems.
	C02	The learner should also get acquainted with different learning algorithms and models used in machine learning.
	C03	Artificial Intelligence (AI) and accompanying tools and techniques bring transformational changes in the world. Machines capability to match, and sometimes even surpass human capability, make AI a hot topic in Computer Science. This course aims to introduce the learner to this interesting area.
USCS502 Linux Server Administration	C01	Learner will be able to develop Linux based systems and maintain.
	C02	Learner will be able to install appropriate service on Linux server as per requirement.
	C03	Learner will have proficiency in Linux server administration.
USCS503 Software Testing and Quality Assurance	C01	Understand various software testing methods and strategies.
	C02	Understand a variety of software metrics, and identify defects and managing those defects for improvement in quality for given software.
	C03	Design SQA activities, SQA strategy, formal technical review report for software quality control and assurance
USCS504 Information and Network Security	C01	Understand the principles and practices of cryptographic techniques.
	C02	Understand a variety of generic security threats and vulnerabilities, and identify & analyze particular security problems for a given application.
	C03	Understand various protocols for network security to protect against the threats in a network
	C01	Learners are able to design & develop IoT Devices.

USCS505 Architecting of IoT	C02	They should also be aware of the evolving world of M2M Communications and IoT analytics.
USCS506 Web Services	C01	Emphasis on SOAP based web services and associated standards such as WSDL
	C02	Design SOAP based / RESTful / WCF services Deal with Security and QoS issues of Web Services
	C03	To understand WCF service. To design secure web services and QoS of Web Services
USCS507 Game Programming	C01	Learner should study Graphics and gaming concepts with present working style of developers where everything remains on internet and they need to review it, understand it, be a part of community and learn.
	C02	Along with the VR and AR they should also aware of GPU, newer technologies and programming using most important API for windows.
	C03	Learner should get the understanding computer Graphics programming using Directx or Opengl.
T.Y.B.Sc. C.S. Semester VI		
USCS601 Wireless Sensor Networks and Mobile Communication	C01	After completion of this course, learner should be able to list various applications of wireless sensor networks.
	C02	Describe the concepts, protocols, design, implementation and use of wireless sensor networks.
	C03	Implement and evaluate new ideas for solving wireless sensor network design issues.
USCS602 Cloud Computing	C01	After successfully completion of this course, learner should be able to articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing using open source technology.
	C02	Learner should be able to identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.

	C03	They should explain the core issues of cloud computing such as security, privacy, and interoperability.
USCS603 Cyber Forensics	C01	To understand the procedures for identification, preservation, and extraction of electronic evidence, auditing and investigation of network and host system intrusions, analysis and documentation of information gathered
	C02	The student will be able to plan and prepare for all stages of an investigation - detection, initial response and management interaction, investigate various media to collect evidence, report them in a way that would be acceptable in the court of law.
USCS604 Information Retrieval	C01	After completion of this course, learner should get an understanding of the field of information retrieval and its relationship to search engines.
	C02	It will give the learner an understanding to apply information retrieval models.
	C03	To provide an overview of the important issues in classical and web information retrieval.
USCS605 Digital Image Processing	C01	Learner should review the fundamental concepts of a digital image processing system.
	C02	Analyze the images in the frequency domain using various transforms.
	C03	Evaluate the techniques for image enhancement and image segmentation.
	C04	Apply various compression techniques. They will be familiar with basic image processing techniques for solving real problems.
USCS606 Data Science	C01	Understanding basic data science concepts. Learning to detect and diagnose common data issues, such as missing values, special values, outliers, inconsistencies, and localization.
	C02	Making aware of how to address advanced statistical situations, Modeling and Machine Learning.

	C03	After completion of this course, the students should be able to understand & comprehend the problem. To define suitable statistical method to be adopted.
USCS607 Ethical Hacking	C01	To understand the ethics, legality, methodologies and techniques of hacking.
	C02	Learner will know to identify security vulnerabilities and weaknesses in the target applications
	C03	To test and exploit systems using various tools and understand the impact of hacking in real time machines.

In-Charge
Computer Science