

DEPARTMENT OF COMPUTER SCIENCE

F.Y. B.Sc. Year 2016-17

PROGRAM OUTCOMES:

The core philosophy of overall syllabus is to -

- Form strong foundation of Computer science,
- Introduce emerging trends to the students in gradual way,
- Groom the students for the challenges of ICT industry

PROGRAM SPECIFIC OUTCOMES

- In the first year i.e. for semester I & II, the basic foundation of important skills required for software development is laid. The syllabus proposes to have four core subjects of Computer science and two core courses of Mathematics-Statistics. All core subjects are proposed to have theory as well as practical tracks. While the Computer Science courses will form fundamental skills for solving computational problems, the Mathematics & Statistics course will inculcate research- oriented acumen.
- The syllabus design for further semesters encompasses more advanced and specialized courses of Computer Science. Student taking this course will get a very strong foundation and exposure to basics, advanced and emerging trends of the subject.

Course outcomes for all Courses: SEMESTER -I

Course Code: USCS101	Course Name : Computer Organization and Design
Objective	To understand the structure and operation of modern processors and their instruction sets
UNIT	Course Outcome <ul style="list-style-type: none">After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none">To learn about how computer systems work and underlying principles.To understand the basics of digital electronics needed for computers.
UNIT-II	<ul style="list-style-type: none">To understand the basics of instruction set architecture for reduced and complex instruction sets.To understand the basics of processor structure and operation.

UNIT-III	<ul style="list-style-type: none"> To understand how data is transferred between the processor and I/O devices
Course Code: USCS102	Course Name : Programming with Python- I
Objective	The objective of this paper is to introduce various concepts of programming to the students using Python.
UNIT	Course Outcome After successful completion of course students will be :
UNIT – I	<ul style="list-style-type: none"> Students should be able to understand the concepts of programming before actually starting to write programs. Students should be able to develop logic for Problem Solving.
UNIT-II	<ul style="list-style-type: none"> Students should be made familiar with the basic constructs of programming such as data, operations, conditions, loops, functions etc.
UNIT-III	<ul style="list-style-type: none"> Students should be able to apply the problem solving skills using syntactically simple language i.e. Python (version: 3.X or higher)

Course Code: USCS103	Course Name : Free and Open-source Software
Objective	Open Source has acquired a prominent place in the software industry. Having knowledge of Open Source and its related technologies is an essential for Computer Science students. This course introduces Open Source methodologies and ecosystems to students.
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none"> Upon completion of this course, students should have a good working knowledge of the Open Source ecosystem, its use, impact and importance.
UNIT-II	<ul style="list-style-type: none"> This course shall help students to learn Open Source methodologies, case studies with real life examples.
UNIT-III	<ul style="list-style-type: none"> Understand the ecosystem, operating systems, hardware and technologies related to open source software.

Course Code: USCS104	Course Name : Database System
Objective	The objective of this course is to introduce the concept of the DBMS with respect to the relational model, to specify the functional and data requirements for a typical database application and to understand creation, manipulation and querying of data in databases
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none"> Students should be able to evaluate business information problems and find the requirements of a problem in terms of data.
UNIT-II	<ul style="list-style-type: none"> Students should be able to design the database schema with the use of appropriate data types for storage of data in the database.
UNIT-III	<ul style="list-style-type: none"> Students should be able to create, manipulate, query and back up the databases.

Course Code: USCS105	Course Name : Discrete Mathematics
Objective	The purpose of the course is to familiarize the prospective learners with mathematical structures that are fundamentally discrete. This course introduces sets and functions, forming and solving recurrence relations and different counting principles. These concepts are useful to study or describe objects or problems in computer algorithms and programming languages.
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none"> To provide an overview of the theory of discrete objects, starting with relations and partially ordered sets. Study about recurrence relations, generating function and operations on them.
UNIT-II	<ul style="list-style-type: none"> Give an understanding of graphs and trees, which are widely used in software.
UNIT-III	<ul style="list-style-type: none"> Provide basic knowledge about models of automata theory and the corresponding formal languages.

Course Code: USCS106	Course Name : Descriptive Statistics and Introduction to Probability
Objective	The purpose of this course is to familiarize students with the basics of Statistics. This will be essential for prospective researchers and professionals to know these basics.
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none"> • Enable learners to know descriptive statistical concepts
UNIT-II	<ul style="list-style-type: none"> • Enable study of probability concept required for Computer learners
UNIT-III	<ul style="list-style-type: none"> • Understand and solve problems based on Probability and operations of events. • Get the knowledge of Probability definition and Elementary Theorems of probability.

Course Code: USCS107	Course Name : Soft Skills Development
Objective	To help learners develop their soft skills and develop their personality together with their technical skills. Developing professional, social and academic skills to harness n strengths, capabilities and knowledge equip them to excel in real whidden environment ork and corporate life. Understand various issues in personal and pro fashion communication and learn to overcome them.
UNIT	Course Outcome After successful completion of course students will be
UNIT – I	<ul style="list-style-type: none"> • To know about various aspects of soft skills and learn ways to develop personality.
UNIT-II	<ul style="list-style-type: none"> • Understand the importance and type of communication in personal and professional environments. • To provide insight into much needed technical and non-technical qualities in career planning.
UNIT-III	<ul style="list-style-type: none"> • Learn about Leadership, team building, decision making and stress management.

Course Code: USCSP101+ USCSP102+	Course Name : Core Subject Practical
Objective	To understand the structure and operation of modern processors and their instruction sets. The objective of this paper is to introduce various concepts of programming to the students using Python.
UNIT	Course Outcome After successful completion of course students will be
UNIT – I	<ul style="list-style-type: none"> ● Study and verify the truth table of various logic gates (NOT, AND, OR, NAND, NOR, EX-OR, and EX-NOR). ● Simplify given Boolean expression and realize it. ● Installing and setting up the Python IDLE interpreter. Executing simple statements like expression statements (numeric and Boolean types), assert, assignment, delete statements; the print function for output. ● Programs related to string manipulation
UNIT-II	<ul style="list-style-type: none"> ● Design and verify the operation of flip-flops using logic gates. ● Design a 4 bit magnitude comparator using combinational circuits. ● Programs using list comprehensions and anonymous functions ● Programs using break and continue statements.
UNIT-III	<ul style="list-style-type: none"> ● Verify the operation of a counter. ● Verify the operation of a 4 bit shift register ● Using SPIM, write and test an adding machine program that repeatedly reads in integers and adds them into a running sum. The program should stop when it gets an input that is 0, printing out the sum at that point.

Course Code: USCSP103 + USCSP104	Course Name : Core Subject Practical
Objective	<p>Open Source has acquired a prominent place in the software industry. Having knowledge of Open Source and its related technologies is an essential for Computer Science students. This course introduces Open Source methodologies and ecosystems to students.</p> <p>The objective of this course is to introduce the concept of the DBMS with respect to the relational model, to specify the functional and data requirements for a typical database application and to understand creation, manipulation and querying of data in databases</p>
UNIT	Course Outcome
	<ul style="list-style-type: none"> ● After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none"> ● Identify any Open Source software and create detailed report about it. Sample Guidelines ● .Students should be able to design the database schema with the use of appropriate data types for storage of data in the database. ● Learn at least three different open source licenses and details.
UNIT-II	<ul style="list-style-type: none"> ● Contributing to Wikipedia: <ul style="list-style-type: none"> a. Introduction to wikipedia: operating model, license, how to contribute? ● b. Create your user account on wikipedia ● c. Identify any topic of your choice and contribute the missing information ● Students should be able to create, manipulate, query and back up the databases.
UNIT-III	<ul style="list-style-type: none"> ● Contributing to Open Source <ul style="list-style-type: none"> a. Identify any Open Source project of your interest b. Learn more about the project w.r.t. Lab 1. c. Start contributing to the project either by ● Virtualization: Open Source virtualization technologies: <ul style="list-style-type: none"> a. Install and configure any one: VirtualBox, Zen, KVM b. Create and use virtual machines

Course Code: USCSP105 + USCSP106	Course Name : Core Subject Practical
Objective	<p>The purpose of the course is to familiarize the prospective learners with mathematical structures that are fundamentally discrete. This course introduces sets and functions, forming and solving recurrence relations and different counting principles. These concepts are useful to study or describe objects or problems in computer algorithms and programming languages.</p> <p>The purpose of this course is to familiarize students with the basics of Statistics. This will be essential for prospective researchers and professionals to know these basics.</p>
UNIT	Course Outcome
	<ul style="list-style-type: none"> ● After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none"> ● Graphs of standard functions such as absolute value function, inverse function, logarithmic and exponential functions, flooring and ceiling functions, trigonometric functions over suitable intervals. ● Enable learners to know descriptive statistical concepts..
UNIT-II	<ul style="list-style-type: none"> ● Recurrence relation. ● Finite state Automata and Finite state machines.. ● Give an understanding of graphs and trees, which are widely used in software. ● Students should be able to create, manipulate, query and back up the databases. ● Enable study of probability concept required for Computer learners
UNIT-III	<ul style="list-style-type: none"> ● Breadth and Depth First search algorithms. ● Concept of searching, inserting and deleting from binary search trees. ● Correlation and regression ● Conditional probability

Course outcomes for all Courses: SEMESTER -II

Course Code: USCS201	Course Name : Programming with C
Objective	The objective of this course is to provide a comprehensive study of the C programming language, stressing upon the strengths of C, which provide the students with the means of writing modular, efficient, maintainable, and portable code.
UNIT	Course Outcome After successful completion of course students will be enable
UNIT – I	<ul style="list-style-type: none"> ● write, compile and debug programs in C language. ● use different data types in a computer program.
UNIT-II	<ul style="list-style-type: none"> ● design programs involving decision structures, loops and functions. ● explain the difference between call by value and call by reference
UNIT-III	<ul style="list-style-type: none"> ● understand the dynamics of memory by the use of pointers. ● use different data structures and create/update basic data files.

Course Code: USCS202	Course Name : Programming with Python – II
Objective	The objective of this paper is to explore the style of structured programming to give the idea to the students how programming can be used for designing real-life applications by reading/writing to files, GUI programming, interfacing database/networks and various other features.
UNIT	Course Outcome After successful completion of course students will be enable
UNIT – I	<ul style="list-style-type: none"> ● understand how to read/write to files using python. ● catch their own errors that happen during execution of programs.
UNIT-II	<ul style="list-style-type: none"> ● get an introduction to the concept of pattern matching. ● make familiar with the concepts of GUI controls and designing GUI applications.
UNIT-III	<ul style="list-style-type: none"> ● connect to the database to move the data to/from the application. ● connect to computers, read from URLs and send email.

Course Code: USCS203	Course Name : Linux
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Objective	This course introduces various tools and techniques commonly used by Linux programmers, system administrators and end users to achieve their day to day work in the Linux environment. It is designed for computer students who have limited or no previous exposure to Linux.
UNIT	Course Outcome After successful completion of course students will have
UNIT – I	<ul style="list-style-type: none"> 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.
UNIT-II	<ul style="list-style-type: none"> This course shall help students to learn advanced subjects in computer science practically.
UNIT-III	<ul style="list-style-type: none"> Students shall be able to progress as a Developer or Linux System Administrator using the acquired skill set.

Course Code: USCS204	Course Name :Data Structures
Objective	To explore and understand the concepts of Data Structures and its significance in programming. Provide a holistic approach to design, use and implement abstract data types. Understand the commonly used data structures and various forms of its implementation for different applications using Python.
UNIT	Course Outcome After successful completion of course students will have
UNIT – I	<ul style="list-style-type: none"> Learn about Data structures, its types and significance in computing
UNIT-II	<ul style="list-style-type: none"> Explore about Abstract Data types and its implementation
UNIT-III	<ul style="list-style-type: none"> Ability to program various applications using different data structure in Python

Course Code: USCS205	Course Name :Calculus
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Objective	The course is designed to have a grasp of important concepts of Calculus in a scientific way. It covers topics from as basic as definition of functions to partial derivatives of functions in a gradual and logical way. The learner is expected to solve as many examples as possible to get complete clarity and understanding of the topics covered.
UNIT	Course Outcome After successful completion of course students will have
UNIT – I	<ul style="list-style-type: none"> • Understanding of Mathematical concepts like limit, continuity, derivative, integration of functions.
UNIT-II	<ul style="list-style-type: none"> • Ability to appreciate real world applications which use these concepts.
UNIT-III	<ul style="list-style-type: none"> • Skill to formulate a problem through Mathematical modeling and simulation.

Course Code: USCS206	Course Name :Statistical Methods and Testing of Hypothesis
Objective	The purpose of this course is to familiarize students with the basics of Statistics. This will be essential for prospective researchers and professionals to know these basics.
UNIT	Course Outcome After successful completion of course students will have
UNIT – I	<ul style="list-style-type: none"> • Enable learners to know descriptive statistical concepts
UNIT-II	<ul style="list-style-type: none"> • Enable study of probability concept required for Computer learners
UNIT-III	<ul style="list-style-type: none"> • Enable learners to know descriptive statistical concepts • Enable study of probability concept required for Computer learners

Course Code: USCS207	Course Name :Green Technologies
Objective	To familiarize with the concept of Green Computing and Green IT infrastructure for making computing and information system environments sustainable. Encouraging optimized software and hardware designs for development of Green IT Storage, Communication and Services. To highlight useful approaches to embrace green IT initiatives.
UNIT	Course Outcome After successful completion of course students will have
UNIT – I	<ul style="list-style-type: none"> • Learning about green IT can be achieved in and by hardware, software, network communication and data center operations.
UNIT-II	<ul style="list-style-type: none"> • Understand the strategies, frameworks, processes and management of green IT
UNIT-III	<ul style="list-style-type: none"> • Learning about green IT can be achieved in and by hardware, software, network communication and data center operations. • Understand the strategies, frameworks, processes and management of green IT

Course Code: USCSP201 + USCSP202	Course Name : Core Subject Practical
Objective	The objective of this course is to provide a comprehensive study of the C programming language, stressing upon the strengths of C, which provide the students with the means of writing modular, efficient, maintainable, and portable code. The objective of this course is to explore the style of structured programming to give the idea to the students how programming can be used for designing real-life applications by reading/writing to files, GUI programming, interfacing database/networks and various other features.
UNIT	Course Outcome <ul style="list-style-type: none"> • After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none"> • Programs to understand the basic data types and I/O. • Programs on Operators and Expressions • Programs to read and write files. • Program to demonstrate exception handling.

UNIT-II	<ul style="list-style-type: none"> ● Programs on decision statements. ● Programs on looping. ● Program to demonstrate exception handling. ● Program to demonstrate the use of regular expressions.
UNIT-III	<ul style="list-style-type: none"> ● Programs on pointers. ● Programs on string manipulations. ● Program to show draw shapes & GUI controls. ● Program to create server-client and exchange basic information.

Course Code: USCSP203 + USCSP204	Course Name : Core Subject Practical
Objective	<p>This course introduces various tools and techniques commonly used by Linux programmers, system administrators and end users to achieve their day to day work in the Linux environment. It is designed for computer students who have limited or no previous exposure to Linux.</p> <p>To explore and understand the concepts of Data Structures and its significance in programming. Provide a holistic approach to design, use and implement abstract data types.</p>
UNIT	Course Outcome
UNIT – I	<ul style="list-style-type: none"> ● After successful completion of course students will be enable to ● Linux Installation: <ul style="list-style-type: none"> a. Install your choice of Linux distribution e.g. Ubuntu, Fedora, Debian. b. Try different installation media like CD/DVD, USB Drive to install. c. Installing and Removing Software: d. Install gcc package. Verify that it runs, and then remove it. ● Implement Linear Search to find an item in a list. ● Implement binary search to find an item in an ordered list.

UNIT-II	<ul style="list-style-type: none"> ● Command line operations: <ol style="list-style-type: none"> a. Install any new package on your system b. Remove the package installed c. Find the passwd file in / using find command d. Create a symbolic link to the file you found in last step ● Linux Editors: vim/emacs <ol style="list-style-type: none"> a. Create,modify, search, navigate a file in editor. b. Learn all essential commands like search, search/replace, highlight, show line numbers.
UNIT-III	<ul style="list-style-type: none"> ● Network: <ol style="list-style-type: none"> a. Get IP address of your machine using ifconfig. b. If IP is not set, then assign an IP address according to your network settings. c. Get hostname of your machine. d. Use ping to check the network connectivity to remote machines. e. Use telnet/ssh to connect to remote machines and learn the difference between the two. f. Troubleshooting network using traceroute, ping, route commands. ● Recursive implementation of <ol style="list-style-type: none"> a. Factorial b. Fibonacci c. Tower of Hanoi

Course Code: USCSP201 + USCSP202	Course Name : Core Subject Practical
Objective	<p>The purpose of this course is to familiarize students with the basics of Statistics. This will be essential for prospective researchers and professionals to know these basics. The course is designed to have a grasp of important concepts of Calculus in a scientific way. It covers topics from as basic as definition of functions to partial derivatives of functions in a gradual and logical way. The learner is expected to solve as many examples as possible to get complete clarity and understanding of the topics covered.</p>
UNIT	Course Outcome
UNIT – I	<ul style="list-style-type: none"> ● After successful completion of course students will be enable to ● Continuity of functions; Derivative of functions ● Increasing, decreasing, concave up and concave down functions ● Relative maxima, relative minima, absolute maxima, absolute minima ● Problems based on binomial distribution ● Problems based on normal distribution

UNIT-II	<ul style="list-style-type: none"> ● Newton's method to find approximate solution of an equation ● Area as a limit and length of a plane curve ● Property plotting of normal distribution ● Plotting pdf, cdf, pmf, for discrete and continuous distribution
UNIT-III	<ul style="list-style-type: none"> ● Local linear approximation and directional derivatives ● PMaxima and minima of functions of two variables. ● Non parametric tests- I ● Post-hoc analysis of one-way analysis

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PROGRAM OUTCOMES:

The curriculum is more contextual, industry affable and suitable to cater the needs of society and nation in present day context. Theory of Computation course provides understanding of grammar, syntax and other elements of modern language designs. It develops capabilities to design formulations of computing models and its applications in diverse areas.

PROGRAM SPECIFIC OUTCOMES

- The course in Operating System satisfies the need of understanding the structure and functioning of system.
- Android Developer Fundamentals as a skill enhancement catering to modern day needs of Mobile platforms and applications.
- Database Management Systems develops understanding of concepts and techniques for data management along with covers concepts of database at advance level.
- Graph theory is rapidly moving into the mainstream mainly because of its applications in diverse fields which include can further open new opportunities in the areas of genomics, communications networks and coding theory, algorithms and computations and operations research.
- Concepts of Physical Computing and IoT programming will definitely open future area as Embedded Engineer, involvement in IoT projects, Robotics and many more. The RasPi is a popular platform as it offers a complete Linux server in a tiny platform for a very low cost and custom-built hardware with minimum complex hardware builds which is easier for projects in education domain.

Course outcomes for all Courses: SEMESTER -III

Course Code: USCS301	Course Name : Theory of Computation
Objective	To provide the comprehensive insight into theory of computation by understanding grammar, languages and other elements of modern language design. Also to develop capabilities to design and develop formulations for computing models and identify its applications in diverse areas.
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none">• Learn about Automata theory and its application in Language Design.
UNIT-II	<ul style="list-style-type: none">• Understand Grammar and Languages.• Learn about Turing Machines and Pushdown Automata.

UNIT-III	<ul style="list-style-type: none"> Understand Linear Bound Automata and its applications.
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Course Code: USCS302	Course Name : Core Java
Objective	The objective of this course is to teach the learner how to use Object Oriented paradigm to develop code and understand the concepts of Core Java and to cover-up with the prerequisites of Core java.
UNIT	After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none"> Understand and implement Object oriented programming concepts using Java. Knowledge of input, its processing and getting suitable output.
UNIT-II	<ul style="list-style-type: none"> Understand, design, implement and evaluate classes and applets.
UNIT-III	<ul style="list-style-type: none"> Knowledge and implementation of AWT package.

Course Code: USCS303	Course Name : Operating System
Objective	Learners must understand proper working of operating systems. To provide a sound understanding of the Computer operating system, its structures, functioning and algorithms.
UNIT	Course Outcome After successful completion of course students will be enable
UNIT – I	<ul style="list-style-type: none"> To provide an understanding of the operating system, its structures and functioning.
UNIT-II	<ul style="list-style-type: none"> Develop and master understanding of algorithms used by operating systems for various purposes.
UNIT-III	<ul style="list-style-type: none"> To provide an understanding of the operating system, its structures and functioning. Develop and master understanding of algorithms used by operating systems for various purposes.

Course Code: USCS304	Course Name : Database Management Systems
Objective	The objective of this course is to develop understanding of concepts and techniques for data management and learn about widely used systems for implementation and usage
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none"> • Master concepts of stored procedure and triggers and its use.
UNIT-II	<ul style="list-style-type: none"> • Learn about using PL/SQL for data management.
UNIT-III	<ul style="list-style-type: none"> • Understand concepts and implementations of transaction management and crash recovery.

Course Code: USCS305	Course Name : Combinatorics and Graph Theory
Objective	To give the learner a broad exposure of combinatorial Mathematics through applications especially the Computer Science applications.
UNIT	Course Outcome After successful completion of course students will be enable
UNIT – I	<ul style="list-style-type: none"> • Appreciate beauty of combinatorics and how combinatorial problems naturally arise in many settings.
UNIT-II	<ul style="list-style-type: none"> • Understand the combinatorial features in real world situations and Computer Science applications.
UNIT-III	<ul style="list-style-type: none"> • Apply combinatorial and graph theoretical concepts to understand Computer Science • Understand the concepts and apply them to solve problems

Course Code: USCS306	Course Name : Physical Computing and IoT Programming
Objective	To learn about SoC architecture. Learn how Raspberry Pi. Learn to program Raspberry Pi. Implement internet of Things and Protocols.
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none"> • Enable learners to understand System On Chip Architectures. • Introduction and preparing Raspberry Pi with hardware and installation.
UNIT-II	<ul style="list-style-type: none"> • Learn physical interfaces and electronics of Raspberry Pi and program them using practical's
UNIT-III	<ul style="list-style-type: none"> • Learn how to make consumer grade IoT safe and secure with proper use of protocols.

Course Code: USCS307	Course Name : Web Programming
Objective	To provide insight into emerging technologies to design and develop state of - the art web applications using client-side scripting, server-side scripting, and database connectivity.
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none"> • To design valid, well-formed, scalable, and meaningful pages using emerging technologies. • Understand the various platforms, devices, display resolutions, viewports, and browsers that render websites
UNIT-II	<ul style="list-style-type: none"> • Design and apply XML to create a markup language for data and document centric applications.
UNIT-III	<ul style="list-style-type: none"> • To develop and implement client-side and server-side scripting language programs. • To develop and implement Database Driven Websites.

Course Code: USCS301	USCS302 USCS303+USCS304
Objective	<p>The objective of this course is to teach the learner how to use Object Oriented paradigm to develop code and understand the concepts of Core Java and to cover-up with the prerequisites of Core java.</p> <p>The objective of this course is to develop understanding of concepts and techniques for data management and learn about widely used systems for implementation and usage</p>
	<p style="text-align: center;">Course Outcome</p> <p>After successful completion of course students will be enable to</p>
	<ul style="list-style-type: none"> • Demonstrate Java inheritance using extends keyword. • Demonstrate method overloading and method overriding in Java. • Implement FCFS scheduling algorithm in Java. • Implement SJF (with no preemption) scheduling algorithm in Java. • Creating and working with Insert/Update/Delete Trigger using Before/After clause. • Implement recursive Functions in PL/SQL Block.

Course Code: USCS302	USCS305+USCS306+USCS307
Objective	<p>To learn about SoC architecture. Learn how Raspberry Pi. Learn to program Raspberry Pi. Implement internet of Things and Protocols.</p> <p>To provide insight into emerging technologies to design and develop state of - the art web applications using client-side scripting, server-side scripting, and database connectivity.</p>
	<p style="text-align: center;">Course Outcome</p> <p>After successful completion of course students will be enable to</p>
	<ul style="list-style-type: none"> • Solving problems using induction. • Solving problems on Eulerian and Hamiltonian graphs. • Solving problems using Dijkstra's Algorithm. • Install Raspberry pi and demonstrate linux command. • Design webpage using different tags. • Design a webpage that make use of Cascading Style Sheets.

Course outcomes for all Courses: SEMESTER -IV

Course Code: USCS401	Course Name : Fundamentals of Algorithms
Objective	<ul style="list-style-type: none"> • To understand basic principles of algorithm design and why algorithm analysis is important. • To understand how to implement algorithms in Python • To understand how to transform new problems into algorithmic problems with efficient solutions • To understand algorithm design techniques for solving different problems
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none"> • Understand the concepts of algorithms for designing good programs.
UNIT-II	<ul style="list-style-type: none"> • Implement graph algorithms using Python. • Understand the concepts of algorithms for designing good programs.
UNIT-III	<ul style="list-style-type: none"> • Implement graph algorithms using Python.

Course Code: USCS402	Course Name : Advanced Java
Objective	<ul style="list-style-type: none"> • Explore advanced topics of Java programming for solving problems.
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none"> • Understand the concepts related to Java Technology
UNIT-II	<ul style="list-style-type: none"> • Explore and understand use of Java Server Programming
UNIT-III	<ul style="list-style-type: none"> • Understand the concepts related to Java Technology • Explore and understand use of Java Server Programming

Course Code: USCS403	Course Name : Computer Networks
Objective	In this era of Information, its computation and its exchange techniques, Learners should be able to conceptualize and understand the framework and working of communication networks. And on completion, will be able to have a firm grip over this very important segment of the Internet.
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none"> Learner will be able to understand the concepts of networking, which are important for them to be known as a ‘networking professionals’
UNIT-II	<ul style="list-style-type: none"> Useful to proceed with industrial requirements and International vendor certifications.
UNIT-III	<ul style="list-style-type: none"> Learners will be able to understand the concepts of networking, which are important for them to be known as ‘networking professionals’. Useful to proceed with industrial requirements and International vendor certifications.

Course Code: USCS404	Course Name : Software Engineering
Objective	The objective of this course is to introduce the concept of the DBMS with respect to the relational model, to specify the functional and data requirements for a typical database application and to understand creation, manipulation and querying of data in databases.
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none"> Define various software application domains and remember different process model used in software development. Analyze & design the software models using unified modeling language(UML). Convert the requirements model into the design model and demonstrate use of software and user interface design principles.
UNIT-II	<ul style="list-style-type: none"> Explain needs for software specifications also they can classify different types of software requirements and their gathering techniques.

	<ul style="list-style-type: none"> • Explain quality management & different types of metrics used in software development. • Apply concepts of project management & planning.
UNIT-III	<ul style="list-style-type: none"> • SQA and can classify different testing strategies. • Explain the concepts of various software testing methods & be able to apply appropriate testing approaches for development of software. • Organize different activities of the project as per Risk management.

Course Code: USCS405	Course Name : Linear Algebra Using Python
Objective	To offer the learner the relevant linear algebra concepts through computer science applications.
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT-I	<ul style="list-style-type: none"> • Appreciate the relevance of linear algebra in the field of computer science.
UNIT-II	<ul style="list-style-type: none"> • Understand the concepts through program implementation
UNIT-III	<ul style="list-style-type: none"> • Instill computational thinking while learning linear algebra.

Course Code: USCS406	Course Name : .NET Technologies
Objective	To explore .NET technologies for designing & developing dynamic, interactive and responsive web applications.
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none"> • Understand the .NET framework.
UNIT-II	<ul style="list-style-type: none"> • Develop a proficiency in the C# programming language • Proficiently develop ASP.NET web applications using C#
UNIT-III	<ul style="list-style-type: none"> • Use ADO.NET for data persistence in a web application.

Course Code: USCS407	Course Name : Android Developer Fundamentals
Objective	To provide comprehensive insight into developing applications running on smart mobile devices and demonstrate programming skills for managing tasks on mobile. To provide systematic approach for studying definition, methods and its applications for Mobile-App development
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none"> Understand the requirements of the Mobile programming environment. Learn about basic methods, tools and techniques for developing Apps.
UNIT-II	<ul style="list-style-type: none"> Explore and practice App development on Android Platform
UNIT-III	<ul style="list-style-type: none"> Develop working prototypes of working systems for various uses in daily lives.

Course Code: USCSP401	USCS401+ USCS402+ USCS403
Objective	<ul style="list-style-type: none"> To understand how to implement algorithms in Python To understand basic principles of algorithm design and why algorithm analysis is important. Explore advanced topics of Java programming for solving problems. To understand the framework and working of communication networks.
UNIT	Course Outcome After successful completion of course students will be enable to
	<ul style="list-style-type: none"> Perform matrix multiplication and calculate the time complexity. To perform sorting techniques on any given problem. Develop a java application for database management. Implement Java application to encode and decode JSON in Java. Design and set up an organization network using packet tracer.

Course Code: USCSP402	USCS405+ USCS406+ USCS407
Objective	<ul style="list-style-type: none"> • Applying the linear algebra concepts on vectors. • Perform the matrix application. • Design of ASP.NET pages with server control, web control and rich control. • Practical's aim is to install the android and create the apps in the android platform.
UNIT	<p style="text-align: center;">Course Outcome</p> <p>After successful completion of course students will be enable to</p>
	<ul style="list-style-type: none"> • Enter the vector as a list, find the dot product of two vectors. • Check whether the matrix is invertible. Also finds eigen vector of matrix. • Design ASP.NET pages with the use of server control, web control, rich control. • Performing validation using various validation control • Create an android app to demonstrate the use of the option menu. • Create android app to save user data in a database

PROGRAM OUTCOMES:

The third year curriculum in the subject of Computer Science is designed to transform students into technically competent, socially responsible and ethical Computer Science professionals. The third year is the further advancement which covers developing capabilities to design formulations of computing models and its applications in diverse areas. Curriculum helps the student to evaluate his/her computer science domain specific skills and also to meet industry expectations.

PROGRAM SPECIFIC OUTCOMES:

- Proposed Curriculum contains challenging and varied subjects aligned with the current trend with the introduction of Machine Intelligence specific subject such as Artificial Intelligence, Information Retrieval.
- Data Management related subjects such as Cloud Computing and Data Science. Security domain is also evolved by the introduction of Ethical Hacking, Cyber Forensic and Information and Network Security. To get the hands on experience Linux Server Administration and Web Services topics are included.
- This syllabus is to create a pool of technologically savvy, theoretically strong, innovatively skilled and ethically responsible generation of computer science professionals.

Course Code: USCS501	Course Name : Artificial Intelligence
Objective	Artificial Intelligence (AI) and accompanying tools and techniques bring transformational changes in the world. This course aims to introduce the learner to this interesting Area.
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT I	<ul style="list-style-type: none">● After completion of this course, learner should get a clear understanding of AI and different search algorithms used for solving problems.● The learner should also get acquainted with different learning algorithms and models used in machine learning.● Students are able to design to design the different real life related problem algorithm which can be solved by using these algorithm.
UNIT II	
UNIT III	

Course Code: USCS503	Course Name : Software Testing and Quality Assurance
Objective	To provide learner with knowledge in Software Testing techniques and provide skills to design test case plan for testing software.
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT I	<ul style="list-style-type: none"> Understand various software testing methods and strategies. Understand a variety of software metrics, and identify defects and managing those defects for improvement in quality for given software. Design SQA activities, SQA strategy, formal technical review report for software quality control and assurance.
UNIT II	
UNIT III	

Course Code: USCS504	Course Name : Information and Network Security
Objective	To provide students with knowledge of basic concepts of computer security including network security and cryptography.
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT I	<ul style="list-style-type: none"> Understand various software testing methods and strategies. Understand a variety of software metrics, and identify defects and managing those defects for improvement in quality for given software. Design SQA activities, SQA strategy, formal technical review report for software quality control and assurance.
UNIT II	
UNIT III	

Course Code: USCS506	Course Name : Web Services
Objective	To understand the details of web services technologies like SOAP, WSDL, and UDDI.
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT I	<ul style="list-style-type: none"> Emphasis on SOAP based web services and associated standards such as WSDL. Design SOAPbased / RESTful / WCF services Deal with Security and QoS issues of Web Services To Understand paradigms needed for testing Web Services To Understand Web Services and implementation model for SOA
UNIT II	
UNIT III	

Course Code: USCS507	Course Name : Game Programming
Objective	Learner should get the understanding computer Graphics programming using DirectX or OpenGL.
UNIT	Course Outcome After successful completion of course students will be able to
UNIT I	<ul style="list-style-type: none"> Learner should study Graphics and gaming concepts with present working style of developers. Digital capabilities such as coding, programming, game-art design, animating, and 3D modeling Everything remains on internet and they need to review it, understand it, be a part of community and learn.
UNIT II	
UNIT III	

Course Code: USCSP501	Course Name : Practical of Elective-1
Objective	<ul style="list-style-type: none"> The goal of AI practical is to design models using different algorithms. Practical aims at designing different test cases for the given program and check if The program met the user's requirements.
	Course Outcome After successful completion of course students will be able to
	<ul style="list-style-type: none"> Learn different algorithms to solve Romanian map-problems Implement different algorithms to solve restaurant waiting problems Analyze adaptive dynamic programming Implement passive reinforcement learning algorithm Learn to design different test cases for the program. Perform testing using JMeter, and Android Application testing using Appium Tools, Bugzilla Bug tracking tools. Design and test programs which has different objects and items such as combo box, list box etc. Design and test login web pages.

Course Code: USCSP504	Course Name : Practical of Elective-II
Objective	Focus of the practical is on to designing program using different cipher techniques and to implement different programs on security methods.
	Course Outcome After successful completion of course students will be able to

	<ul style="list-style-type: none"> • Learn to design and demonstrate program using different cipher techniques. • Implement encryption and decryption of strings • Demonstrate security programs based on algorithms such as Diffie-Hellman Key Agreement, MD5 algorithm • Configure firewalls and implement SSL. • Implement operation that can receive request and will return a response. • Perform program implementation business UDDI registry. • Design application that consumes web services in different platform. • Develop JAX-WS web service. • Design program using RESTFUL web services, WCF and CRUD operation
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Course Code: USCSP503	Course Name : Project Implementation
Objective	Experiential Learning
	Course Outcome
	After successful completion of course students will be enable to create a pool of technologically savvy, theoretically strong, innovatively skilled and ethically responsible generation of computer science professionals.

Course Code: USCSP504	Course Name : Practical of Skill Enhancement : USCS507
Objective	Practical of this course aims at developing game programming skills in learners. Students will be exposed to game design, and will learn the basics of game design.
	Course Outcome
	After successful completion of course students will be enable to
	<ul style="list-style-type: none"> • Install DirectX setup and design program for buffers, shaders and textures. • Develop program for lightning and loading models in the given software. • Load packages of the required game.

Course outcomes for all Courses: SEMESTER -VI

Course Code: USCS601	Course Name : Cloud Computing
Objective	The objective of this course is to provide learners with the comprehensive and in-depth knowledge of Cloud Computing concepts, technologies, architecture, implantations and applications and also to expose the learners to frontier areas of Cloud Computing, while providing sufficient foundations to enable further study and research.
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none"> 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. They would be able to identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud
UNIT-II	<ul style="list-style-type: none"> Get a view on virtualized environment. They would be able to create virtual machines and they would be familiar with different challenges of cloud computing.
UNIT-III	<ul style="list-style-type: none"> Learn about open stack, openstack operations, private cloud building blocks and different applications of the open stack.

Course Code: USCS603	Course Name : Cyber Forensics
Objective	Computer forensics is the branch of forensic science in which evidence is found in a computer or digital device. The aim of computer forensics is to examine digital devices in a constructive way with the goal of identifying, preserving, recovering, analyzing, and presenting the evidence in a court of law.
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none"> Gain knowledge about computer forensics, the processes of computer forensics, and advantages and tools available in computer forensics.
UNIT-II	<ul style="list-style-type: none"> Learn about Internet forensics which consists of the extraction, analysis and identification of evidence related to user's online activities. Internet-related evidence which includes artifacts such as log files, history files, cookies, cached content, as well as any remnants of information left in the computer's volatile memory (RAM).
UNIT-III	<ul style="list-style-type: none"> Learn about role of digital forensics and the relationship of digital forensics to traditional forensic science, traditional science and the appropriate use of scientific methods.

Course Code: USCS604	Course Name : Information Retrieval
Objective	The main objective of this course is to present the basic concept in information retrieval and more advance techniques of multimodal based information system. Another goal of this course is to understand the problem related to IR and acquire the necessary experience to design and implement real application using IR system.
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none"> • Learners should get an understanding of the field of information retrieval.
UNIT-II	<ul style="list-style-type: none"> • Learners should get an understanding of information retrieval link analysis and specialized search.
UNIT-III	<ul style="list-style-type: none"> • Learners should get an understanding to relationship of information retrieval to search engines and it will give the learner an understanding to apply information retrieval models.

Course Code: USCS606	Course Name : Data Science
Objective	The main objective of this course is to understand basic data science concepts. Learning to detect and diagnose common data issues, such as missing values, special values, outliers, inconsistencies, and localization. Making aware of how to address Advanced statistical situations, Modeling and Machine Learning.
UNIT	Course Outcome After successful completion of course students will be enable to
UNIT – I	<ul style="list-style-type: none"> • Students will be acquainted with introduction to data science. They should be able to collect, clean, and prepare meaningful data. They should be able to evaluate data in terms of source, volume, frequency, and flow.
UNIT-II	<ul style="list-style-type: none"> • Students should be able to demonstrate query languages and operations to specify and transform data.
UNIT-III	<ul style="list-style-type: none"> • Students should be able to demonstrate proficiency with statistical analysis of data. They would be able to define suitable statistical methods that are to be adopted.

Course Code: USCS607	Course Name : Ethical Hacking
Objective	The course module introduces the concept of Ethical hacking and gives the student the opportunity to learn about different tools and techniques in ethical hacking and security and practically apply some of the tools.
UNIT	Course Outcome After successful completion of course students will be enable to

UNIT – I	<ul style="list-style-type: none"> Learner will know to identify security vulnerabilities and weaknesses in the target applications. They would get to know about the types of attacks and prevention techniques.
UNIT-II	<ul style="list-style-type: none"> Students should know about the pre-attack techniques, difference between black, gray and white hat and security testing plans.
UNIT-III	<ul style="list-style-type: none"> Students should be able to know about different system hacking techniques, malware analysis and different security mechanism.

Course Code: USCSP601	Course Name : Practical of Elective-I
Objective	<ul style="list-style-type: none"> The course practical aims at delivering computing services which includes servers, storage database networking and software intelligence. The course practical aims at delivering hands on practical of analyzing and Presenting digital evidence in a manner that are legally acceptable
	Course Outcome After successful completion of course students will be enable to
	<ul style="list-style-type: none"> Install and configure virtualization. Implement IaaS, PaaS ,SaaS, cloud security and identity management Design program of Single-Sign-On and user management in cloud Check and analyze forensic image. Maintain the integrity of data Perform data acquisition. Study and solve forensic cases Capture packets in a network Study different tools for network tracing, process monitoring and recovery of deleted files.

Course Code: USCSP602	Course Name : Practical of Elective-II
Objective	<ul style="list-style-type: none"> The objective of the course practical is to make the learners aware about different Methodologies to minimize the overhead of user locating needed information. The objective of the course practical is to make the learners aware about how to Interpret data, extract meaningful information, and assess findings.
	Course Outcome After successful completion of course students will be enable to

	<ul style="list-style-type: none"> • Implement bitwise operation, page rank algorithm and dynamic programming. • Develop program to compute similarity between two text documents and to count number of occurrence of each alphabet. • Design web crawler. • Implement program of IR system using lucene. • Design program in R for data curation, collection and management. • Implement PCA, cluster operation and different regressions. • Perform hypothesis testing
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Course Code: USCSP603	Course Name : Project Implementation
Objective	Experiential Learning
	Course Outcome
	After successful completion of course students will be enable to create a pool of technologically savvy, theoretically strong, innovatively skilled and ethically responsible generation of computer science professionals.

Course Code: USCSP604	Course Name : Practical of Skill Enhancement : USCS607
Objective	Practical focuses on making the learners learn about different weak points in the system or network. Also focuses is given on how to secure our machines and network.
	Course Outcome
	After successful completion of course students will be enable to
	<ul style="list-style-type: none"> • Learn the use of google and who is for reconnaissance. • Use different tools for cracking password and encrypting and decrypting algorithms. • Analyze output of different linux commands. • Make use of NMap scanner to perform port scanning. • Learn simulation for cross-site scripting attack
