

**MINUTES OF THE MEETING OF THE BOARD OF STUDIES IN COMPUTER
SCIENCE**

HELD ON FEBRUARY 17, 2024 AT 10.00 a.m.

Vide Chowgule College Notice BOS/2023-24/F.133/1307 dated 1st February 2024 meeting of this Board of Studies (BoS) was convened on February 17th, 2024 at 10.00 a.m. in Block Laboratory-I of Computer Science Department, Parvatibai Chowgule College of Arts and Science (Autonomous), Margao-Goa. Since the number of members present represented the quorum, the BoS began its proceedings.

Minutes are presented in the format.

Members present in person:

1. Dr. Sameena Falleiro - Chairperson
2. Dr. Sharad Sinha – Academic Council Nominee
3. Mr. Jervis Pereira – Industry Representative
4. Mr Vinay Praveen Mahale – Alumni Representative
5. Dr. Shaila Ghanti – Member
6. Mr. Alberto Ian Barreto – Member
7. Mr. Kumaresh V.C – Member
8. Mr. D. Prabakaran – Member
9. Mrs. Suchitra Bhat – Member
10. Ms. Judith Dias Barreto – Member
11. Ms. Dikshita Aroskar – Member Secretary
12. Ms. Sanas Shaikh – Member
13. Mr. Gajanan Nial – Member
14. Mr. Mahesh Matha – Member
15. Mr. Amogh Raiturkar – Member
15. Mr. Mitendra Alve – Member

Members absent with intimation:

1. Dr. Kissan Gauns Dessai – Academic Council Nominee

Members absent without intimation:

1. Dr. J.A. Lakshminarayana – Nominee of Vice Chancellor, Goa University

Proceedings:

The members of the Board of Studies (BoS) were welcomed by the Chairperson Dr. Sameena Falleiro. The Member Secretary Ms. Dikshita Aroskar introduced and explained the agenda for this meeting and the Board transacted the following business:

Agenda :

1. Revision of CLO & alignment of CLO to PLO/PO in accordance with OBE.
2. Approval of syllabus for SEC courses to be offered at semester I, II and III.
3. Approval of VAC courses to be offered at semester I and II.
4. Approval of minor Course to be offered at Semester III.
5. A.O.B.

AGENDA 1: Revision of CLO & alignment of CLO to PLO/PO in accordance with OBE.

The department actively engaged in defining new Program Learning outcomes (PLOs) for the BSc in Computer Science program and revised Course Learning outcomes (CLO) for all the courses of FY and SY under NEP structure. By discussing the core areas of its focus, the PLOs were thoroughly deliberated, and subsequently approved by the board members during the meeting.

This comprehensive process ensured that the identified PLO's accurately reflect the program's overarching goals and objectives. The board members collaborated to establish clear and measurable outcomes that align with the department's commitment to delivering a robust curriculum. The approved PLO's are presented in Annexure B and revised Course Outcomes for all courses under NEP structure is provided in Annexure A.

During the meeting, board members suggested further enhancements to the curriculum to align with the newly defined Program Learning Outcomes (PLOs). It was proposed to introduce dedicated courses on Programming Paradigms or incorporate content on various programming paradigms within existing programming courses. This addition aims to provide students with a comprehensive understanding of diverse programming approaches, contributing directly to the development of the newly defined PLOs. Additionally, it was recommended to include topics on energy consumption in relevant courses such as Computer Organization and Internet of Things (IOT). This strategic inclusion is intended to impart knowledge and awareness about energy-efficient computing practices, aligning with the environmental and sustainable considerations highlighted in the recently defined PLOs. Moreover, board members suggested incorporating aspects of testing in courses like web development to contribute to the security parameter mentioned in the PLOs.

AGENDA 2: Approval of syllabus for SEC courses to be offered at semester I, II and III under NEP 2020.

Syllabi for the Skill Enhancement courses (SEC):UG-COM-SEC3: UI-UX, UG-COM-SEC4: E-commerce, UG-COM-SEC5: Graphic Design and UG-COM-SEC6 : Front End Web Development to be offered at semester I/II/III was discussed and deliberated.

Following thorough examination, the board members collectively approved the syllabi for these courses (Annexure C).

- I. UG-COM-SEC4: E-commerce
- II. UG-COM-SEC5: Graphic Design
- III. UG-COM-SEC6 : Front End Web Development

Additionally, the syllabus for the SEC course UG-COM-SEC1: Programming with R and UG-COM-SEC2: Programming in Python underwent revision, and the updated version was also approved by the members of the board (Annexure A).

- IV. UUG-COM-SEC1:Programming with R
- V. UG-COM-SEC2: Programming in Python
- VI. UG-COM-SEC3: UI-UX

AGENDA 3: Approval of VAC courses to be offered at semester I and II.

The college has decided to convene a separate Board of Studies (BOS) meeting for approving MDC and VAC courses. Consequently, the agenda item is deferred.

AGENDA 4: Approval of minor Course to be offered at Semester III.

In addition to the previously minuted decision to offer Object-Oriented Programming and Data Structures to minor students in Semester III, the department convened to deliberate the introduction of a separate Minor Course for the same semester.

During the discussions, it was proposed to introduce a Minor Course in Data Science or any other suitable course for students at Semester III. The board members engaged in insightful conversations regarding the inclusion of Data Science as a specialized Minor Course. This proposition recognizes the relevance of Data Science and its increasing demand in various industries.

The syllabus for the course Data Science with Python has been meticulously prepared and is presented in (Annexure C).

AGENDA 5: AOB.

I. Approval of new elective for PGDCA : The syllabus of Elective course E-Commerce development was discussed, deliberated and approved. The same is presented in Annexure III.

II. Review of program Structure for 3rd and 4th Year BSc Computer Science Program : The Board of Studies (BOS) members conducted a comprehensive review of the structure for the third and fourth years of the BSc-CS program. After careful examination, several strategic modifications were suggested to enhance the curriculum:

- A. Combination of Machine Learning and Deep Learning: It was proposed to combine the courses on Machine Learning and Deep Learning into a single comprehensive course in Semester VII.
- B. Shift of Educational Technology to a Vocational Course (VOC) at Semester VIII: Education Technology, previously part of the core curriculum, is recommended to be shifted to a Vocational Course in Semester VIII.
- C. Introduction of Parallel Computing: In place of Education Technology, it was suggested to introduce a course on Parallel Computing in Semester VIII.
- D. Inclusion of Advanced Operating System Course: The introduction of a course on Advanced Operating System was recommended in Semester VIII.

III. Eligibility Criteria and Selection Procedure for admission to M.Sc. IT program :

In light of the revised eligibility criteria set forth by Goa University for admission to PG programs, the department embarked on a comprehensive process to formulate new eligibility criteria for admissions to the MSc IT program. This involved meticulous discussions, thorough deliberations, and ultimate approval by the board members.

The following is the eligibility criteria and selection procedure:

Candidates with B.Sc. (Computer Science) / B.C.A. /B. Voc (Software Development)/ Equivalent degree with a minimum score of 55% at degree level are eligible. Candidates with a score of 60% and above at P.G.D.C.A. and at least a minimum 50% at B.Sc. (Computer Science) /B.C.A. / Equivalent are also eligible to apply.

OR

Bachelor Degree in Mathematics/Physics/Statistics/Electronics with a minimum score of 55% at degree level. Such candidates shall be provisionally admitted until successful completion of Bridge Course(s) before completion of Semester I recommended to the students on a case to case

basis by the respective mentors assigned to them at the time of Admission to the Programme and approved by the Department Faculty Council(DFC).

OR

Bachelor Degree in Science with 55% at degree level and P.G.D.C.A. with a minimum of 60% and above.

NOTE: Apart from the eligibility conditions mentioned above, selection of candidates will be done on merit on the basis of their performance at the Admission Ranking Test for MSc IT.

It was proposed and agreed upon that the question paper for admission be subject to a review by the Department Faculty Council. The List of Bridge courses and their syllabus for Non Computer Science candidates for admission to M.Sc. IT program is presented in annexure III.

IV. BVoc - Software Development

A] Introduction of New Course: Content Writing for BVoc - Software Development First Year

In recognition of the overlapping content between the Academic Writing course and the Language course in the first year of the BVoc - Software Development program, a decision was made to introduce a new course titled "Content Writing" for Semester II. This revised course will encompass advanced topics and aims to provide students with an enhanced understanding of content creation.

The syllabus for the Content Writing course underwent comprehensive discussions, deliberations, and received approval from the concerned authorities. The approved syllabus is officially documented and presented in Annexure A

B] Course Replacement: Introduction of "Security in Web and Mobile Applications"

A decision was made to replace the existing "E-commerce" course offered in the VIth semester of the BVoc - Software Development program with a new course titled "Security in Web and Mobile Applications. The syllabus for the newly introduced "Security in Web and Mobile Applications" course was discussed and is presented in Annexure A.

PART A: Resolutions (Annexure A and B)

1. Resolution was passed to approve the newly framed PLO's for BSc in Computer Science program and revised CLO's in all the courses offered in the BSc program under NEP structure.
2. Resolution was passed to approve the syllabi for Skill Enhancement Courses to be offered at Semester I, II and III of BSc Computer Science program under the approved Program structure.
3. The college has decided to convene a separate Board of Studies (BOS) meeting for approving MDC and VAC courses. Consequently, the agenda item is deferred.
4. Resolution was passed to approve the syllabi for Minor Course to be offered at Semester III.

A.O.B.

1. Resolution was passed to approve the syllabi for elective course for PGDCA program.
2. Resolution was passed to approve the eligibility criteria and selection procedure for admission to MSc-IT program.
3. Resolution was passed to approve the syllabi for General Course Content Writing to be offered at Semester II and Security in Web and Mobile Applications at Semester VI for BVoc - Software Development program.

PART B:

Important points/recommendations of BoS that require consideration/approval of Academic Council:

1. To seek approval for the newly framed PLO's for BSc in Computer Science program and revised CLO's for all the courses of semester I, II, III and IV under NEP structure presented in Annexure A.
2. To seek approval for the syllabi for Skill Enhancement Courses to be offered at Semester I, II and III of BSc Computer Science program under the approved Program structure presented in Annexure C.
3. The college has decided to convene a separate Board of Studies (BOS) meeting for approving MDC and VAC courses. Consequently, the agenda item is deferred.
4. To seek approval for the syllabi for Minor course to be offered at Semester III of BSc Computer Science program presented in Annexure C.

A.O.B.

1. To seek approval for the syllabi of elective course E-commerce development for PGDCA program presented in Annexure III.
2. To seek approval for the newly drafted eligibility criteria and selection procedure for admission to MSc-IT program presented in Annexure IV and the List of Bridge courses and their syllabus for Non Computer Science candidates for admission to M.Sc. IT program.
3. To seek approval for the syllabi to be offered at Semester III and IV for BVoc Software Development program presented in Annexure C.

The Chairman thanked the members of the Board of Studies in Computer Science for their valuable contribution and active participation in the meeting.

The meeting ended with a vote of thanks to the Chair.

The foregoing minutes of the meeting were circulated by the Chairman, Board of Studies in Computer Science after the conclusion of the BoS meeting.

The following members of the Board of Studies were present for the meeting:

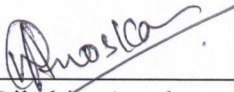
1. Dr. Sameena Falleiro - Chairperson
2. Dr. Sharad Sinha – Academic Council Nominee
3. Mr. Jervis Pereira – Industry Representative
4. Mr Vinay Praveen Mahale – Alumni Representative
5. Dr. Shaila Ghanti – Member
6. Mr. Alberto Ian Barreto – Member
7. Mr. Kumaresh V.C – Member
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14. Mr. Mahesh Matha – Member
15. Mr. Amogh Raiturkar – Member
15. Mr. Mitendra Alve – Member

Members absent with intimation:

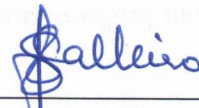
1. Dr. Kissan Gauns Dessai – Academic Council Nominee

Members absent without intimation:

1. Dr. J.A. Lakshminarayana – Vice Chancellor, Goa University Nominee



Ms. Dikshita Aroskar



Dr. Sameena Falleiro

PART C: The remarks of the Dean of Academics:

- a. The minutes are in order.
- b. The minutes may be placed before the Academic Council with remark, if any.
- c. Important points of the minutes which need clear policy decision of the Academic Council to be recorded.

Date: 21/02/2024

Signature of the Dean of Academics:



Dr. Meghana S. Devli

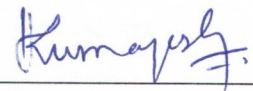
PART D: The remarks of the Members Secretary of the Academic Council:

- a. The minutes are in order.
- b. The minutes may be placed before the Academic Council with remark, if any.
- c. Important points of the minutes which need clear policy decision of the Academic Council to be recorded.

Date: 29/2/24

Signature of the Member Secretary,

Academic Council



Mr. V. C. Kumaresh



Chowgule Education Society's

Parvatibai Chowgule College of Arts and Science
Autonomous

Accredited by NAAC with Grade 'A+'
Best Affiliated College-Goa University Silver Jubilee Year Award

Annexure A
Summary of the changes incorporated in CLOs

Sem ester	Course	Existing CLOs	Revised CLOs	Reason for revising
CORE COURSES SEMESTER I, II, III, IV				
I	Introduction to Programming	<p>CLO1: Explain problem solving strategies.</p> <p>CLO2: Draw a flowchart for a given problem.</p> <p>CLO3: Write an algorithm for a given problem.</p> <p>CLO4: Explain and Apply sorting and searching algorithms.</p> <p>CLO5: Recognize and incorporate programming elements such as loops, decision making, functions, arrays, strings.</p> <p>CLO6: Recognize and incorporate programming elements such as structures, pointers and files into applications that solve real world problems.</p>	<p>CLO1: Understand problem solving strategies.</p> <p>CLO2: Draw a flowchart and write an algorithm for a given problem.</p> <p>CLO3: Recognize and incorporate programming elements such as loops, decision making, functions, arrays, strings.</p> <p>CLO4: Recognize and incorporate programming elements such as structures, pointers and files into applications that solve real world problems.</p>	To align the CLO with the newly drafted Program Learning Outcome.
II	Database Management Systems - I	<p>CLO1: Explain the various concepts of database systems.</p> <p>CLO2: Design ER-models to represent simple database application scenarios.</p>	<p>CLO1: Explain the fundamental concepts of database systems, including data models, database languages, and database design.</p> <p>CLO2: Design and model a database using</p>	To align the CLO with the newly drafted Program Learning Outcome.

		<p>CLO3: Convert an ER diagram to a database schema.</p> <p>CLO4: Formulate queries in Relational Algebra, and SQL to manipulate the database.</p> <p>CLO5: Analyze the schema to see if they fulfill Normalization criterion.</p>	<p>Entity-Relationship diagrams.</p> <p>CLO3: Formulate queries in Relational Algebra, and SQL to create and manipulate the databases.</p> <p>CLO4: Normalize databases to eliminate data redundancy and ensure data integrity.</p>	
III	Data Structures	<p>CO1 : Define relevant standard algorithms for various data structures. Learn various applications of data structures.</p> <p>CO2 : Implementation of data structures.</p> <p>CO3 : Use various data structures for sorting and searching.</p> <p>CO4 : Analyze and compare algorithms for efficiency using Big-O notation.</p> <p>CO5 : Formulate new solutions for programming problems.</p>	<p>CLO1 : Understanding core data structures.</p> <p>CLO2 : Implementation and manipulation of data structures.</p> <p>CLO3 : Analyze and implement different sorting and searching algorithms.</p> <p>CLO4 : Perform fundamental operations on different types of tree structures, including insertion, deletion, and various traversals.</p>	To align the CLO with the newly drafted Program Learning Outcome.
	Object Oriented Programming	<p>CO1: Apply fundamental object-oriented concepts in problem solving.</p> <p>CO2: Analyze problem scenario and identify classes/objects, their properties/functionalities and associations.</p> <p>CO3: Analyze the problem scenario based on UML diagrams and develop the system.</p> <p>CO4: Implement the object oriented model in</p>	<p>CLO1: Apply fundamental object-oriented concepts in problem solving.</p> <p>CLO2: Identify classes, their members and relationships between them.</p> <p>CLO3: Implement the object oriented model in any object oriented language.</p> <p>CLO4: Develop applications to solve real world problems.</p>	To align the CLO with the newly drafted Program Learning Outcome.

		any object oriented language.		
IV	Computer Architecture and Operating Systems	<p>CLO1: Explain the detailed function of a typical Computer system and its components.</p> <p>CLO2: Identify the functions of operating system</p> <p>CLO3: Analyze the process, its states and process scheduling algorithms</p> <p>CLO4 :Explain deadlocks and synchronization, memory management, and disk scheduling. .</p> <p>CLO5: Implement Assembly Language Program and Shell Script for a given task.</p> <p>CLO6: Implement algorithm of CPU Scheduling, Memory Scheduling.</p>	<p>CLO1: Explain the detailed function of a typical Computer system and its components.</p> <p>CLO2: Identify the functions of operating system</p> <p>CLO3: Analyze the process, its states and process scheduling algorithms</p> <p>CLO4 :Explain deadlocks and synchronization, memory management, and disk scheduling. .</p> <p>CLO5: Implement Assembly Language Program and Shell Script for a given task.</p> <p>CLO6: Implement algorithm of CPU Scheduling, Memory Scheduling.</p>	To align the CLO with the newly drafted Program Learning Outcome.
	Mathematical Foundations for Computer Science	<p>CO1: Represent and solve linear systems using matrices and elementary row operations.</p> <p>CO2: Compute eigenvalues, eigenvectors, and understand their relevance in various problems in Computer Science.</p> <p>CO3: Use interpolation methods to estimate values between data points.</p> <p>CO4: Define and work with vector spaces, subspaces, and basis,</p>	<p>CLO1: Represent and solve linear systems using matrices.</p> <p>CLO2: Competence in dealing with linear transformations, null space, range, and isomorphisms.</p> <p>CLO3: Define and work with vector spaces, subspaces, and basis, emphasizing their role in computer graphics and linear algebra applications.</p> <p>CLO4: Compute eigenvalues and eigenvectors of matrices, particularly in the context</p>	To align the CLO with the newly drafted Program Learning Outcome.

		emphasizing their role in computer graphics and linear algebra applications. CO5: Compute eigenvalues and eigenvectors of matrices, particularly in the context of data analysis, machine learning, and optimization.	of data analysis, machine learning, and optimization. CLO5: Use interpolation methods to estimate values between data points. CLO6: Application of matrices and Vectors in solving real-world problems.	
	Web Development with PHP-MYSQL	CO1: Demonstrate a fundamental understanding of PHP, including its syntax and basic principles. CO2: Conduct CRUD (Create, Read, Update, Delete) operations with PHP and MySQL, involving the retrieval, insertion, updating, and deletion of data. CO3: Design and build user registration and login systems, applying password hashing and security measures for user authentication. CO4: Implement security best practices in PHP web development, including input validation and sanitation, to protect against common threats like Cross-Site Scripting (XSS) and SQL injection.	CLO1: Demonstrate a fundamental understanding of PHP in Object Oriented paradigm, including its syntax and basic principles. CLO2: Conduct CRUD (Create, Read, Update, Delete) operations with PHP and MySQL, involving the retrieval, insertion, updating, and deletion of data. CLO3: Apply hashing and security measures for user authentication. CLO4: Implement security best practices in PHP web development, including input validation and sanitation, to protect against common threats like Cross-Site Scripting (XSS) and SQL injection.	To align the CLO with the newly drafted Program Learning Outcome.
	Software Engineering	CO1: Understand the various Software Development Methodologies. CO2: Apply Estimation techniques to live projects. CO3: Analyze Software Projects.	CO1: Understand the various Software Development Methodologies. CO2: Apply Estimation techniques to live projects. CO3: Analyze Software Projects. CO4: Design Software Projects.	To align the CLO with the newly drafted Program Learning Outcome.

		CO4: Design Software Projects.		
SEC COURSES SEMESTER I, II, III				
	Programming with R	<p>CLO1 : Develop solutions to problems and implement these solutions in R.</p> <p>CLO2 : Use R with various data sources and perform computation.</p> <p>CLO3 : Solve mathematical problems using R.</p> <p>CLO4 : Plot charts and graphs using R.</p>	<p>CLO1: Understand the R environment and do basic programming in R</p> <p>CLO2: Analyse, extract and manipulate data by using functions in R.</p> <p>CLO3: Compute various measures like central tendency, measures of dispersion by using graphical techniques.</p> <p>CLO4: Compute the correlation coefficient for bivariate data, perform simple and multiple linear regression on data set and analyse time series.</p>	To align the CLO with the newly drafted Program Learning Outcome.
	Programming in Python	<p>CLO1: Understand syntax of Python Programming.</p> <p>CLO2: Write a program using conditional statements, loops.</p> <p>CLO3: Apply required List, Tuple and Dictionary function.</p> <p>CLO4: Write Python program specific to the domain of the given prob</p>	<p>CLO1: Understand the basics (Data types, Operators etc.)</p> <p>CLO2: Write programs using conditional statements, loops</p> <p>CLO3: Apply required List, Tuple and dictionary function</p> <p>CLO4: Write Python program specific to the domain of the given problem</p>	To align the CLO with the newly drafted Program Learning Outcome.

Annexure A
Summary of the changes incorporated in syllabus

Semester	Course	Existing	Changes suggested	Reason
I	Introduction to Programming	Topics on sorting and searching.	Removed sorting and Searching algorithms from syllabus	The concepts are covered in data structure and vast syllabus.
I	Programming with R	Databases in R	Basic statistics and regression using R is added	statistics and regression was needed to demonstrate the use of the R tool.
I	Programming in Python	-	Use of Python package to manage the environmental impact of computation added to the practical component.	To contribute to the development of an environmentally friendly solution as specified in the Program Learning Outcome.
I/II/II	UI/UX design	Removed component on Web design concepts from syllabus	Added content on Human Computer Interaction	Separate courses is offered on front end web development

Proposed Changes to the Program Structure
(To be implemented w.e.f. Acad. Year 2024 - 2025)

DEPARTMENT OF COMPUTER SCIENCE						
PROPOSED NEP STRUCTURE						
WEF FROM AY 2023-2024						
B.Sc IN COMPUTER SCIENCE (WITH HONOURS)						
(4-year course structure)						
S E M	Major subject/ discipline (3T+1P)	Minor Stream (Disc./Voc) (3T+1P)	(MDC for Others) (2T + 1P)	VAC (2 credits)	SEC (2T+1P)	INTER NSHIP
I	UG-COM-101 Introduction to Programming	UG-COM-101 Introduction to Programming	UG-COM-MDC	UG-COM-VAC	UG-COM-SEC	
			UG-COM-MDC			
II	UG-COM-102 Database Management	UG-COM-102 Database Management	UG-COM-MDC	UG-COM-VAC	UG-COM-SEC	
			UG-COM-MDC			
III	UG-COM-201: Data Structures	UG-COM-202: Object Oriented Programming	UG-COM-MDC		UG-COM-SEC	
	UG-COM-202: Object Oriented Programming					
IV	UG-COM-203: Computer Architecture and Operating System	UG-COM-VOC- 1: Mobile Application Development				
	UG-COM-204:					

	Mathematical Foundations for Computer Science					
	UG-COM-205: Web Development with php					
	UG-COM-206: Software Engineering					
V	UG-COM-301: Full Stack Development	UG-COM-VOC -2: Digital Marketing				Internship (4 credits)
	UG-COM-302: IOT					
	UG-COM-303: Computer Networks					
VI	UG-COM-304: Data Science	UG-COM-VOC -3: Software Testing(voc)				
	UG-COM-305: Cloud Computing					
	UG-COM-306: AI					
	UG-COM-PRJ: Project					
VII	UG-COM-401: Design and Analysis of Algorithms	UG-COM-405: Image Processing				
	UG-COM-402: Software Architecture, Design Patterns and Frameworks					
	UG-COM-403: Advanced					

	DBMS					
	UG-COM-404: Machine Learning and Deep Learning					
VIII	UG-COM-406: Compiler Design	UG-COM-410: Network Security				
	UG-COM-407: Advanced Operating System	UG-COM-411: Educational Technology				
	UG-COM-408: NLP					
	UG-COM-409: Parallel Computing					

Note : SEC will be offered from the pool of approved syllabus.

SEC Pool

Sr. No.	Course Code and Title
1	UG-COM-SEC1 - Programming with R
2	UG-COM-SEC2 - Programming in Python
3	UG-COM-SEC3 - UI/UX Design
4	UG-COM-SEC4 - E-Commerce
5	UG-COM-SEC5 - Graphic Design
6	UG-COM-SEC6 - Front End Web Development

SEMESTER I

DISCIPLINE SPECIFIC CORES

Revised Syllabus

(To be implemented w.e.f. Acad. Year 2024 - 2025)

Course Title: Introduction to Programming

Course Code: UG-COM-101

Credits: 3

Marks: 75

Course Objectives :

- To understand the concept of basic computer algorithm and flowchart and use the algorithm for various problem solving.
- To implement algorithms using a high level programming language.
- To understand basic principles of structured programming –example C.

Course Learning Outcome:

Upon completion of the course students will be able to:

CLO1: Understand problem solving strategies.

CLO2: Draw a flowchart and write an algorithm for a given problem.

CLO3: Recognize and incorporate programming elements such as loops, decision making, functions, arrays, strings.

CLO4: Recognize and incorporate programming elements such as structures, pointers and files into applications that solve real world problems.

Module I

[10 HRS]

Introduction to Computer Problem Solving : Algorithms, Flowchart, The Problem-Solving Aspect, General problem-solving strategies, Top-Down Design, Implementation of Algorithms, Efficiency of Algorithms, Recursive algorithms.

Basic Algorithms : Exchanging the values, Summation of a set of numbers, factorial computation, generation of the Fibonacci series, reversing the digits of an integer, base conversion.

Factoring Methods : Finding divisors of an integer, finding the Greatest Common Divisor of two integers, generating prime numbers, computing prime factors of an integer.

Module II

[20 HRS]

C Language : History, Structure of a C program, Keywords, Identifiers, variables, constants, data types, Arithmetic Operators & Expressions, Logical operators and Relational Operators, Precedence and Associativity rules.

Conditions and Iterations : Conditions and Actions, Condition statement, Simple control statement (if, if-else,switch), Iterative control statements (for, while, do-while).

Functions : What is a function, Advantages of functions, Standard library functions; User define functions – declaration, definition, function call, parameter passing, return keyword. Scope of variables, Storage classes, Recursion.

Arrays : One- and Two-dimensional arrays: Array declaration, initialization, accessing the values, passing arrays to functions.

Pointers : Pointer declaration, initialization, Pointer arithmetic, Pointer to Pointer, Arrays and Pointers, Functions and Pointers – passing pointers to functions, function returning pointer, dynamic memory allocation.

Module III

[15 HRS]

Strings : Declaration and initialization, standard library string functions, strings and pointers, array of strings.

Structure and Union : Creating structures, accessing structure members, array of structures, passing structure to functions, nested structure, pointers and structures, union, difference between structures and unions.

File Handling : FILE variable, file access modes, operations on files, random access to files, command line arguments.

Pre-processing : Format of Preprocessor directive, File Inclusion directive, Macro substitution, conditional compilation.

Practical: Introduction to Programming

Credit: 1

Marks: 25

Duration: 30 Hrs

Programs using C language that covers the following concepts:

1. Conditions (1P)
 - if..else
 - nested if

2. Iterative Control Statements (2P)
 - for
 - while
 - do...while

3. Functions. (2P)
 - Standard Library functions
 - Call by Value
 - Call by reference
 - Recursive functions

4. Arrays. (2P)
 - One Dimensional Arrays
 - Two Dimensional Arrays

5. Pointers. (2P)
 - Arrays and Pointers
 - Function returning pointers
 - Dynamic memory allocation

6. Strings. (2P)
 - Standard Library string functions
 - Strings and Pointers
 - Array of Strings

7. Structure and Union (2P)
 - Array of structures
 - Passing Structure to functions
 - Nested structure
 - Structure and Pointer
 - Union

8. File Handling.

(2P)

- Text file
- Binary file
- Random Access to a file
- Command Line arguments

REFERENCE BOOKS:

MANDATORY:

1. Dromey, R. G. (1982). How to Solve it by Computer. Prentice-Hall, Inc..
2. Kanetkar, Y. (2012). Let us C, BPB Publications,
3. Forouzan, B. A., & Gilberg, R. F. (2000). Computer Science: A structured programming approach using C. Brooks/Cole Publishing Company..

SUPPLEMENTARY:

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2. Gottfried, B. (2010). Programming with C, Tata McGraw Hill.

WED REFERENCES:

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3. <https://www.tutorialspoint.com/cprogramming>
4. <https://www.javatpoint.com/c-programming-language-tutorial>
5. <https://www.w3schools.in/c-tutorial/>
6. <https://www.guru99.com/c-programming-tutorial.html>
7. <https://www.geeksforgeeks.org/c-programming-language/>
8. E Book - <https://www.edutechlearners.com/download/books/Let%20Us%20C%20by%20Yashavant%20Kanetkar%20PDF.pdf>
9. E Book - <http://www2.cs.uregina.ca/~hilder/cs833/Other%20Reference%20Materials/The%20C%20Programming%20Language.pdf>
10. E Book - http://www.kciti.edu/wp-content/uploads/2017/07/cprogramming_tutorial.pdf

SKILL ENHANCEMENT COURSES
Revised Syllabus
(To be implemented w.e.f. Acad. Year 2024 - 2025)

Course Title: Programming with R

Course Code: UG-COM-SEC1

Credits: 2

Marks: 50

Course Objectives:

- To enable students to handle data in the R software thereby helping them to understand meaningful statistical analysis performed on the data.
- To enable students to extract data, and perform basic statistical operations.
- Data analysis such as – data cleaning, data visualization, data summarization and regression.

Course Learning Outcomes:

At the end of the course students will be able to:

CLO1: Understand the R environment and do basic programming in R

CLO2: Analyse, extract and manipulate data by using functions in R.

CLO3: Compute various measures like central tendency, measures of dispersion by using graphical techniques.

CLO4: Compute the correlation coefficient for bivariate data, perform simple and multiple linear regression on data set and analyse time series.

Module I: Basics of R-language

[15 Hrs]

Overview of the R language: Installing R and R Studio: Using R studio, Scripts, Text editors for R, Graphical User Interfaces(GUIs) for R, Creating and storing R workspaces, installing packages and libraries, Mathematical operations.

Data Types in R- Numeric, Integer, Character, Logical, Complex and missing data.

Data Structures in R

- Vectors-Creation, Arithmetic operations of Vectors, Vector Sub setting, Sorting and Sequencing functions.
- Matrix and Arrays-Creation Arithmetic Operations of Matrix, Sub setting, Use of drop function.
- Factors-Converting a vector into factor, assigning levels and labels, ordered Factor.
- List- Creating a List, accessing List elements, manipulating List elements, merging Lists, converting Lists to Vectors.

- Data Frames-Creation of Data Frame, adding new columns, rows and removing columns, accessing column using the \$ sign, importing a data set (important file formats such as csv, txt and spreadsheet), aggregate function and subsetting of dataframes, tapply function, manipulation using dplyr package (select, filter, arrange, mutate and group by function, pipe operator).

Programming Fundamentals: Relational Operators, Relational Operators and Vectors, Logical Operators, Logical Operators and Vectors, & vs &&, | vs ||, Conditional Statements, While Loop, For Loop, Looping Over List, Loops for Vectors, Loops for Matrices, Loops for Data Frames, Loops for Lists, writing a Function in R, Nested Functions, Function Scoping, Recursion, Mathematical Functions in R, Calculus in R, Input and Output Operations.

Reading and writing data in R (file formats such as csv, txt, and xlsx).

Module II: Basic Statistics and Regression

[15 Hrs]

Summarizing and exploring data: Descriptive statistics (mean, median, mode, variance, skewness, five-point summary), dealing with missing data in R, Data cleaning (dplyr package, tidyr package and pipe operator), Exploratory Data Analysis: data visualization using inbuilt functions and ggplot2 package (pie chart, bar chart, line chart, histogram, box plot, scatter plot, normal QQ plot).

Regression analysis using R: Regression vs Correlation, Simple and multiple regression, Ordinary least square, Assumptions of Classical normal linear regression model, corrplot package, car package, lmtest package, scatter plot(using plot function and ggplot2 package) to understand the relationship between variables, lm, abline, predict, resid function, interpreting ‘summary table’ of the regression model, normality of residuals (qqnorm and qqPlot functions), multicollinearity (correlation matrix, corrplot and vif function), autocorrelation (acf plot and Durbin Watson test), heteroscedasticity (graphically, bptest, ncvTest).

Time series data, components of a time series data, additive and multiplicative time series model, ts function, diff function, plot of a time series data, time series data with linear trend; regression analysis using ‘lm’ function.

Practicals: Programming with R

Credit:1

Marks:25

Duration:30 Hrs

1. R-Programming Basics: Installing R Studio, Using R console to perform basic arithmetic operations, display strings and workspace variables. [1P]
2. Data Structures: Vectors, Lists, Matrices, Data Frames, Factors and Arrays [3P]
3. Control Flow and Iterations. [1P]
4. Functions in R. [1P]
5. Implement Problems based on measures of central tendency. [1P]
6. Implement Problems based on measures of dispersion. [1P]
7. Implement Problems based on moments, skewness and kurtosis. [1P]
8. Loading, data cleaning and data visualization. [2P]
9. Perform simple and multiple linear regression. [2P]
10. Perform time series analysis [2P]

REFERENCE BOOKS:

MANDATORY:

1. K. G. Srinivasa, G. M. Siddesh et al, Statistical Programming in R, Oxford University Press.
2. Gardener, M. (2018), Beginning R: The Statistical Programming Language, Wiley & Sons.

SUPPLEMENTARY:

1. Sekhar, S.R.M., et al. (2017), Programming with R, Cengage Learning India.
2. Wickham, H., et al. (2017), R for Data Science: Import, Tidy, Transform, Visualize, and Model Data, O'Reilly'.
3. Field, A., Miles, J and Field (2012), Z. Discovering Statistics using R (Indian Reprint 2022), SAGE
4. Sandip Rakshit, R Programming for Beginners, McGraw Hill Education.
5. Tilman M. Davies, The Book for R, No Starch Press.
6. Emmanuel Paradis, R Programming for Beginners.

WEB BASED:

1. <https://intellipaat.com/blog/tutorial/r-programming/>
2. <https://www.geeksforgeeks.org/r-statistics/?ref=lbp>
3. <https://www.tutorialspoint.com/r/index.htm>
4. <https://www.javatpoint.com/r-tutorial>
5. <https://www.w3schools.com/r/>
6. <https://www.programiz.com/r>

Course Title: Programming in Python

Course Code: UG-COM-SEC2

Credits: 2

Marks: 50

Duration:30 Hrs.

Course prerequisite: Introduction to Programming(UG-COM-101)

Course Objectives:

- To apply various data types and control structures.
- To apply python data structures - list, tuple and dictionary.
- To structure a python program as a set of functions.
- To do input/output with files in Python.
- To provide skills of data analysis using Python programming language.

Course Learning Outcomes:

At the end of the course students should be able to :

CLO1: Understand the basics (Data types, Operators etc.)

CLO2: Write programs using conditional statements, loops

CLO3: Apply required List,Tuple and dictionary function

CLO4: Write Python program specific to the domain of the given problem

Module I

[15 HRS]

Motivation, programming paradigms, What Python can do, Python's technical strength, Python interpreter, Program execution, Execution model variations, How to run programs.

Basic Syntax :

Variable and Data Types, Operator, Conditional Statements - if, if- else, Nested if-else. Looping – For, While, Nested loops. Control Statements – Break, Continue, Pass.

Strings :

Accessing Strings, Basic Operations, String slices, Function and Methods.

Tuples and Lists :

Introduction, Accessing list, Operations, Working with lists, Function and Methods. Introduction Accessing tuples, Operations, Working, Functions and Methods.

Module II

[15 HRS]

Dictionaries:

Introduction, Accessing values in dictionaries, Working with dictionaries, Properties.

Functions:

Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables.

Modules:

Importing module. Math module. Random Module.

Exception Handling:

Exception. Exception Handling - Except clause, Try , except,finally clause. User Defined Exceptions.

Input-Output :

Printing on screen, Reading data from keyboard, Opening and closing file, Reading and writing files, Functions. Printing on screen, Reading data from keyboard, Opening and closing file, Reading and writing files.

Practicals: Programming in Python

Credit: 01

Marks: 25

Duration:30 Hrs

List of Experiments using Python Language:

1. Write a python program to compute a given formula. [1P]
2. Write a python program to implement an if else statement. [1P]
3. Write a python program to implement nested if else statements. [1P]
4. Implement for and while loop in python. [2P]
5. Write a string manipulation in python. [2P]
6. Write a program to implement lists in python. [2P]
7. Write a python program to implement tuple. [1P]
8. Write a python program to implement a dictionary. [2P]
9. Write python program to implement function [1P]
10. Write a python program to implement Input-Output File Operations in python. [1P]
11. Using a Python package to manage the environmental impact of computation. [1P]

REFERENCE BOOKS:

MANDATORY:

1. Mark Lutz, Learning Python, O'Reilly Media, Fifth Edition.

SUPPLEMENTARY:

1. Alex Martelli, (2006) Python – A Nutshell, O'Reilly Media, Second Edition.
2. Wes McKinney, (2012) Python for Data Analysis, O'Reilly Media.

WEB BASED:

1. <https://www.w3schools.com>
2. <https://www.tutorialspoint.com>
3. <https://www.javatpoint.com>
4. <https://www.geeksforgeeks.org>
5. <https://www.guru99.com>

Course Title: UI/UX Design
Course Code: UG-COM-SEC3
Credits: 2
Marks: 50
Duration:30 Hrs.

Course Objectives:

- To study the different aspects of UI/UX Design.
- To study computer interface design concepts.

Course Outcomes:

Upon completion of the course student will be able to:

- CLO1:** Understand the principles of UI/UX design interaction with a computer System.
CLO2: Understand the concept of a graphical user interface, and its design characteristics.
CLO3: Apply fundamental design principles including typography, color theory, screen design and layouts.
CLO4: To create interactive and intuitive user interfaces.

Module I: Introduction to UI and UX Design:

[15 HRS]

Explain the distinctions between UI and UX design. Understand the significance of UI/UX in digital product development.

Human-Computer Interaction: Importance of user Interface, Human characteristics, Human consideration, Human interaction speeds, Understanding business functions. User centered design, Persona.

Rapid Prototyping: Storyboarding. Paper Prototyping and Mockup, Video Prototyping, Creating and Comparing Alternatives.

Graphical User Interface Design: HCI guidelines, Windows: Navigation schemes selection of window; Selection of devices based and screen-based controls, Components, Text and messages, Icons, Multimedia, Colors., controls, help & error messages design.

Module II: Heuristic Evaluation and Visualization

[15 HRS]

Web user interface design – Jessy James Garette five layers of user experience. Heuristic Evaluation: Heuristic Evaluation — Why and How?

Visualization, Amount of information, Focus and emphasis, Presentation information simply and meaningfully, Statistical graphics.

Practicals: UI/UX Design

Credit : 1

Marks : 25

Duration: 30 Hrs

List of practicals:

Suggested list of practical (Numbers in brackets indicate number of practicals)

1. Paper Prototyping using templates (1P)
2. Persona- conducting contextual interview and developing persona (1P)
3. Storyboarding (2P)
4. GUI design: Using FIGMA: (3P)
5. Web UI design: Using FIGMA: (3P)
6. Prototyping in FIGMA (3P)
7. Visualization and infographics (1P)
8. Heuristic Evaluation (1P)

A Mini Project combining all the technologies learnt using a front-end development framework such as bootstrap is recommended.

REFERENCES:

Mandatory:

1. Cooper, A., Reimann, R., & Dubberly, H. (2003). About face 2.0: The essentials of interaction design. John Wiley & Sons, Inc..
2. Alan.D, Janet.F, Gregory D. and Russell,B. (2012) Human-Computer Interaction, Prentice Hall.
3. D.T,(2018) Web Technologies, Black Book, Dream Tech

Supplementary:

1. Shneiderman, B., & Plaisant, C. (2010). Designing the user interface: strategies for effective human- computer interaction. Pearson Education India.
2. Donald.A.N. (2010) The Design of Everyday Things Basic Books.

WEB REFERENCES:

1. <http://hcibib.org/>
2. https://www.tutorialspoint.com/human_computer_interface/index.htm.
https://www.academia.edu/4955516/Wiley_The_Essential_Guide_to_User_Interface_Design_3rd_Edition_Apr_2007?auto=download.

3. https://www.slideshare.net/busaco/hci-2015-110-humancomputer-interaction-overview?qid=1c116f30-ec87-4eb4-a375-49b2bbe65d75&v=&b=&from_search=2
4. <https://www.w3schools.com>
5. <https://www.tutorialspoint.com/html/index.htm>
6. <https://www.tutorialspoint.com/css/index.htm>
7. <https://www.tutorialspoint.com/javascript/index.htm>
8. <https://www.tutorialspoint.com/jquery/index.htm>
9. <https://www.udemy.com/courses/development/web-development/>

Annexure B

PROGRAMME LEARNING OUTCOMES (PLO)

After successful completion of a three years Bachelor's degree in Computer Science, the student will be able to:

PLO-1	Understanding and Application of Fundamental Knowledge	Graduates will attain a comprehensive understanding of fundamental principles in core areas of Computer Science. This proficiency will empower them to develop robust problem-solving skills, applying their foundational knowledge to analyze and solve complex problems effectively. Moreover, they will demonstrate the capability to apply their core knowledge seamlessly in translating theoretical concepts into practical solutions.
PLO-2	Proficiency in Programming Paradigms and Problem Solving	Graduates will showcase adeptness in various programming paradigms, ensuring a versatile approach to code development. Their proficiency extends to the effective application of design patterns and best practices in programming, fostering the creation of modular, maintainable, and extensible software solutions. This combination of skills equips graduates to navigate diverse coding challenges with a strategic and efficient problem-solving mindset.
PLO-3	Developing solutions for real world problems.	Graduates will possess the ability to craft verified, tested, efficient, and secure computerized solutions for real-world problems, leveraging principles in Computer Science and contemporary technologies. They will demonstrate the capability to collaborate across disciplines. This collaboration involves integrating their expertise with insights from diverse fields, enabling the creation of comprehensive and holistic solutions for intricate real-world challenges.
PLO-4	Contributing to Socially responsible and environment friendly solutions.	Graduates will showcase their ability to actively engage in and contribute to the creation of socially responsible designs and environmentally friendly solutions. They will adapt professional ethics within the broader context of technological change, emphasizing a commitment to responsible practices that consider societal and environmental impacts.

		This competency reflects their dedication to using their technical expertise for the betterment of society and the environment.
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Annexure C

SEMESTER I/II/III

SKILL ENHANCEMENT COURSES

New Syllabus

(To be implemented w.e.f. Acad. Year 2024 - 2025)

Course Title: E-Commerce
Course Code: UG-COM-SEC4
Credits: 2
Marks: 50

Course Objectives:

- To analyze different e-commerce business models and strategies
- Identify key technologies and tools used in e-commerce
- Develop a basic e-commerce website

Course Outcomes:

At the end of the course students will be able to:

- CLO1 : Understand the fundamental concepts and terminology of e-commerce.
- CLO2 : Analyze different e-commerce business models and strategies.
- CLO3 : Identify key technologies and tools used in e-commerce.
- CLO4 : Develop a basic e-commerce website.

Module I:

[15 hrs]

Introduction to E-Commerce

Overview of e-commerce, Benefits and challenges

E-Commerce Business Models

B2C, B2B, C2C, and other models, Subscription models

E-Commerce Technologies

Internet infrastructure, Payment systems, Security and privacy

Module II:

[15 hrs]

E-Commerce Website Development

Website design principles, Content management systems (CMS), User experience (UX) and user interface (UI) design

E-Commerce Payment and Fulfillment

Payment gateways, Shipping and logistics, Inventory management

E-Commerce Marketing

Digital marketing strategies, SEO and SEM, Social media marketing Analytics

PRACTICALS : E-Commerce

Credit : 1

Marks : 25

Duration: 30 Hrs

List of suggested practical's:

ECOMMERCE PLATFORMS:

1. WORDPRESS: (4P)

Primarily designed for creating blogs but can be used to create online store by adding appropriate themes & plugins. Basic Programming Knowledge in PHP may be required in later stages.

2. WIX: (2P)

Wix is a drag & drop website builder which can also be used to build an ecommerce website without any programming experience.

3. SHOPIFY: (2P)

Made specially to create online stores, add products, categories & handle payments all without Any Programming knowledge required.

4. BLOGGER : (2P)

Similar to WordPress but a blogging service provided by google which again can be customized to create an online store.

TOOLS USED TO FACILITATE ECOMMERCE (5P)

1. GOOGLE ANALYTICS: Present in most ecommerce platforms and can be integrated in almost any application, giving the owner insights of the customer base visiting the website. Can also be fine- tuned to give more detailed analysis like how many visits actually got converted into leads etc.

2. MAIL CHIMP: A service to send emails to customers. Useful in marketing.

3. ZENDESK :Zendesk is used to setup a support centre for your application users .Users can open a ticket and get their issues resolved. Useful in issue tracking and management.

4. APPOINTLET : A Service integrated with google calendar and helps manage all appointments. Useful in applications where an appointment is required.

5. UNBOUNCE :Used to create landing pages for an application . A good landing page sometimes defines whether a user will visit the site or turn away.

REFERENCE BOOKS:

MANDATORY:

1. "E-commerce for Dummies" by Don Jones and Mark D. Scott - A comprehensive guide for beginners covering everything from setting up an online store to marketing and selling products online.

SUPPLEMENTARY:

1. Ravi Kalakota and Andrew B. Whinston.(2014).Electronic Commerce A Manager’s Guide .Pearson Education.
2. "Don't Make Me Think: A Common Sense Approach to Web Usability" by Steve Krug
3. "E-commerce Evolved: The Essential Playbook to Build, Grow & Scale a Successful E-commerce Business" by Tanner Larsson
4. "Invisible Selling Machine" by Ryan Deiss

WEB REFERENCES:

- 1) <https://nptel.ac.in/>
- 2) <https://www.tutorialspoint.com/>
- 3) <http://www.wordpress.com><http://www.wordpress.com/>
- 4) <https://www.wix.com><http://www.wix.com/>
- 5) <https://www.shopify.com><http://www.shopify.com/>
- 6) <https://www.blogger.com><http://www.blogger.com/>
- 7) <https://www.google.co.in/analytics/>
- 8) <https://www.mailchimp.com><http://www.mailchimp.com/>
- 9) <https://www.zendesk.com/>
- 10) <https://www.appointlet.com/>
- 11) <http://www.unbounce.com/>

Course Title: Graphic Design
Course Code: UG-COM-SEC5
Credits: 2
Marks: 50

Course Objectives:

- To understand the basic concept of Multimedia.
- To develop skills for designing graphical images.
- To develop skills for audio and video editing.
- To acquire skills in using audio/video editing software.

Course Outcomes:

Upon completion of the course students will be able to:

CLO1: Understand the basic concepts and skills required for Multimedia

CLO2: Demonstrate proficiency in the text, graphics, visual and audio medium via the respective tools used

CLO3: Classify and realize the types of Authoring tools and their functions.

CLO4: Assemble and deliver multimedia projects.

Module I: Introduction to Multimedia and Computer Graphics: [15 HRS]

Commonly used terms associated with multimedia like CDROM, Storyboard, Script and Authoring tools. Stages of a Multimedia Project-Planning and Costing, Designing and Producing, Testing and Delivering. The Multimedia team and their roles- Project Manager, Writer, Video specialist, Audio specialist and Multimedia programmer. Multimedia Software. Multimedia Hardware. Social & Ethical considerations, Digital Representations & Standards. A survey of Computer Graphic:

Computer Aided Design, Presentation Graphics, Computer art, Entertainment, Education and Training, Visualization, Image Processing, Graphical User Interface

Multimedia Authoring Tools:

Types of authoring tools; Card and Page based tools; Icon-based; Time-based; Object-Oriented Tools.

TEXT: Text in graphics, character set, fonts, layout.

Character Attributes, Text Attributes, Marker Attributes, Bundled Text Attributes, Bundled Marker Attributes.

Vector graphics fundamentals, shapes, transforms and filters, Bitmapped graphics: resolution, image compression, manipulation, Geometrical transformations.

Module II: Audio, Video and Color**[15 HRS]**

Basic Sound Concepts, Digitizing and processing sound, Music, Speech, Compression, formats, MIDI and Digital Audio Human vision, Camera systems, Gamma correction, Color matching, different Color models – RGB, CYMK, Transformations among color model.

Video: Analog and Digital Video, video standards, Video on PC. Introduction to graphics accelerator cards, Video Broadcast Standards - NTSC, PAL, SECAM, HDTV. Introduction to video capturing, Media & Instrument – Videodisk, DVCAM, Camcorder.

Recording Formats like S-VHA Video, Component (YUV), Component Digital, Composite Digital, and Video Hardware Resolutions.

Video Tips like shooting platforms, Lighting, Chroma Key or Blue Screen.

Practicals: Graphic Design**Credits : 1****Marks: 25****Duration: 30 Hours**

Note : Practical can be done using GIMP, Audacity, Windows Video editor, Pencil 2D, Synfig2D or any other open-source image editing and audio video editing software

List of practicals:

1. Design a Brochure for a given product, give details. Learn about different Image file Formats (2P)
2. Design a poster with given information and learn about image compression (2P)
3. Record and Edit the Sound file and Learn about Effects and Filters of sound (3P)
4. Record your voice and learn about audio compression and audio mixing (3P)
5. Prepare Video content for a given information with title and special effects and filters.(3P)
6. Prepare effective video content (2P)

REFERENCE BOOKS:**MANDATORY:**

1. Chapman, N., & Chapman, J. (2005). Digital multimedia. John Wiley & Sons, Inc.
2. Li, Z. N., Drew, M. S., & Liu, J. (2004). Fundamentals of multimedia (pp. 253-265). Upper Saddle River (NJ): Pearson Prentice Hall.
3. Vaughan, Tay; Multimedia: Making it Work; Tata McGraw-Hill, 9th edition.

SUPPLEMENTARY:

1. Jeffcoate, J. (1995). Multimedia in practice. Technology and Applications. Great Britain: Prentice Hall.

WEB REFERENCES:

1. <https://www.gimp.org/>
2. <https://www.audacityteam.org/>
3. https://swayam.gov.in/nd2_ugc19_hs42/
4. <https://www.tutorialspoint.com/multimedia>
5. <https://libguides.bc.edu/>

Course Title: Front End Web Development

Course Code: UG-COM-SEC6

Credits: 2

Marks: 50

Course objectives:

- Design good user interfaces.
- Apply design principles such as learnability, visibility, error prevention, efficiency and graphic design.

Course Outcomes:

On completion of the course students will be able to:

CLO1: Design Content for a web application using HTML and CSS.

CLO2: Style content so as to provide an effective User Interface.

CLO3: Provide dynamism in the User Interface to enhance usability using Javascript and JQuery.

CLO4: Develop a static web application.

Module I: Web Essentials, HTML and CSS

[15 HRS]

Clients, Servers, and Communication. The Internet-Basic Internet Protocols The World Wide Web-HTTP request message-response message-Web Clients; Web Servers, Domain and Hosting.

HTML - Introduction. The development process, basic HTML, formatting and fonts, commenting code, basic HTML tags, Meta tags.

HTML5 - Introduction, New Elements, Canvas, SVG, Drag/Drop, Geolocation, Video, Audio, Input types, form elements, form attributes, web storage, app cache, web workers, SSE

CSS - Introduction – Syntax, Id & Class, Backgrounds, Text, Fonts, Links, Lists, Tables. CSS Box Model – Border, Outline, Margin, Padding. Advanced - Grouping/Nesting, Dimension, Display, Positioning, Floating, Align, Pseudo-class, Pseudo-element, Image Gallery, Image Opacity, Image Sprites.

CSS3 - Introduction, Borders, Backgrounds, Gradients, Text Effects, Fonts, 2D Transforms, 3D Transforms, Transitions, Animations, Multiple Columns.

Module II: Dynamism in UI

[15 HRS]

JavaScript - Introduction - What is JavaScript, Understanding Events, JavaScript Example, External JavaScript. Basic Elements – Comment, Variable, Global Variable, Data Types, Operators, If Statement, Switch, Loop: for and while, Function. JavaScript Objects – objects, Array. Browser Object Model - Browser Objects, Window Object, Document Object – get Element ById, get Elements ByName, getElementsByTagName, innerHTML property, inner Text property. Validation- form validation, email validation.

JQuery - Introduction - Syntax, Selectors, Events. Effects- Hide/Show, Fade, Slide, Animate, stop(), Call back, Chaining. HTML/CSS- Add, Remove, CSS Classes, css(), Dimensions, slider. Traversing – ancestors, descendants, siblings, filtering. Responsive Design. Web Accessibility and Search Engine Optimization.

Practicals : Front End Web Development

Marks: 25

Credits: 1

Duration: 30 Hrs

List of Practical: (the numbers in brackets indicate number of practicals) :

1) Create a HTML page with the following: [3 P]

- a) title heading paragraph emphasis strong and image elements
- b) complex HTML table
- c) simple HTML Form covering major form elements
- d) Embed Video in an HTML page

3) Using CSS do the following: [3 P]

- a) Create a Navigation bar (with dropdown) with CSS
- b) Create a CSS Grid
- c) Create a CSS3 based button

- d) Make an image rounded shape
- e) Create a CSS based sticky footer
- f) Create CSS3 Corner Ribbon
- g) Create CSS3 blurry text effect
- h) Create CSS3 speech bubble shape
- i) Create image cross fade with CSS3 transition
- j) Set style for link hover active and visited states of hyperlink

4) Write JavaScript functions to :

[3 P]

- a) accept a string as a parameter and converts the first letter of each word of the string in upper case.
- b) check whether a given credit card number is valid or not.
- c) check whether a given value is a valid url or not.
- d) check whether a given email address is valid or not.
- e) print an integer with commas as thousands separators
- f) remove items from a dropdown list.

5) Use J Query to :

[3 P]

- a) Disable buttons
- b) Make textbox read only
- c) Uncheck checkboxes
- d) Confirm again

- e) Sort
- f) Switch rows and columns

6) A mini project combining all the technologies learnt using a front-end web development framework such as bootstrap is recommended. [3 P]

REFERENCE BOOKS:

MANDATORY:

1. D.T,(2018) Web Technologies, Black Book, Dream Tech

WEB BASED:

- 1.<https://www.w3schools.com>
- 2.<https://www.tutorialspoint.com/html/index.htm>
- 3.<https://www.tutorialspoint.com/css/index.htm>
- 4.<https://www.tutorialspoint.com/javascript/index.htm>
- 5.<https://www.tutorialspoint.com/jquery/index.htm>
- 6.<https://www.udemy.com/courses/development/web-development/>

SEMESTER III

MINOR COURSE

New Syllabus

(To be implemented w.e.f. Acad. Year 2024 - 2025)

Course Title: Foundations of Data Science with Python

Course Code: UG-COM-207

Credits: 3

Marks: 75

Course Objectives:

- To understand the concept of data science and its role in extracting insights from data
- To understand the basic Python syntax, data types, control structures, and functions
- Utilize Python libraries such as NumPy and Pandas for data manipulation and analysis tasks.

Course Outcomes:

At the end of the course students will be able to:

CLO1: Explain key principles related to data manipulation, analysis, visualization, and interpretation using Python programming language.

CLO2: Apply Python programming fundamentals to perform data manipulation, analysis, and visualization tasks efficiently.

CLO3: Employ data manipulation libraries such as NumPy and Pandas to clean, transform, and explore datasets effectively.

CLO4: Describe the basic principles and types of machine learning algorithms, including supervised and unsupervised learning approaches.

Module I: Introduction to Data Science and Python Basics

[15 hrs]

Introduction to Data Science: Understanding the role and importance of data science in various fields, Introduction to key concepts: data, information, knowledge, and insights, Overview of data science tools and techniques.

Introduction to Python Programming: Introduction to Python programming language, Installing Anaconda distribution for Python, Basic Python syntax: variables, data types, operators, and expressions, Control structures: if statements, loops, and functions, Hands-on exercises and practice problems using Jupyter notebooks.

Working with Data in Python: Introduction to data structures in Python: lists, tuples, dictionaries, Accessing and manipulating data in Python, Introduction to libraries for data manipulation:

NumPy and Pandas, Reading and writing data from/to different file formats (e.g., CSV, Excel), Practical exercises and projects to manipulate and analyze data

Module II: Data Visualization and Analysis

[15 hrs]

Data Visualization with Matplotlib and Seaborn: Introduction to data visualization principles, Overview of Matplotlib and Seaborn libraries for data visualization, Creating basic plots: line plots, scatter plots, bar charts, histograms, Customizing plots: labels, colors, markers, and legends, Exploratory data analysis through visualization, Hands-on exercises and projects to visualize data using Jupyter notebooks

Statistical Analysis with Python: Introduction to statistical analysis concepts, Descriptive statistics: mean, median, mode, variance, standard deviation, Inferential statistics: hypothesis testing, t-tests, chi-square tests, Introduction to statistical libraries in Python: SciPy and StatsModels, performing statistical analysis on datasets using Jupyter notebooks, Practical exercises and projects to apply statistical techniques.

Module III: Introduction to Machine Learning

[15 hrs]

Fundamentals of Machine Learning: Introduction to machine learning concepts and terminology, Types of machine learning: supervised learning, unsupervised learning, and reinforcement learning, Overview of popular machine learning algorithms: linear regression, logistic regression, decision trees, k-nearest neighbors, Introduction to scikit-learn library for machine learning in Python,

Time-Series Analysis: Overview of time-series analysis, Components of time-series, time-series forecasting model.

Practicals :Foundations of Data Science with Python.

Credit: 01

Marks: 25

Duration: 30 Hrs

1. Python Basics:

[3P]

- a) Write Python code to calculate the area of a circle given its radius.
- b) Create a Python function that takes two numbers as input and returns their sum.
- c) Write a Python program to check if a given number is prime.

2. Working with Data in Python:

[3P]

- a) Load a CSV file containing student grades into a Pandas DataFrame. Display the first few rows of the DataFrame.
- b) Calculate the mean, median, and standard deviation of a numeric column in the DataFrame.
- c) Filter the DataFrame to show only students with grades above a certain threshold.

3. Data Visualization with Matplotlib and Seaborn: [3P]

- a) Create a line plot showing the trend of a stock price over a period of time.
- b) Generate a scatter plot to visualize the relationship between two variables in a dataset.
- c) Create a histogram to visualize the distribution of ages in a population dataset.

4. Statistical Analysis with Python: [3P]

- a) Perform a t-test to compare the mean heights of two groups of individuals.
- b) Calculate the correlation coefficient between two numeric variables in a dataset.
- c) Conduct a chi-square test to analyze the association between two categorical variables.

5. Fundamentals of Machine Learning: [3P]

- a) Implement linear regression to predict housing prices based on features like square footage and number of bedrooms.
- b) Train a logistic regression model to classify email messages as spam or not spam based on text features.
- c) Build a decision tree classifier to predict whether a passenger survived the Titanic disaster based on passenger attributes.

REFERENCE BOOKS:

MANDATORY:

1. Nandi, G., Sharma, R. K. (2020). Data Science Fundamentals and Practical Approaches: Understand Why Data Science Is the Next (English Edition). India: Bpb Publications.
2. McKinney, W. (2017). Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython. United States: O'Reilly Media.
3. Let Us Python. (2019). India: BPB Publications.

SUPPLEMENTARY:

1. Dromey R.G., How to solve it by computer, Prentice Hall of India, 2nd Edition, 2004.
2. Mark Lutz, Learning Python, O'Reilly Media, Third Edition, 2008
3. Wes McKinney, Python for Data Analysis, O'Reilly Media, 2012
4. Jure.L.,Anand. R,Jeffrey.U(2014). Mining of Massive Datasets v2.1(2nd ed.).Cambridge University Press.

5. Kevin P. Murphy,(2012).Machine Learning: A Probabilistic Perspective .MIT Press.
6. Provost, F., & Fawcett, T. (2013). Data Science for Business: What you need to know about data mining and data-analytic thinking. " O'Reilly Media, Inc."

WEB REFERENCES:

1. <https://www.python.org/doc/>
2. <https://www.w3schools.com/python/>
3. <https://matplotlib.org/stable/index.html>
4. <https://seaborn.pydata.org/>
5. <https://scikit-learn.org/stable/>
6. https://www.tensorflow.org/api_docs

BVoc - Software Development

SEMESTER II

New Syllabus

(To be implemented w.e.f. Acad. Year 2024 - 2025)

Course Title: Content Writing

Course Code : SD-G24

Credits: 4

Marks: 100

Course Objective:

- This course introduces students to the principles and techniques of effective content writing for various digital platforms. Students will learn how to create engaging, informative, and persuasive content for websites, blogs, social media, and other online channels.

Course Outcomes:

At the end of the course students will be able to:

CLO1: Understand the principles of effective content writing for digital platforms.

CLO2: Identify and analyze target audiences to tailor content accordingly.

CLO3: Create compelling and engaging content using appropriate tone, style, and voice.

CLO4: Optimize content for search engines and maximize online visibility.

Module I: Introduction to Content Writing

[20 HRS]

Overview of content writing principles and practices Understanding the digital landscape and Discuss the importance of backlinks in the digital landscape and how they contribute to a website's authority and credibility Exploring different types of content: articles, blog posts, social media updates, etc.

Writing Techniques and Style. Explain how understanding backlinks can help writers tailor content to attract quality inbound links from reputable sources. Explore strategies for creating content that naturally attracts backlinks from other websites within the same niche or industry.

Developing a unique voice and tone for different platforms Crafting headlines, introductions, and call-to-actions Incorporating storytelling techniques to engage readers

Module II: Search Engine Optimization (SEO)

[10 HRS]

Include a section on backlink acquisition strategies as part of the SEO principles and best practices. This could involve guest blogging, outreach campaigns, and creating link-worthy content.

Discuss the role of backlinks in SEO and how they influence search engine algorithms in determining a website's authority and relevance. Provide guidance on ethical and effective methods for building a diverse backlink profile while avoiding black hat SEO practices that could lead to penalties from search engines.

Module III : Writing for Social Media

[20 HRS]

Tailoring content for various social media platforms (e.g., Facebook, Twitter, Instagram)

Understanding the role of visuals and multimedia in social media content Managing tone and voice in social media interactions. Touch upon the indirect impact of social media shares on backlink generation. When content goes viral or gains significant traction on social media platforms, it often attracts backlinks from other websites interested in citing or referencing the content.

Module IV: Content Strategy and Analytics

[10 HRS]

Developing content calendars and editorial schedules Analyzing content performance using analytics tools (e.g., Google Analytics) Iterating and optimizing content based on performance metrics.

Highlight the importance of monitoring social media analytics to identify content that resonates with the audience and has the potential to attract backlinks from external sources.

Encourage students to craft social media content that not only engages users but also encourages sharing and ultimately leads to the creation of backlinks.

REFERENCE BOOKS:

Mandatory :

1. "Everybody Writes: Your Go-To Guide to Creating Ridiculously Good Content" by Ann Handley
2. "Content Rules: How to Create Killer Blogs, Podcasts, Videos, Ebooks, Webinars (and More) That Engage Customers and Ignite Your Business" by Ann Handley and C.C. Chapman
3. "Everybody Writes: Writing for the Web" by Barry Silverstein
4. "The Ultimate Guide to Content Writing: The Art of Writing Engaging Web Content, Blogs, Emails, and More" by Mehdi Khazendar

Supplementary:

1. "Content Strategy for the Web" by Kristina Halvorson and Melissa Rach
2. "The Copywriter's Handbook: A Step-By-Step Guide To Writing Copy That Sells" by Robert W. Bly

Web References:

1. <https://www.skillshare.com/en/browse/content-writing>
2. <https://www.udemy.com/course/content-writing-with-live-practical-project/>
3. <https://www.youtube.com/watch?v=J2h0Xb0WNwQ>

SEMESTER VI

Course Title: Security in Web and Mobile Applications

Course Code : SD-G25

Credits: 4

Marks: 100

Course Outcomes :

At the end of the course students will be able to:

CLO1: Define the significance of security in web and mobile applications.

CLO2: Identify common security threats and vulnerabilities in web and mobile environments.

CLO3: Explain fundamental concepts of cryptography and encryption.

CLO4: Understand principles of authorization and access control and Apply secure communication protocols in web and mobile applications.

CLO5: Apply best practices to mitigate common security vulnerabilities in web and mobile applications.

CLO6: Implement secure authentication mechanisms in web and mobile applications and vulnerability management strategies and security testing methodologies.

Module I: Fundamentals of Web and Mobile Application Security

[15 Hours]

Web and mobile application security principles involve understanding the fundamental concepts and practices aimed at protecting applications from unauthorized access, data breaches, and other security threats. It includes concepts such as authentication, authorization, data encryption, secure communication protocols, input validation, output encoding, and secure session management. Security principles also encompass the concept of defense in depth, which involves implementing multiple layers of security controls to mitigate risks effectively.

Common security threats and attack vectors refer to various techniques and methods employed by attackers to compromise the security of web and mobile applications. Examples of common threats and attack vectors include SQL injection, cross-site scripting (XSS), cross-site request forgery (CSRF), insecure direct object references (IDOR), security misconfigurations, and sensitive data exposure. Understanding these threats and attack vectors is crucial for developers and security professionals to identify vulnerabilities and implement appropriate countermeasures.

OWASP (Open Web Application Security Project) publishes a list of the top 10 most critical web application security risks, which serves as a guideline for identifying and addressing common vulnerabilities. The OWASP Top 10 list includes vulnerabilities such as injection attacks (e.g., SQL injection, NoSQL injection), broken authentication, sensitive data exposure, XML external

entities (XXE), broken access control, security misconfigurations, cross-site scripting (XSS), insecure deserialization, using components with known vulnerabilities, and insufficient logging and monitoring. Understanding the OWASP Top 10 vulnerabilities helps developers prioritize security efforts and focus on mitigating the most critical risks in their applications.

Secure coding involves writing code that is resilient to security threats and vulnerabilities from the outset. It includes adopting coding practices that adhere to security best practices, such as input validation, output encoding, parameterized queries to prevent SQL injection, proper error handling, and secure session management. Defensive programming techniques aim to anticipate and mitigate potential security issues by implementing robust error handling, input validation, and access controls. Secure coding also involves following coding standards and guidelines, conducting code reviews, and using automated security testing tools to identify vulnerabilities early in the development lifecycle.

Module II: Cryptography and Secure Communication

[15 Hours]

Basics of Encryption and Decryption:

Encryption is the process of converting plaintext (readable data) into ciphertext (unreadable data) using an encryption algorithm and a key. Decryption is the reverse process of converting ciphertext back into plaintext using a decryption algorithm and the correct key. The purpose of encryption is to protect data confidentiality by ensuring that only authorized parties can access the plaintext. Encryption algorithms can be categorized into symmetric and asymmetric encryption.

Types of Cryptographic Algorithms: Symmetric and Asymmetric:

Symmetric Encryption: In symmetric encryption, the same key is used for both encryption and decryption. Examples of symmetric encryption algorithms include AES (Advanced Encryption Standard), DES (Data Encryption Standard), and 3DES (Triple DES).

Asymmetric Encryption: Asymmetric encryption uses a pair of keys: a public key for encryption and a private key for decryption. The public key is widely distributed, while the private key is kept secret. Examples of asymmetric encryption algorithms include RSA (Rivest-Shamir-Adleman) and ECC (Elliptic Curve Cryptography).

Secure Communication Protocols: HTTPS, SSL/TLS:

HTTPS (Hypertext Transfer Protocol Secure) is the secure version of HTTP, the protocol used for transmitting data over the internet. HTTPS encrypts data transmitted between a web browser and a web server using SSL/TLS encryption protocols.

SSL (Secure Sockets Layer) and TLS (Transport Layer Security) are cryptographic protocols that provide secure communication over a computer network. They ensure that data transmitted between two parties is encrypted and cannot be intercepted or tampered with by attackers.

SSL and TLS protocols establish a secure connection between a client and a server by authenticating the server's identity, negotiating encryption algorithms, and exchanging cryptographic keys.

Key Management and Secure Key Exchange Mechanisms:

Key management involves securely generating, storing, distributing, and disposing of cryptographic keys used for encryption and decryption.

Secure key exchange mechanisms ensure that cryptographic keys are exchanged securely between parties without being intercepted or tampered with by attackers.

Key exchange protocols such as Diffie-Hellman key exchange and its variants (DH, DHE, ECDH, ECDHE) enable parties to securely negotiate a shared secret key over an insecure communication channel.

Key management practices include using strong key generation algorithms, protecting keys from unauthorized access, periodically rotating keys, and securely disposing of keys that are no longer needed.

Module III: Authentication and Authorization Mechanisms

[15 HRS]

Authentication Methods: Passwords, Multi-factor Authentication (MFA), Biometrics:

Passwords: Password-based authentication involves users providing a unique combination of characters to prove their identity. Password policies should enforce complexity requirements, regular updates, and protection against common attacks like brute force.

Multi-factor Authentication (MFA): MFA enhances security by requiring users to provide two or more authentication factors to access an account. These factors typically include something the user knows (password), something they have (security token), or something they are (biometric characteristic).

Biometrics: Biometric authentication uses physical or behavioral traits of an individual, such as fingerprints, facial recognition, or iris scans, to verify identity. Biometric authentication is increasingly being used in mobile devices and other systems for secure and convenient access control.

Secure Password Storage and Hashing Techniques:

Storing passwords securely involves using cryptographic hashing algorithms to convert plaintext passwords into irreversible hashes before storage.

Hashing techniques ensure that even if the password database is compromised, attackers cannot easily reverse-engineer passwords.

Common hashing algorithms include SHA-256, SHA-512, bcrypt, and Argon2. These algorithms incorporate salting (adding random data to each password before hashing) and stretching (repeated hashing) to further enhance security.

OAuth, OpenID Connect, and Single Sign-On (SSO):

OAuth (Open Authorization): OAuth is an authorization framework that enables third-party services to access user data without exposing user credentials. It allows users to grant limited access to their resources (e.g., profile data) to other applications or services without sharing their passwords.

OpenID Connect: OpenID Connect is an authentication protocol built on top of OAuth 2.0. It provides user authentication and single sign-on (SSO) functionality, allowing users to log in to multiple applications using the same set of credentials.

Single Sign-On (SSO): SSO is a mechanism that allows users to authenticate once and gain access to multiple applications or services without needing to log in separately to each one. SSO systems typically use authentication tokens or cookies to manage user sessions across multiple domains or applications.

Role-based Access Control (RBAC) and Permissions Management:

RBAC is an access control model that assigns permissions to users based on their roles within an organization. Users are granted access rights according to their roles, rather than individual identities.

RBAC simplifies permissions management and reduces the risk of unauthorized access by providing a structured approach to defining access controls.

Permissions management involves defining access policies, assigning roles to users, and enforcing least privilege principles to limit access to only the resources necessary for performing specific tasks.

Input Validation and Output Encoding:

Input Validation: Input validation is the process of inspecting and validating user input to ensure that it conforms to expected formats and ranges. This helps prevent malicious input from being processed and potentially causing security vulnerabilities such as injection attacks.

Output Encoding: Output encoding involves encoding user-generated content before displaying it in web pages to prevent Cross-Site Scripting (XSS) attacks. Encoding converts potentially dangerous characters into their equivalent HTML entities, ensuring that the content is rendered as intended without posing a security risk.

Protection Against Common Vulnerabilities: SQL Injection, Cross-Site Scripting (XSS), Cross-Site Request Forgery (CSRF):

SQL Injection (SQLi): SQL injection is a type of attack where malicious SQL queries are inserted into input fields, exploiting vulnerabilities in the application's database layer. Protection measures include using parameterized queries, prepared statements, and input validation to sanitize user input.

Cross-Site Scripting (XSS): XSS attacks involve injecting malicious scripts into web pages viewed by other users. Protection methods include output encoding, validating and sanitizing input, and implementing proper content security policies to prevent execution of unauthorized scripts.

Cross-Site Request Forgery (CSRF): CSRF attacks trick users into performing actions on a web application without their consent. Mitigation techniques include using anti-CSRF tokens, validating referer headers, and implementing strict input validation and authentication mechanisms.

Implementation of Security Headers and Content Security Policy (CSP):

Security Headers: Security headers are HTTP response headers that provide additional security controls to web browsers. Examples include the X-Content-Type-Options, X-Frame-Options, and X-XSS-Protection headers. These headers help prevent certain types of attacks, such as MIME sniffing, clickjacking, and XSS attacks.

Content Security Policy (CSP): CSP is a security standard that allows website owners to specify which content sources are allowed to be loaded by their web pages. CSP helps mitigate XSS attacks by defining a whitelist of trusted sources for scripts, stylesheets, and other resources, thereby reducing the risk of unauthorized code execution.

Security Testing Techniques: Penetration Testing, Code Review, Vulnerability Scanning:

Penetration Testing: Penetration testing, also known as ethical hacking, involves simulating real-world attacks to identify security weaknesses in web and mobile applications. Penetration testers use various tools and techniques to exploit vulnerabilities and assess the effectiveness of existing security controls.

Code Review: Code review is a manual or automated process of examining application code to identify security vulnerabilities, coding errors, and adherence to security best practices. Code review helps detect issues early in the development lifecycle and ensures that security considerations are integrated into the development process.

Vulnerability Scanning: Vulnerability scanning involves using automated tools to scan web and mobile applications for known security vulnerabilities and misconfigurations. Vulnerability scanners identify potential weaknesses in the application's code, configuration, and infrastructure, allowing developers to remediate them before they can be exploited by attackers.

REFERENCE BOOKS

Mandatory:

1. "Web Application Security: A Beginner's Guide" by Bryan Sullivan and Vincent Liu
2. "The Mobile Application Hacker's Handbook" by Dominic Chell, Tyrone Erasmus, Shaun Colley, Ollie Whitehouse

Supplementary :

3. "OWASP Mobile Security Testing Guide" by OWASP (Open Web Application Security Project)
4. "The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws" by Dafydd Stuttard and Marcus Pinto

Web References:

1. YouTube Channel: The Cyber Mentor
2. YouTube Channel: HackerSploit
3. <https://owasp.org/> OWASP (Open Web Application Security Project)
4. https://www.sans.org/in_en/ SANS Institute

Annexure III
PGDCA
ELECTIVE COURSES
NEW SYLLABUS
(To be implemented w.e.f. Acad. Year 2024 - 2025)

Course Title: E-Commerce Development

Course Code: PGD -CA.E.4

Credits: 3

Marks: 75

Course Objectives:

- To analyze different e-commerce business models and strategies
- Identify key technologies and tools used in e-commerce
- Develop a basic e-commerce website

Course Outcomes:

At the end of the course students will be able to:

CLO1: Understand the fundamental concepts and terminology of e-commerce.

CLO2: Analyze different e-commerce business models and strategies.

CLO3: Identify key technologies and tools used in e-commerce.

CLO4: Develop a basic e-commerce website.

Module I

[15 HRS]

Introduction to E-Commerce

Overview of e-commerce, Historical development, Benefits and challenges

E-Commerce Business Models

B2C, B2B, C2C, and other models, Subscription models, Revenue streams

E-Commerce Technologies

Internet infrastructure, Payment systems, Security and privacy

Module II

[15 HRS]

E-Commerce Website Development

Website design principles, Content management systems (CMS), User experience (UX) and user interface (UI) design

E-Commerce Marketing

Digital marketing strategies, SEO and SEM, Social media marketing.

E-Commerce Payment and Fulfillment

Payment gateways, Shipping and logistics, Inventory management.

Legal and Ethical Issues in E-Commerce

Cybersecurity and data protection, Intellectual property, Regulatory compliance.

E-Commerce Analytics

Web analytics tools, Key performance indicators (KPIs), Data-driven decision-making.

PRACTICALS: E-Commerce Development

Credit: 01

Marks: 25

Duration: 30 Hrs (15P)

List of suggested practical's(the numbers in brackets indicate number of practical's):

ECOMMERCE PLATFORMS (4P)**WORDPRESS**

Primarily designed for creating blogs but can be used to create online stores by adding appropriate themes & plugins. Basic Programming Knowledge in PHP may be required in later stages.

WIX (2P)

Wix is a drag & drop website builder which can also be used to build an ecommerce website without any programming experience.

SHOPIFY (2P)

Made specially to create online stores, add products, categories & handle payments all without Any Programming knowledge required.

BLOGGER (2P)

Similar to WordPress but a blogging service provided by google which again can be customized to create an online store.

TOOLS USED TO FACILITATE ECOMMERCE (5P)**(Introduction to some of the tools)**

GOOGLE ANAYLTICS: Present in most ecommerce platforms and can be integrated in almost any application, giving the owner insights of the customer base visiting the website. Can also be fine- tuned to give more detailed analysis like how many visits actually got converted into leads etc.

MAIL CHIMP: A service to send emails to customers. Useful in marketing.

ZENDESK :Zendesk is used to set up a support centre for your application users .Users can open a ticket and get their issues resolved. Useful in issue tracking and management.

APPOINTLET : A Service integrated with google calendar and helps manage all appointments. Useful in applications where an appointment is required.

UNBOUNCE :Used to create landing pages for an application . A good landing page sometimes defines whether a user will visit the site or turn away.

REFERENCE BOOKS:

MANDATORY:

1. "E-commerce for Dummies" by Don Jones and Mark D. Scott - A comprehensive guide for beginners covering everything from setting up an online store to marketing and selling products online.

SUPPLEMENTARY:

1. Ravi Kalakota and Andrew B. Whinston.(2014).Electronic Commerce A Manager's Guide .Pearson Education.
2. "Don't Make Me Think: A Common Sense Approach to Web Usability" by Steve Krug
3. "E-commerce Evolved: The Essential Playbook to Build, Grow & Scale a Successful E-commerce Business" by Tanner Larsson
4. "Invisible Selling Machine" by Ryan Deiss

WEB REFERENCES:

- 1) <https://nptel.ac.in/>
- 2)<https://www.tutorialspoint.com/>
- 3) <http://www.wordpress.com><http://www.wordpress.com/>
- 4) <https://www.wix.com><http://www.wix.com/>
- 5) <https://www.shopify.com><http://www.shopify.com/>
- 6) <https://www.blogger.com><http://www.blogger.com/>
- 7) <https://www.google.co.in/analytics/>
- 8)<https://www.mailchimp.com><http://www.mailchimp.com/>

MSc - IT

List of Bridge courses and their syllabus for Non Computer Science candidates for admission to M.Sc. IT program

NEW SYLLABUS

(To be implemented w.e.f. Acad. Year 2024 - 2025)

Bridge Courses for Non-Computer Science candidates

Non-Computer Science candidates who wish to apply for M.Sc. IT programme shall have to undergo the Bridge course(s) through self-study using content identified from existing MOOCs courses. The syllabus and suggested links to MOOCs are mentioned in section C.

List of Bridge Courses and their Syllabus

Bridge courses will be allocated to Non-Computer science graduates at the time of admission by the faculty council on a case to case basis from the following list of Bridge Courses.

1. Programming and Simple Linear Data Structures (Theory: 40 Marks, Practical 60 Marks)
2. Fundamentals of Operating Systems (Theory: 50 Marks)
3. Database Management Systems (Theory: 40 Marks, Practical:60 Marks)
4. Mathematical Foundation of Computer Science (Theory: 50 Marks)

Mode of conduct: Self-Study via MOOCs. Doubt clearing sessions will be conducted by the teaching faculty of MSc IT.

To be qualified for the MSc IT degree, candidates are required to pass the test in the individual theory and laboratory components of the Bridge course (40% marks to be obtained in theory and lab separately).

The evaluation of the Bridge course shall be done by the teaching faculty of MSc IT. Candidates are preferably advised to undergo the Bridge course(s) before the start of the programme. A candidate must pass the Bridge course(s) with minimum 40% mark.

The content of the Bridge course(s) will consist of the fundamentals in the following topics

1. Programming and Simple Linear Data Structures: (Theory:40 Marks, Practical:60 Marks)

Introduction to Algorithms, Flow charts, Assembly language and high-level language
Programming in C: Tokens, Identifiers, Data Types, Sequence Control, Subprogram Control, Arrays, Structures, Union, String, Pointers, Functions
Data Structures: Abstract data types, Linear Data Structures: stacks, queues, and their applications. Linked Lists: singly linked list. Basic sorting algorithms: bubble sort, selection sort, insertion sort

2. Fundamentals of Operating Systems: (Theory: 50 Marks)

Introduction to Operating Systems, Processes and Threads, Interprocess Communication,

Concurrency and Synchronization, Deadlock, CPU Scheduling, Memory Management, Virtual Memory, File System Processes and Threads

3. Database Management Systems: (Theory: 40 Marks, Practical:60 Marks)

Introduction to RDBMS, Relational model

Structured Query Language (SQL), Introduction, Intermediate SQL,

Relational Algebra. Selection, Projection, Union, Set Difference, Cartesian product

Entity-Relationship Model

Relational Database Design

4. Mathematical Foundation for Computer Science: (Theory: 50 Marks)

Set Theory: Concepts of sets – Union, Intersection, Cardinality. Elementary counting;

permutations and combinations. Fundamentals of logic: Propositional and Predicate Logic,

Predicates and Quantifiers, Rules of Inference. Relations and Functions: Cartesian Product,

Relations and their types. Functions, Types of Functions, Operations on Functions

Number Systems: Decimal, Binary, Octal, Hexadecimal, conversions

Boolean Algebra, Boolean Expression, Boolean Functions.

Suggested Links to MOOCs courses

Course Name	Organized By	Link
Programming and Data Structure	Dr. P.P. Chakraborty, Department of Computer Science and Engineering, IIT Kharagpur.	http://www.nptelvideos.in/2012/11/programming-and-data-structure.html
Operating Systems Fundamentals	Prof Santanu Chattopadhyay, IIT Kharagpur	https://nptel.ac.in/courses/106105214
Database Management Systems	Prof Partha Pratim Das, IIT Kharagpur	https://nptel.ac.in/courses/106105175
Discrete Mathematics	Prof. Kamala Krithivasan, Department of Computer Science and Engineering, IIT Madras	http://www.nptelvideos.in/2012/11/discrete-mathematical-structures.html

Annexure IV

ELIGIBILITY CRITERIA AND SELECTION PROCEDURE FOR ADMISSION TO M.Sc. IT (w.e.f. 2024-2025)

Existing:

Eligibility and Selection Procedure:

Candidates with B.Sc. (Computer Science) / B.C.A. /B. Voc (Software Development)/ Equivalent degree with a minimum score of 55% at degree level are eligible. Candidates with a score of 60% and above at P.G.D.C.A. and at least a minimum 50% at B.Sc. (Computer Science) /B.C.A. /Equivalent are also eligible to apply. Selection of candidates will be done on merit on the basis of their performance at the Admission Ranking Test.

Proposed:

A. Eligibility and Selection Procedure:

- Candidates with B.Sc. (Computer Science) / B.C.A. /B. Voc (Software Development)/ Equivalent degree with a minimum score of 55% at degree level are eligible. Candidates with a score of 60% and above at P.G.D.C.A. and at least a minimum 50% at B.Sc. (Computer Science) /B.C.A. /Equivalent are also eligible to apply.

OR

- Bachelor Degree in Mathematics/Physics/Statistics/Electronics with a minimum score of 55% at degree level. Such candidates shall be provisionally admitted until successful completion of Bridge Course(s) before completion of Semester I recommended to the students on a case to case basis by the respective mentors assigned to them at the time of Admission to the Programme and approved by the Department Faculty Council(DFC).

OR

- Bachelor Degree in Science with 55% at degree level and P.G.D.C.A. with a minimum of 60% and above.

NOTE: Apart from the eligibility conditions mentioned above, selection of candidates will be done on merit on the basis of their performance at the Admission Ranking Test for MSc IT.

Bridge Courses for Non-Computer Science candidates

Non-Computer Science candidates who wish to apply for M.Sc. IT programme shall have to undergo the Bridge course(s) through self-study using content identified from existing MOOCs courses. The syllabus and suggested links to MOOCs are presented in annexure III.