# COMPUTER SCIENCE

## FYBSc Sem I

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| 1 | **USCS 101 Computer Organization and Design** | **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 |
| | | **CO 5** | To understand how data is transferred between the processor and I/O devices |
| 2 | **USCS 102 Programming with Python- I** | **CO 1** | Students should be able to understand the concepts of programming before actually starting to write programs. |
| | | **CO 2** | Students should be able to develop logic for Problem Solving. |
| | | **CO 3** | Students should be made familiar about the basic constructs of programming such as data, operations, conditions, loops, functions etc. |
| | | **CO 4** | Students should be able to apply the problem solving skills using syntactically simple language i.e. **Python (version: 3.X or higher)** |
| 3 | **USCS 103 Free and Open-source Software** | **CO 1** | Upon completion of this course, students should have a good working knowledge of Open Source ecosystem, its use, impact and importance |
| | | **CO 2** | This course shall help student to learn Open Source methodologies, case studies with real life examples. |
| 4 | **USCS 104 Database Systems** | **CO 1** | Students should be able to evaluate business information problem and find the requirements of a problem in terms of data. |
| | | **CO 2** | Students should be able to design the database schema with the use of appropriate data types for storage of data in database. |
| | | **CO 3** | Students should be able to create, manipulate, query and back up the databases. |
| 5 | **USC 105 Discrete Mathematics** | **CO 1** | To provide overview of theory of discrete objects, starting with relations and partially ordered sets. |
| | | **CO 2** | Study about recurrence relations, generating function and operations on them. |

| | | CO 3 | Give an understanding of graphs and trees, which are widely used in software. |
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| | | CO 4 | Provide basic knowledge about models of automata theory and the corresponding formal languages. |
| 6 | **USCS 106 Descriptive Statistics and Introduction to Probability** | CO 1 | Enable learners to know descriptive statistical concepts |
| | | CO 2 | Enable study of probability concept required for Computer learner |
| 7 | **USCS 107 Soft Skills Development** | 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 . |

**FYBSc Sem II**

| | | CO 1 | Students should be able to write, compile and debug programs in C language |
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| 1 | **USCS 201 Programming with C** | CO 2 | Students should be able to use different data types in a computer program |
| | | CO 3 | Students should be able to design programs involving decision structures, loops and functions. |
| | | CO 4 | Students should be able to explain the difference between call by value and call by reference . |
| | | CO 5 | Students should be able to understand the dynamics of memory by the use of pointers. |
| | | CO 6 | Students should be able to use different data structures and create/update basic data files. |
| 2 | **USCS 202 Programming with Python – II** | CO 1 | Students should be able to understand how to read/write to files using python. |
| | | CO 2 | Students should be able to catch their own errors that happen during execution of programs. |
| | | CO 3 | Students should get an introduction to the concept of pattern matching. |
| | | CO 4 | Students should be made familiar with the concepts of GUI controls and designing GUI applications. |

| | | CO 5 | Students should be able to connect to the database to move the data to/from the application. |
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| | | CO 6 | Students should know how to connect to computers, read from URL and send email. |
| 3 | **USCS 203 Linux** | CO 1 | Upon completion of this course, students should have a good working knowledge of Linux, from both a graphical and command line perspective, allowing them to easily use any Linux distribution. |
| | | CO 2 | This course shall help student to learn advanced subjects in computer science practically. |
| | | CO 3 | Student shall be able to progress as a Developer or Linux System Administrator using the acquired skill set. |
| 4 | **USCS 204 Data Structures** | CO 1 | Learn about Data structures, its types and significance in computing . |
| | | CO 2 | Explore about Abstract Data types and its implementation . |
| | | CO 3 | Ability to program various applications using different data structure in Python. |
| 5 | **USCS 205 Calculus** | CO 1 | Understanding of Mathematical concepts like limit, derivative, integration of functions |
| | | CO 2 | Ability to appreciate real world applications which uses these concepts. |
| | | CO 3 | Skill to formulate a problem through Mathematical modeling and simulation. |
| 6 | **USCS 206 Statistical Methods and Testing of Hypothesis** | CO 1 | Enable learners to know descriptive statistical concepts |
| | | CO 2 | Enable study of probability concept required for Computer learners |
| 7 | **USCS 207 Green Technologies** | CO 1 | Learn about green IT can be achieved in and by hardware, software, network communication and data center operations. |
| | | CO 2 | Understand the strategies, frameworks, processes and management of green IT. |

**SYBSc Sem III**

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| 1 | **USCS 301 Theory of Computation** | **CO 1** | Understand Grammar and Languages |
| | | **CO 2** | Learn about Automata theory and its application in Language Design |
| | | **CO 3** | Learn about Turing Machines and Pushdown Automata |
| | | **CO 4** | Understand Linear Bound Automata and its applications |
| 2 | **USCS 302 Core Java** | **CO 1** | Object oriented programming concepts using Java |
| | | **CO 2** | Knowledge of input, its processing and getting suitable output. |
| | | **CO 3** | Understand, design, implement and evaluate classes and applets. |
| | | **CO 4** | Knowledge and implementation of AWT package. |
| 3 | **USCS 303 Operating System** | **CO 1** | To provide a understanding of operating system, its structures and functioning. |
| | | **CO 2** | Develop and master understanding of algorithms used by operating systems for various purposes |
| 4 | **USCS 304 Database Management Systems** | **CO 1** | Master concepts of stored procedure and triggers and its use |
| | | **CO 2** | Learn about using PL/SQL for data management |
| | | **CO 3** | Understand concepts and implementations of transaction management and crash recovery. |
| 5 | **USCS 305 Combinatorics and Graph Theory** | **CO 1** | Appreciate beauty of combinatorics and how combinatorial problems naturally arise in many settings. |
| | | **CO 2** | Understand the combinatorial features in real world situations and Computer Science applications. |
| | | **CO 3** | Apply combinatorial and graph theoretical concepts to understand Computer Science concepts and apply them to solve problems |
| 6 | **USCS 306 Physical Computing and IoT Programming** | **CO 1** | Enable learners to understand System On Chip Architectures |
| | | **CO 2** | Introduction and preparing Raspberry Pi with hardware and installation |
| | | **CO 3** | Learn physical interfaces and electronics of Raspberry Pi and program them using practicals |
| | | **CO 4** | Learn how to make consumer grade IoT safe and secure with proper use of protocols. |
| 7 | **USCS 307** | **CO 1** | To design valid, well-formed, scalable, and |

| | **Web Programming** | | meaningful pages using emerging technologies |
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| | | **CO 2** | Understand the various platforms, devices, display resolutions, viewports, and browsers that render websites |
| | | **CO 3** | To develop and implement client-side and server-side scripting language programs. |
| | | **CO 4** | To develop and implement Database Driven Websites. |
| | | **CO 5** | Design and apply XML to create a markup language for data and document centric applications. |

## SYBSc Sem IV

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| 1 | **USCS 401 Fundamentals of Algorithms** | **CO 1** | Understand the concepts of algorithms for designing good program |
| | | **CO 2** | Implement algorithms using Python |
| 2 | **USCS 402 Advanced Java** | **CO 1** | Understand the concepts related to Java Technology |
| | | **CO 2** | Explore and understand use of Java Server Programming |
| 3 | **USCS 403 Computer Networks** | **CO 1** | Learner will be able to understand the concepts of networking, which are important for them to be known as a *'networking professionals'*. |
| | | **CO 2** | Useful to proceed with industrial requirements and International vendor certifications. |
| 4 | **USCS 404 Software Engineering** | **CO 1** | Learner will learn to become effective team members, aware of cultural diversity, who conduct themselves ethically and professionally. |
| | | **CO 2** | Learner use effective communication skills and technical skills to assure production of quality software, on time and within budget. |
| | | **CO 3** | Learner build upon and adapt knowledge of science, mathematics, and engineering to take on more expansive tasks that require an increased level of self-reliance, technical expertise, and leadership. |
| 5 | **USCS 405 Linear Algebra using Python** | **CO 1** | Appreciate the relevance of linear algebra in the field of computer science |
| | | **CO 2** | Understand the concepts through program implementation |
| | | **CO 3** | Instill a computational thinking while learning linear algebra |

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| 6 | **USCS 406 .Net Technologies** | **CO 1** | Understand the .NET framework |
| | | **CO 2** | Develop a proficiency in the C# programming language |
| | | **CO 3** | Proficiently develop ASP.NET web applications using C# |
| | | **CO 4** | Use ADO.NET for data persistence in a web application |
| 7 | **USCS 407 Android Developer Fundamentals** | **CO 1** | Understand the requirements of Mobile programming environment. |
| | | **CO 2** | Learn about basic methods, tools and techniques for developing Apps |
| | | **CO 3** | Explore and practice App development on Android Platform. |
| | | **CO 4** | Develop working prototypes of working systems for various uses in daily lives. |

## TYBSc Sem V

| 1 | USCS 501 Artificial Intelligence | CO 1 | After completion of this course, learner should get a clear understanding of AI and different search algorithms used for solving problems. |
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| | | CO 2 | The learner should also get acquainted with different learning algorithms and models used in machine learning. |
| 2 | USCS 503 Software Testing and Quality Assurance | 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 given software. |
| | | CO 3 | Design SQA activities, SQA strategy, formal technical review report for software quality control and assurance. |
| 3 | USCS 504 Information and Network Security | CO 1 | Understand the principles and practices of cryptographic techniques. |
| | | CO 2 | Understand a variety of generic security threats and vulnerabilities, and identify & analyze particular security problems for a given application. |
| | | CO 3 | Understand various protocols for network security to protect against the threats in a network. |
| 4 | USCS 506 Web Services | CO 1 | Emphasis on SOAP based web services and associated standards such as WSDL. |
| | | CO 2 | Design SOAP based / RESTful / WCF services Deal with Security and QoS issues of Web Services. |
| 5 | USCS 507 Game Programming | CO 1 | Learner should study Graphics and gamming 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. |

## TYBSc Sem VI

| 1 | USCS 601 Wireless Sensor Networks and Mobile Communication | CO 1 | After completion of this course, learner should be able to list various applications of wireless sensor networks, describe the concepts, protocols, design, implementation and use of wireless sensor networks. |
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| | | CO 2 | Also implement and evaluate new ideas for solving wireless sensor network design issues. |

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| 2 | **USCS 602 Cloud Computing** | **CO 1** | 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. |
| | | **CO 2** | Learner should be able to identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc. |
| | | **CO 3** | They should explain the core issues of cloud computing such as security, privacy, and interoperability. |
| 3 | **USCS 604 Information Retrieval** | **CO 1** | After completion of this course, learner should get an understanding of the field of information retrieval and its relationship to search engines. |
| | | **CO 2** | It will give the learner an understanding to apply information retrieval models. |
| 4 | **USCS 606 Data Science** | **CO 1** | After completion of this course, the students should be able to understand & comprehend the problem; and should be able to define suitable statistical method to be adopted. |
| 5 | **USCS 607 Ethical Hacking** | **CO 1** | Learner will know to identify security vulnerabilities and weaknesses in the target applications. |
| | | **CO 2** | They will also know to test and exploit systems using various tools and understand the impact of hacking in real time machines. |