SYLLABUS FOR COMPUTER SCIENCE (MAJOR)

Under Single Major Single Minor (FYUGP)

(To be implemented from Session 2024-25)

SEM. I & II

Proposed Syllabus for four years B.Sc. Computer Science (Major) Programme

Year	Semester	Paper Code	Paper	Credits	Periods/Week	Exam. Marks	Total Marks
1st Year	I	COMSMAJ101	Digital Design and Analysis	3	3	60	80
		COMSMAJ101L	Digital Design and Analysis (Lab)	1	4	20	
		COMSMAJ102	Programming in C	3	3	60	80
		COMSMAJ102L	Programming in C (Lab)	1	4	20	
		POOASEC105 POOASEC106	Basic Programming in Python MS Power Point	2	2	40	60
		POOASEC105L POOASEC106L	Basic Programming in Python (Lab) MS Power Point (Lab)	1	2	20	
		MIN1	Student has to choose only ONE discipline from the subjects given below: 1. Physics 6. Geography 2. Mathematics 7. Geology 3. Statistics 8. Microbiology 4. Chemistry 9. Zoology 5. Economics 10. Botany	3	3	60	80
		MIN1 (L/T)	Minor Practical/Tutorial	1	4	20	
		VAC	Environmental Education	3	3	60	80
		VACT	Environmental Education (Tutorial)	1	1	20	
	II	COMSMAJ203	Discrete Structures	3	3	60	80
		COMSMAJ203T	Discrete Structures (Tutorial)	1	1	20	
		COMSMAJ204	Object Oriented Programming Using Java	3	3	60	80
		COMSMAJ204L	Object Oriented Programming Using Java (Lab)	1	2	20	
		POOBSEC218 POOBSEC219	Cyber Security HTML Programming	2	2	40	60
		POOBSEC218L POOBSEC219L	Cyber Security (Lab) HTML Programming (Lab)	1	1	20	
		MIN2	Student will be provided the SAME discipline from the subjects selected previously as Minor.	4	4	60	80
		MIN2 (L/T)	Minor Practical/Tutorial	1	4	20	
		AEC1	Compulsory English	3	3	60	80
		AECT	Compulsory English (Tutorial)	1	2	20	
		IDC1	Student has to choose only ONE discipline from a pool of subjects that will be provided.	2	2	40	60
		IDCT	Inter Disciplinary (Tutorial)	1	1	20	
		IN1	Summer Internship The Colleges are expected to network with skill development centres, vocational training institutes for facilitating student internships. Online based internships programs are also permitted in case of Computer Science (Major) students. The students must submit a certificate of completion of the internship at the end of the semester.	2	-	-	

NOTE: Tutorials should involve problem solving session/activity related to the subject taught.

1st Year

Semester-I

Course-MAJOR	**Paper Code- COMSMAJ101**	**Credits-3**	**Lectures/Week-3**
Paper:	**Digital Design and Analysis**		

Prerequisite(s) and/or Note(s):

(1) High school Physics.

(2) Note(s): Syllabus changes yearly and may be modified during the term itself, depending on the circumstances. However, students will be evaluated only on the basis of topics covered in the course.

Course Objectives

Knowledge acquired:

(1) Basic knowledge of digital logic and digital circuits,

(2) Overall idea about how computers function and the internal building blocks of a computer.

(3) Knowledge about how operations are performed in a computer

(4) A thorough understanding of the fundamental concepts and techniques used in digital electronics.

Skills gained:

(1) Application of the knowledge of digital logic to understand digital electronics circuits.

(2) The ability to understand, analyze and design various combinational and sequential circuits.

(3) To understand and examine the structure of various number systems and its application in digital design.

Competency Developed:

(1) Ability to identify basic requirements for a design application and propose a cost effective solution.

(2) The ability to identify and prevent various hazards and timing problems in a digital design.

(3) Ability and skill to develop/build, and troubleshoot digital circuits.

Syllabus Overview

Unit 1: Fundamentals of Computers — 7 Lectures

Generation of Computers and Computer Languages, Computer Systems, Basic block Diagram, Von-Neumann Architecture, Types of Computers, Hardware, Firmware, I/O Devices, Storage classifications, Language translators.

Unit 2: Number Systems and Codes — 10 Lectures

Binary, octal, hexadecimal and decimal number systems and their inter conversion, BCD numbers (8421-2421), Gray code, excess–3 code, code conversion, ASCII, EBCDIC codes, their advantages and disadvantage, Binary addition and subtraction, Negative number representation: Sign magnitude, 1's, 2's Complement. signed and unsigned binary numbers, Fixed and floating-point representation.

Unit 3: Logic Gates — 7 Lectures

AND, OR, NOT Gates and their Truth Tables, NOR, NAND & XOR gates, Boolean algebra, Basic Boolean Laws, De-morgan’s theorem, Boolean function and their truth tables, Minimization techniques, K-Map for 2, 3 and 4 variables, Sum of Product & Product of Sum, Don’t care conditions.

Unit 4: Logic Families — 7 Lectures

Introduction to digital logic family such as RTL, DTL, TTL, ECL, CMOS, IIR, HTL etc., their comparative study, Basic circuit, performance characteristics.

Unit 5: Combinational Logic 7 Lectures

Half adder, Full adder, parallel adder, half subtractor, full subtractor, 4-bit binary adder cum subtractor, Multiplexer, Demultiplexer, Decoder, BCD to seven segment Decoder, Encoders.

Unit 6: Sequential Circuit: 7 Lectures

Set-reset latches, D-flip-flop, R-S flip-flop, J-K flip-flop, Master slave flip-flop, edge triggered flip-flop, T flip-flop, Synchronous/Asynchronous counter, Up/down synchronous counter, Ripple Counter, Applications of counter, Serial in/Serial out shift register, Parallel in/Serial out shift register, Serial in/parallel out shift register, parallel in/ parallel out shift register, Bi-directional register, Applications of register.

Suggested Readings

1. Rajaraman V. & Radhakrishnan, An Introduction To Digital Computer Design, PHI.
2. Malvino & Leach, Digital Principles & Applications, TMH
3. S. Salivahanan, S. Arivazhagan, Digital Circuits and Design, Oxford University Press

Course-MAJOR	**Paper Code-COMSMAJ101L**	**Credits-1**	**Lab hours/Week-2**
Paper:	**Digital Design and Analysis (Lab)**		

Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:

1. Implementation of all the basic gates.
2. Design all gates using NAND gates.
3. Design all gates using NOR gates.
4. Design of a XOR gate using basic gates.
5. Design of an 8x1 MUX using basic gates.
6. Design of an 1x8 DEMUX using basic gates.
7. Design of a Decoder (different variants) using basic gates.
8. Design of an Encoder (different variants) using basic gates.
9. Simple Boolean Expression using Basic gates and Universal gates: (Examples)

   $A . (\overline{B}+A) + B.\overline{A}$

   XZ + X’ Y Z

   A + B [AC + (B + C’) D]

10. Design Half-Adder, Full-Adder, Half-Subtractor, Full-Subtractor Circuit

Course-MAJOR	**Paper Code-COMSMAJ102**	**Credits-3**	**Lectures/Week-3**
Paper:	**Programming in C**		

Prerequisite(s) and/or Note(s):

(1) High school mathematics.

(2) Note(s): Syllabus changes yearly and may be modified during the term itself, depending on the circumstances. However, students will be evaluated only on the basis of topics covered in the course.

Course Objectives

Knowledge acquired:

(1) Knowledge about program development and implementation

(2) Syntax of C programming language

(3) Knowledge about how humans interact with computers through a language.

Skills gained:

(1) Problem solving skills
(2) Logical thinking to approach a problem
(3) Building programs for different problems at hand.

Competency Developed:

(1) Applying the skills learnt to model real world problems
(2) Facility in solving real life problems by thinking logically and outside of box.
(3) Ease of switching to any other programming language

Syllabus Overview

Unit 1: Introduction to C, Data Types, Variables and Operators — 6 Lectures

History of C, Overview of Procedural Programming, Introduction to Algorithm & Flowcharts. Using main() function Compiling and Executing Simple Programs in C. Declaring, Defining and Initializing Variables, Scope of Variables, Using Named Constants, Keywords, Data Types, Casting of Data Types, Operators (Arithmetic, Logical and Bitwise), Using Comments in programs, Character I/O (getc, getchar, putc, putchar etc), Formatted and Console I/O (printf(), scanf()) , Using Basic Header Files (stdio.h, conio.h, stdlib.h, etc).

Unit 2: Expressions, Conditional Statements and Iterative Statements — 10 Lectures

Simple Expressions in C (including Unary Operator Expressions, Binary Operator Expressions), Understanding Operators Precedence in Expressions, Conditional Statements (if construct, switch-case construct), Understanding syntax and utility of Iterative Statements (while, do-while, and for loops), Use of break and continue in Loops, Using Nested Statements (Conditional as well as Iterative)

Unit 3: Understanding Functions — 5 Lectures

Utility of functions, Call by Value, Call by Reference, Functions returning value, Void functions, Return type of functions, Functions parameters, Differentiating between Declaration and Definition of Functions, Functions with variable number of Arguments.

Unit 4: Implementation of Arrays and Strings — 10 Lectures

Creating and Using One Dimensional Arrays (Declaring and Defining an Array, Initializing an Array, Accessing individual elements in an Array, Manipulating array elements using loops), Use Various types of arrays (integer, float and character arrays / Strings) Two-dimensional Arrays (Declaring, Defining and Initializing Two Dimensional Array, Working with Rows and Columns). String handling functions.

Unit 5: User-defined Data Types (Structures and Unions) — 5 Lectures

Understanding utility of structures and unions, Declaring, initializing and using simple structures and unions, Manipulating individual members of structures and unions, Array of Structures.

Unit 6: Pointers and References in C — 4 Lectures

Understanding a Pointer Variable, Simple use of Pointers (Declaring and Dereferencing Pointers to simple variables)

Unit 7: File and I/O — 5 Lectures

Opening and closing a file, Reading and writing Text Files, Using put(), get(), read() and write() functions, Random access in files.

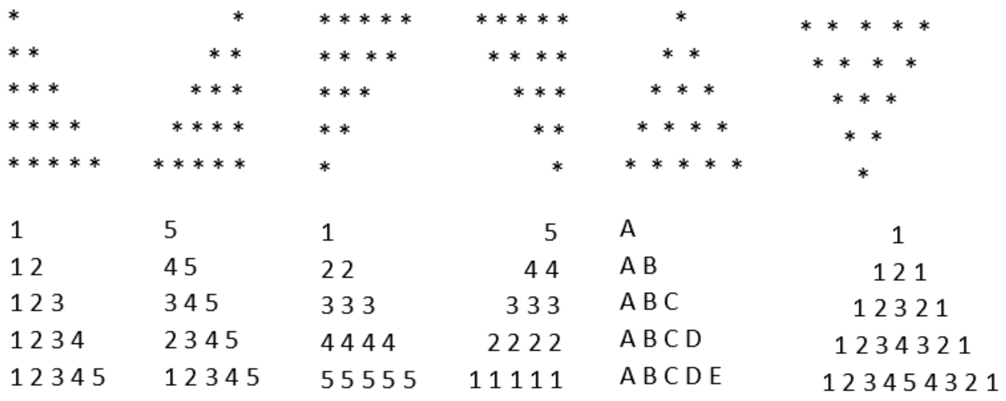
Suggested Readings

1. "The C Programming Language ANSI C Version", Kernighan & Ritchie, Prentice Hall Software Series
2. "ANSI C - Made Easy", Herbert Schildt, Osborne McGraw-Hill
3. "Learning to Program in C", N. Kantaris, Babani
4. "C - The Complete Reference", Herbert Schildt, Osborne McGraw-Hill
5. "Programming in C", Reema Thareja, Oxford University Press
6. "A First Course in Programming With C", T. Jeyapoovan, Vikas Publishing House
7. "Let Us C", Yashavant P. Kanetkar, BPB Publications

Course-MAJOR	**Paper Code-COMSMAJ102L**	**Credits-1**	**Lab hours/Week-2**
Paper:	**Programming in C (Lab)**		

Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:

1. WAP to perform input/output of all basic data types.
2. WAP to enter two numbers and find their sum.
3. WAP to find the simple interest.
4. WAP to Swap Two Numbers (using and without using a third variable).
5. WAP to check whether a number is even or odd
6. WAP to compute the factors of a given number.
7. WAP to print the sum and product of digits of an integer.
8. WAP to check whether a character is vowel or consonant
9. WAP to find the largest among three numbers
10. WAP to compute the sum of the first ‘n’ terms of the following series
    S =1-2+3-4+5+……………n
11. WAP to compute the sum of the first ‘n’ terms of the following series
    S = 1+1/2+1/3+1/4+……………n
12. WAP to find the factors of a number.
13. WAP to print all the prime numbers within a given range
14. WAP to display the Fibonacci series.
15. WAP to find the factorial of a number.
16. WAP to check if a number is prime or not.
17. WAP to check if a number is Armstrong or not.
18. WAP to check if a number is Perfect or not.
19. WAP to print a triangle of stars as follows (take number of lines from user):



```
*                  *    * * * * *   * * * * *       *         * * * * *
* *              * *    * * * *       * * * *      * *         * * * *
* * *          * * *    * * *           * * *     * * *         * * *
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1          5            1                   5   A                 1
1 2        4 5          2 2               4 4   A B             1 2 1
1 2 3      3 4 5        3 3 3           3 3 3   A B C         1 2 3 2 1
1 2 3 4    2 3 4 5      4 4 4 4       2 2 2 2   A B C D     1 2 3 4 3 2 1
1 2 3 4 5  1 2 3 4 5    5 5 5 5 5   1 1 1 1 1   A B C D E 1 2 3 4 5 4 3 2 1
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Course- SEC	Paper Code-POOASEC105	Credits-2	Lectures/Week-2
Paper:	Basic Programming in Python		

Prerequisite(s) and/or Note(s):

(1) High school mathematics.

(2) Note(s): Syllabus changes yearly and may be modified during the term itself, depending on the circumstances. However, students will be evaluated only on the basis of topics covered in the course.

Course Objectives

Knowledge Acquired:

(1) Fundamental Concepts: Students acquire knowledge of fundamental programming concepts such as variables, data types, loops, conditionals, and functions in Python.

(2) Data Structures: They learn about essential data structures like lists, tuples, dictionaries, and sets, understanding their usage and implementation.

Skills Gained:

(1) Coding Proficiency: Through hands-on practice and assignments, students develop coding proficiency in Python, enabling them to write clear, concise, and functional code.

(2) Problem-Solving: They enhance their problem-solving skills by applying Python programming concepts to solve various computational problems and algorithms.

(3) Debugging and Troubleshooting: Students acquire skills in debugging code and troubleshooting errors, learning how to identify and fix common programming mistakes effectively.

Competency Developed:

(1) Logical Thinking: Python programming exercises require logical thinking and algorithmic problem-solving skills, helping students develop a logical mindset.

(2) Attention to Detail: Writing code necessitates attention to detail to ensure accuracy and functionality. Students develop this competency through debugging and code review processes.

(3) Collaboration and Documentation: Students learn to collaborate on coding projects using version control systems like Git and to document their code effectively, enhancing their ability to work in teams and communicate technical concepts clearly.

Syllabus Overview

Unit 1: Introduction to Python — 10 Lectures

Structure of a Python Program, Elements of Python, Entering Expressions into the Interactive Shell, The Integer, Floating-Point, and String Data Types, String Concatenation and Replication, Storing Values in Variables

Unit 2: Flow control and Functions — 10 Lectures

Boolean Values, Comparison Operators, Boolean Operators, Mixing Boolean and Comparison Operators, Elements of Flow Control, Program Execution, Flow Control Statements, Importing Modules, Ending a Program Early with sys.exit(),def Statements with Parameters, Return Values and return Statements, The None Value, Keyword Arguments and print(), Local and Global Scope, The global Statement, Exception Handling.

Unit 3: List, Dictionary, String and Tuples — 10 Lectures

String, String functions, Manipulating Strings, Lists: Creating Lists; Operations on Lists; Built-in Functions on Lists; Implementation of Stacks and Queues using Lists; Nested Lists. Dictionaries: Creating Dictionaries; Operations on Dictionaries; Built-in Functions on Dictionaries; Dictionary Methods; Populating and Traversing Dictionaries. Tuples and Sets: Creating Tuples; Operations on Tuples; Built-in Functions on Tuples; Tuple Methods; Creating Sets; Operations on Sets; Built-in Functions on Sets; Set Methods.

Suggested Readings

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. Python Tutorial/Documentation www.python.or 2015
3. Allen Downey, Jeffrey Elkner, Chris Meyers , How to think like a computer scientist : learning with Python , Freely available online. 2012
4. http://docs.python.org/3/tutorial/index.html
5. http://interactivepython.org/courselib/static/pythonds
6. http://www.ibiblio.org/g2swap/byteofpython/read/

Course-SEC	**Paper Code-POOASEC105L**	**Credits-1**	**Lab hours/Week-2**
Paper:	**Basic Programming in Python (Lab)**		

Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:

1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon users' choice.
2. WAP to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria:
    a. Grade A: Percentage >=80
    b. Grade B: Percentage>=70 and <80
    c. Grade C: Percentage>=60 and <70
    d. Grade D: Percentage>=40 and <60
    e. Grade E: Percentage<40
3. Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4. WAP to display the first n terms of Fibonacci series.
5. WAP to find factorial of the given number.
6. WAP to implement the use of arrays in Python.
7. WAP to implement String Manipulation in python in Python.
8. WAP to find sum of the following series for n terms: 1 – 2/2! + 3/3! - - - - - n/n!

Course- SEC	**Paper Code- POOASEC105**	**Credits-2**	**Lectures/Week-2**
Paper:	**MS Power Point**		

Prerequisite(s) and/or Note(s):

(1) High school mathematics.

(2) Note(s): Syllabus changes yearly and may be modified during the term itself, depending on the circumstances. However, students will be evaluated only on the basis of topics covered in the course.

Course Objectives

Knowledge Acquired:

(1) Presentation design principles understanding.

(2) MS PowerPoint interface familiarity.

(3) Slide layout and formatting comprehension.

Skills Gained:

(1) Slide creation and editing proficiency.

(2) Visual content insertion capability.

(3) Animation and transition application skill.

Competency Developed:

(1) Effective presentation delivery competency.
(2) Audience engagement techniques mastery.
(3) Time management during presentations efficiency.

Syllabus Overview

Unit 1: Creating and Managing Presentations 15 Lectures

Create a Presentation: Insert and Format Slides, Modify Slides, Handouts, and Notes, Change Presentation Options and Views, Configure a Presentation for Print, Configure and Present a Slide Show, Insert and Format Text: Insert and Format Shapes and Text Boxes, Insert and Format Images, Order and Group Objects.

Unit 2: Tables, Charts, SmartArt, and Media 7 Lectures

Insert and Format Tables: Insert and Format Charts, Insert and Format SmartArt graphics, Insert and Manage Media.

Unit 3: Transitions and Animations 8 Lectures

Apply Slide Transitions, Animate Slide Content, Set Timing for Transitions and Animations, Working with bullets and numbering, Working with different views, Working with slide Master, Slide show option

Suggested Readings

1.Microsoft power point 2019 ,learning the basics by Eric Stockson
2. Microsoft power point 2019 for beginners by J.Davidson.
3. Marquee series MIcrosoft power point 2019 by Audrey Roggenkamp & Lan Rutkowsky ,Nita Rutkosky

Course-SEC	**Paper Code- POOASEC105L**	**Credits-1**	**Lab hours/Week-2**
Paper:	**MS Power Point (Lab)**		

Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:

(1) Creating a Title Slide
(2) Creating Slides Using Layouts
(3) Create a presentation that consists of 5 slides and save your Presentation in desktop.
(4) Demonstrate slide transitions and animation
(5) Insert slide number, slide date, slide header and footer
(6) Demonstrate rehearse time.
(7) Demonstrate master slide.

1st Year

Semester-II

Course-MAJOR	**Paper Code- COMSMAJ203**	**Credits-3**	**Lectures/Week-3**
Paper:	**Discrete Structures**		

Prerequisite(s) and/or Note(s):

(1) High school Mathematics.
(2) Note(s): Syllabus changes yearly and may be modified during the term itself, depending on the circumstances. However, students will be evaluated only on the basis of topics covered in the course.

Course Objectives

Knowledge acquired:

(1) Basic knowledge of discrete mathematics and discrete structures,
(2) To develop understanding of Logic sets and functions
(3) Knowledge of mathematically correct terminology and notations.
(4) Knowledge about construction of direct and indirect proofs.

Skills gained:

(1) Development of problem-solving skills necessary for understanding counting problems.
(2) Ability to generalize from a single instance of a problem an entire class of problems and identification of patterns of data.

Competency Developed:

(1) Ability to analyse problems and solve problems.
(2) Ability to implement mathematical knowledge in data analysis.

Syllabus Overview

Unit 1: Introduction 10 Lectures

Sets - finite and Infinite sets, uncountably Infinite Sets; functions, relations, Properties of Binary Relations, Closure, Partial Ordering Relations; counting - Pigeonhole Principle, Permutation and Combination; Mathematical Induction, Principle of Inclusion and Exclusion.

Unit 2: Growth of Functions 8 Lectures

Asymptotic Notations, Summation formulas and properties, Bounding Summations, approximation by Integrals.

Unit 3: Recurrence Relations 10 Lectures

Recurrence Relations, generating functions, Linear Recurrence Relations with constant coefficients and their solution,Substitution Method, Recurrence Trees, Master Theorem

Unit 4: Graph Theory 10 Lectures

Basic Terminology, Models and Types, multigraphs and weighted graphs, Graph Representation, Graph Isomorphism, Connectivity, Euler and Hamiltonian Paths and Circuits, Planar Graphs, Graph Coloring, Trees, Basic Terminology and properties of Trees, Introduction to Spanning Trees, graph traversals (BFS, DFS).

Unit 5: Propositional Logic 7 Lectures

Logical Connectives, Well-formed Formulas, Tautologies, Equivalences, Inference Theory, Quantifiers.

Suggested Readings

1.C.L. Liu , D.P. Mahopatra, Elements of Discrete mathematics, 2nd Edition , Tata McGraw Hill, 1985,
2.Kenneth Rosen, Discrete Mathematics and Its Applications, Sixth Edition ,McGraw Hill 2006
3.T.H. Coremen, C.E. Leiserson, R. L. Rivest, Introduction to algorithms, 3rd edition Prentice Hall on India, 2009
4.M. O. Albertson and J. P. Hutchinson, Discrete Mathematics with Algorithms , John wiley Publication, 1988
5.J. L. Hein, Discrete Structures, Logic, and Computability, 3rd Edition, Jones and Bartlett Publishers, 2009
6.D.J. Hunter, Essentials of Discrete Mathematics, Jones and Bartlett Publishers, 2008
7.Discrete Mathematical Structures with Applications to Combinatorics, V Ramaswamy, University Press
8.Discrete Mathematics: A Concept-based Approach, Basavaraj S Anami, Venkanna S Madalli, University Press

Course-MAJOR	**Paper Code- COMSMAJ203T**	**Credits-1**	**Tut./Week-1**
Paper:	**Discrete Structures (Tutorial)**		

Discrete Structures Tutorial as assigned and advised by teacher(s).

Course-MAJOR	**Paper Code- COMSMAJ204**	**Credits-3**	**Lectures/Week-3**
Paper:	**Object Oriented Programming Using Java**		

Prerequisite(s) and/or Note(s):
(1) High school mathematics.
(2) Note(s): Syllabus changes yearly and may be modified during the term itself, depending on the circumstances. However, students will be evaluated only on the basis of topics covered in the course.

Course Objectives

Knowledge acquired:
(1) Understanding of Object-Oriented Concepts: Students will acquire knowledge of fundamental Object-Oriented Programming (OOP) concepts such as classes, objects, inheritance, polymorphism, and encapsulation. They'll grasp the theoretical underpinnings of these concepts and their practical applications in software development.
(2) Java Syntax and Language Features: Through hands-on coding exercises and projects, students will become proficient in Java syntax, learning about data types, control flow structures, and exception handling. They'll understand how to write Java programs that follow best practices and adhere to industry standards.
(3) Software Design Principles: The course will equip students with knowledge of software design principles like SOLID principles, design patterns, and anti-patterns. They'll learn how to architect well-structured, maintainable, and extensible software systems using object-oriented design principles.

Skills gained:
(1) Programming Proficiency: Students will develop practical programming skills in Java, including the ability to write, compile, and execute Java programs independently. They'll gain confidence in coding by solving progressively challenging programming problems and implementing real-world applications.
(2) Debugging and Troubleshooting: Through debugging exercises and code reviews, students will learn how to identify and fix errors in Java code effectively. They'll develop skills in using debugging tools and techniques to diagnose and resolve software issues efficiently.

Competency Developed:

(1) Problem-Solving Skills: Students will enhance their problem-solving abilities by applying object-oriented principles to solve complex programming problems. They'll learn how to break down problems into smaller, manageable components and devise elegant solutions using OOP concepts.

(2) Critical Thinking and Analysis: The course will foster students' ability to critically evaluate software designs and code implementations. They'll learn to analyze trade-offs, identify design flaws, and propose alternative solutions, honing their critical thinking skills essential for software development.

(3) Software Development Practices: By working on practical projects, students will develop competency in software development practices such as unit testing, code documentation, and code refactoring. They'll understand the importance of writing clean, readable, and maintainable code, preparing them for careers in software engineering or further academic pursuits in computer science.

Syllabus Overview

Unit 1: Introduction to Java — 7 Lectures

Java Architecture and Features, Compiling and Executing a Java Program, Variables, Constants, Keywords Data Types, Operators (Arithmetic, Logical and Bitwise) and Expressions, Comments, Doing Basic Program Output, Decision Making Constructs (conditional statements and loops) and Nesting, Java Methods (Defining, Scope, Passing and Returning Arguments, Type Conversion and Type and Checking, Built-in Java Class Methods).

Unit 2: Arrays, Strings and I/O — 10 Lectures

Creating & Using Arrays (One Dimension and Multi-dimensional), Referencing Arrays Dynamically, Java Strings: The Java String class, Creating & Using String Objects, Manipulating Strings, String Immutability & Equality, Passing Strings To & From Methods, String Buffer Classes. Simple I/O using System.out and the Scanner class, Byte and Character streams, Reading/Writing from console and files.

Unit 3: Object -Oriented Programming Overview — 10 Lectures

Principles of Object-Oriented Programming, Defining & Using Classes, Controlling Access to Class Members, Class Constructors, Method Overloading, Class Variables & Methods, Objects as parameters, final classes, Object class, Garbage Collection.

Unit 4: Inheritance, Interfaces, Packages, Enumerations, Autoboxing and Metadata — 10 Lectures

Inheritance: (Single Level and Multilevel, Method Overriding, Dynamic Method Dispatch, Abstract Classes), Interfaces and Packages, Extending interfaces and packages, Package and Class Visibility, Using Standard Java Packages (util, lang, io, net), Wrapper Classes, Autoboxing/Unboxing, Enumerations and Metadata.

Unit 5: Exception Handling, Threading, Networking and Database Connectivity — 5 Lectures

Exception types, uncaught exceptions, throw, built-in exceptions, Creating your own exceptions; Multi-threading: The Thread class and Runnable interface, creating single and multiple threads.

Unit 6: Applets and Event Handling — 3 Lectures

Java Applets: Introduction to Applets, Writing Java Applets, Working with Graphics.

Suggested Readings

1. Ken Arnold, James Gosling, David Homes, "The Java Programming Language", 4th Edition, 2005.
2. James Gosling, Bill Joy, Guy L Steele Jr, GiladBracha, Alex Buckley"The Java Language Specification, Java SE 8 Edition (Java Series)", Published by Addison Wesley, 2014.
3. Joshua Bloch, "Effective Java" 2nd Edition,Publisher: Addison-Wesley, 2008.
4. Cay S. Horstmann, GaryCornell, "Core Java 2 Volume 1 ,9th Edition,Printice Hall.2012
5. Cay S. Horstmann, Gary Cornell, "Core Java 2 Volume 2 - Advanced Features)", 9th Edition, Printice Hall.2013
6. Bruce Eckel, "Thinking in Java", 3rd Edition, PHI, 2002.
7. E. Balaguruswamy, "Programming with Java", 4th Edition, McGraw Hill.2009.
8. Paul Deitel, Harvey Deitel, "Java: How to Program", 10th Edition, Prentice Hall, 2011.

Course-MAJOR	**Paper Code- COMSMAJ204L**	**Credits-1**	**Lab hours/Week-2**
Paper:	**Object Oriented Programming Using Java (Lab)**		

Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:

1. To find the sum of any number of integers entered as command line arguments
2. To find the factorial of a given number
3. To learn use of single dimensional array by defining the array dynamically.
4. To learn use of ".length" in case of a two dimensional array
5. To convert a decimal to binary number
6. To check if a number is prime or not, by taking the number as input from the keyboard
7. To find the sum of any number of integers interactively, i.e., entering every number from the keyboard, whereas the total number of integers is given as a command line argument

Course- SEC	**Paper Code-POOBSEC218**	**Credits-2**	**Lectures/Week-2**
Paper:	**Cyber Security**		

Prerequisite(s) and/or Note(s):

(1) Anyone interested in learning about the subject.

(2) Note(s): Syllabus changes yearly and may be modified during the term itself, depending on the circumstances. However, students will be evaluated only on the basis of topics covered in the course.

Course Objectives

Knowledge Acquired:

(1) Cyber threats landscape understanding.

(2) Principles of cryptography comprehension.

(3) Network security protocols familiarity.

Skills Gained:

(1) Ethical hacking techniques application.

(2) Security assessment tools utilization.

(3) Incident response plan development.

Competency Developed:

(1) Risk assessment proficiency.

(2) Security policy formulation expertise.

(3) Communication of security concepts clarity

Syllabus Overview

Unit 1: Introduction of Cyber Security 5 Lectures

A Brief History of the Internet, Computer Crime, Defining Cyber Security and Cyberspace, Communication and web technology, Internet, World wide web, regulation of cyberspace, concept of cyber security, Issues and challenges of cyber security. Cyber security terminologies: Security, Attacks, risk, vulnerability, exploit, hacker, Computer Criminals, Cyber warfare, Security Services, Security Mechanisms, Case Studies.

Unit 2: Cyber crimes 6 Lectures

Cyber crimes targeting Computer systems and Mobiles - spyware, logic bombs, DoS, virus,Trojans, ransomware, data breach, Online scams and frauds - email scams, Phishing, Online job fraud, Online sextortion, Debit/ credit card fraud, Online payment fraud, website defacement,Cyber espionage, Darknet - illegal trades, drug trafficking, human trafficking, Social Media Scams & Frauds-impersonation, identity theft, misinformation, fake news , cyber crime against persons - cyber grooming, child pornography, cyber stalking, Cyber bullying, Social Engineering attacks, Crime reporting procedure, Case studies.

Unit 3: Digital Devices Security, Tools & Technologies for Cyber Security 12 Lectures

End Point device and Mobile phone security, Password policy, Security management, Data backup, Downloading and management of third party software, Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus, Wi-Fi security, Configuration of basic security policy and permissions.

Unit 4: Cyber law and Investigation 7 Lectures

Cyber crime and legal landscape around the world, IT Act, 2000 and its amendments. Limitations of IT Act, 2000. Cyber crime and punishments, Cyber Laws and Legal and ethical aspects related to new technologies- AI/ML, IoT, Blockchain, Darknet and Social media, Cyber Laws of other countries, Case Studies.

Suggested Readings

1. "Cybersecurity for Dummies" by Chey Cobb.
2. “Computer Hacking Beginners Guide” by Alan T. Norman
3. “Hacking: Computer Hacking, Security Testing, Penetration Testing, and Basic Security” by John Slavio.
4. Bharat Bhaskar, Electronic Commerce: Framework, Technology and Application, 4thEd., McGraw Hill Education
5. Security in Computing,3rd Edition,Charles P. Pfleeger & Shari Lawrence Pfeleeger,PHI
6. Cryptography and Network Security,A.Kahate,TMH

Course-SEC	**Paper Code- POOBSEC218L**	**Credits-1**	**Tut. hours/Week-1**
Paper:	**Cyber Security (Lab)**		

Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:

1. What are the Roles and Responsibilities of System Administrator? Demonstrate the steps for creating the User account, setting permissions, and protecting your files with password.
2. What is Wifi? How do you configure the Wifi on Windows operating system
3. Write the steps for creating the User account, setting permissions and protecting your files with password.

4. Write the steps for installation of software from Open source Mode and Paid subscription mode.
5. Write the steps to establish peer to peer network connection using two systems in a LAN.
6. Write the steps in providing network security and to set Firewall Security in windows.
7. Prepare a Case study on Ransomware attacks.
8. Prepare a case study on Social Media Crime.
9. Write the steps to prevent the denial of Service attacks.
10. What is Malware? Write the steps to remove the malware from your PC.
11. List out the various Mobile security apps. Write the steps to install and use, one of the mobile security app.
12. Write the steps to analyze the E-Mail Application’s security vulnerabilities.
13. Write the steps to read Email Headers and identify them as SPAM.
14. Write the steps to check whether the website is legitimate or not.
15. Write the steps to prevent the denial of Service attacks
16. Demonstrate the use of Network tools: ping, ipconfig, ifconfig, tracert, arp, netstat, whois
17. Demonstrate sending of a protected word document.

Course- SEC	**Paper Code-POOBSEC219**	**Credits-2**	**Lectures/Week-2**
Paper:	**HTML Programming**		

Prerequisite(s) and/or Note(s):

(1) Anyone interested in learning about the subject.

1. Experience with any text editor like notepad,
2. How to create directories and files on your computer.
3. How to navigate through different directories.
4. How to type content in a file and save them on a computer.
5. Understanding about images in different formats like JPEG, PNG format.

(2) Note(s): Syllabus changes yearly and may be modified during the term itself, depending on the circumstances. However, students will be evaluated only on the basis of topics covered in the course.

Course Objectives

Knowledge Acquired:

(1) Understanding of web page structure.
(2) Notepad, browser familiarity.
(3) Knowledge about building web pages.

Skills Gained:

(1) Proficiency in web page development.
(2) Visual content insertion capability.
(3) Creation of forms, tables.

Competency Developed:

(1) Effective web page development competency.
(2) Understanding the core concepts of web development and how web pages are constructed.
(3) Ability to structure and organize content on a web page effectively.
(4) Skills in creating forms to collect and manage user input.

Syllabus Overview

Unit 1:	**HTML Overview**	**5 Lectures**

Introduction to web page designing using HTML: create and save an HTML document, access a web page using a web browser, Basic HTML document, HTML document structure.

Unit 2:	**HTML basic tags**	**5 Lectures**

Heading tag, Paragraph tag, Line break tag, Centering content, Horizontal lines, Preserve formatting, HTML tags: html, head, title, body, (attributes: text, background, bgcolor, link, vlink, alink), br (break), hr (horizontal rule), inserting comments, h1..h6 (heading), p (paragraph), b (bold), i (italics), u (underline), ul (unordered list), ol (ordered list), and li (list item). Description lists: dl, dt and dd. Attributes of ol (start, type), ul (type).

Unit 3:	**HTML Formatting**	**5 Lectures**

Bold Text, Italic Text, Underlined Text, Strike Text, Monospaced Font, Superscript Text, Subscript Text, Inserted Text, Deleted Text, Larger Text, Smaller Text, Grouping Content

Unit 4:	**HTML – Images, Tables, Forms**	**15 Lectures**

Insert images: img (attributes: src, width, height, alt), sup (super script), sub(subscript). HTML Forms: Textbox, radio buttons, checkbox, password, list, combo box. Embed audio and video in a HTML page. Create a table using the tags: table, tr, th, td, rowspan, colspan

Suggested Readings

1. HTML 5.0 for Beginners, Vinod KumarMurugesan
2. Learn HTML in Easy way, Ritesh Kumar.
3. A Complete Reference, HTML and CSS, Thomas A. Powell

Course-SEC	**Paper Code- POOBSEC219L**	**Credits-1**	**Lab hours/Week-2**
Paper:	**HTML Programming (Lab)**		

Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:

(1) Creating an HTML document for displaying a web page with the following tags:
   a. Bold
   b. Italic
   c. Alignment
   d. Paragraph
   e. Underline
   f. Text colour
   g. Background colour
   h. Heading
   i. Line break
   j. pre

(2) Design a web page of your CV with headings as objective, educational qualification, achievement, strength, hobbies and personal details.
   Apply the following specifications:
   a. Set any light colour as page background
   b. Bold and underline all headings
   c. Insert your image on the left side of the web page
   d. Use heading tag to specify the heading
   e. After every heading is over put a horizontal line
   f. Use pre tag for educational qualification.

(3) HTML program to create nested lists

(4) HTML program to create a form to take input from user and display it

(5) HTML program demonstrating use of tables.