

Course Title: Computer Architecture Course Code: BCA-DSC-3 (Maj)-301	
Course Outline	This course is designed to help students understand fundamental concepts of computer organization and the design of internal hardware architecture.
Course Outcome	CO1: Understand fundamental terms and concepts related to computer architecture. CO2: Know about the structure and functioning of CPU, memory, and I/O units. CO3: Analyze instruction formats, addressing modes, and instruction execution. CO4: Understand the organization of arithmetic, logic, and control units.
Student Learning Outcomes	<ul style="list-style-type: none"> • On completion of this course, the students will be able to: Understand basic computer organization and its architecture. • Learn how micro-operations, interrupt and instruction cycles are executed in logic circuits. • Learn basic features, memory, input output organization of a simple microprocessor
Course content/Syllabus	<p style="text-align: center;">As prescribed by Panjab University</p> <p style="text-align: center;">UNIT - I</p> <p>Definition of computer organization, design and computer architecture; Digital Systems: basic block diagram of computer; ALU design: Register Transfer Language, bus and memory transfer; Microoperations and their hardware implementation: Arithmetic microoperations - binary adder subtractor, binary incrementer, arithmetic circuit; Logic microoperations – logic circuit; Shift microoperations – 4-bit combinational shifter; Arithmetic Logic Shift Unit.</p> <p style="text-align: center;">UNIT - II</p> <p>Basic Computer Organization: stored program organization, Von Neumann architecture; microoperations and macrooperations; instruction code format, direct and indirect addressing; basic computer registers; Types of instructions - memory reference, register reference, input output instructions; Common bus system; instruction cycle; interrupt cycle; types of interrupts; Introduction to assembly language, assembly language vs machine language.</p> <p style="text-align: center;">UNIT - III</p> <p>Memory organization: memory hierarchy; RAM and ROM chips, memory connection of four 128x8 RAM and one 512x8 ROM chip to CPU; Associative memory; Cache memory -associative, set associative and direct mapping; Virtual memory - paging and segmentation; Microprocessor architecture: 8086/8088 - features, block diagram, memory and register organization, flag register, addressing modes.</p> <p style="text-align: center;">UNIT - IV</p> <p>Input Output organization: input output interface; IOP design, isolated I/O, memory mapped I/O; Asynchronous data transfer: source initiated - destination initiated strobe control and handshaking modes of transfer; programmed I/O data transfer, interrupt-initiated data transfer; Direct Memory Access: DMA controller, cycle stealing and burst mode DMA transfer.</p>
Required Text	1. Mano, M. Morris: Computer System Architecture, Third Edition, Pearson Education India, 2007.

	<ol style="list-style-type: none"> 2. Mano, M. Morris, Contributor Mall, Rajib: Computer System Architecture, Revised Third Edition, Pearson Education India, 2017. 3. Stallings, William: Computer Organization and Architecture: Designing for Performance, 11th Ed. Pearson Education India, 2022. 4. Hayes, John P.: Computer Architecture and Organization, 3rd Ed, McGraw Hill Education, 2017.
Suggested Text, readings and Materials	<ol style="list-style-type: none"> 1. Chaudhuri, P. Pal: Computer Organization and Design, 3rd Ed, Prentice Hall of India Learning Pvt. Ltd., 2008. 2. Puneet Kaur, Computer Architecture, New Edition: Vol.-1, Kalyani Publishers,2025.
Pedagogy for Course Delivery	Lectures, discussions, Assignments
Evaluation Criteria	10 marks will be internal assessment based on the Mid-Semester Test, Academic Activity (Seminar, Project &Assignments) and Attendance. 90 marks will be external assessment based on performance in examinations conducted by Panjab University.

Course Title: Data Structure Course Code: BCA-DSC-3 (Min)-302	
Course Outline	This course is designed to introduce students to various data structures and their basic operations, enabling them to apply these concepts to solve real-world problems.
Course Outcome	CO1: Understand the fundamental concepts of data structures and their applications. CO2: Implement linear data structures such as arrays, stacks, queues, and linked lists. CO3: Apply non-linear data structures like trees and graphs to solve problems. CO4: Analyze and compare searching and sorting techniques. CO5: Develop efficient algorithms using appropriate data structures.
Student Learning Outcomes	<ul style="list-style-type: none"> • On completion of this course, the students will be able to: Choose appropriate data structure as applied to specified problem definition. • Handle various operations on different data structures. • Analyze the time and space complexity of different data structures and their associated algorithms, using Big O notation. • Identify and discuss the application of various data structures in real-world software development and systems.
Course content/Syllabus	<p style="text-align: center;">As prescribed by Panjab University</p> <p style="text-align: center;">UNIT - I</p> <p>Basic Concepts: Introduction to Complexity, Data Structure and Data Structure operations. Applications of Data Structure, Basic data Structures.</p> <p>Arrays: Introduction, Types of Arrays, Memory representation, Applications and operations.</p> <p>Stacks: Introduction, memory representation, Applications and operations, Recursion.</p> <p style="text-align: center;">UNIT - II</p> <p>Linked List: Definition, Types of Linked List: Singly, Doubly, Header, Circular linked List, Operations -traversing, searching, inserting, deleting, operations on singly linked list and doubly linked list, memory representation, Applications, polynomial manipulation.</p> <p>Queue: Introduction, Types, Memory Representation and Applications.</p> <p style="text-align: center;">UNIT - III</p> <p>Trees: Definition and Basic concepts, Representation in Contiguous Storage, Binary Tree, Binary Tree Traversal, Searching, Insertion and deletion in Binary trees, Binary Search tree.</p> <p>Graphs: Introduction, Memory Representation, Graph Traversal (DFS and BFS)</p> <p style="text-align: center;">UNIT - IV</p> <p>Searching: Binary and Linear Search;</p> <p>Sorting: Bubble sort, Insertion sort, Selection sort, Merge Sort, Quick sort. Comparison of various Searching and Sorting algorithms.</p>
Required Text	1. Schaum Lipschutz, “Data Structures with C”, Schaums’ Outlines Series, Indian Edition, 2nd Edition, 2017, Tata McGraw Hill.

	<ol style="list-style-type: none"> 2. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, “Fundamentals of Data Structures in C”, 2nd Edition, 2018, W.H. Freeman and Company. 3. “Data Structures Through C” by Yashavant Kanetkar, 4th Edition, 2022, BPB publication. 4. 4. “Data Structures and Algorithms using C” by R. S. Salaria, 2nd Edition, 2022, Khanna Publishing.
Suggested Text, readings and Materials	<ol style="list-style-type: none"> 1. “Data Structures Using C” by E Balagurusamy, 1st Edition, 2017, Tata McGraw Hill. 2. Gilberg and Forouzan: “Data Structure-A pseudocode approach with C”, 2nd Edition, 2005, Cengage Learning. 3. “Data Structures Using C” by Aaron M. Tenenbaum, Yedidyah Langsam, Moshe J. Augenstein, 1st Edition, 2019, Pearson Publication.
Pedagogy for Course Delivery	Lectures, discussions, Assignments, practical implementation.
Evaluation Criteria	5 marks will be internal assessment based on the Mid-Semester Test, Academic Activity (Seminar, Project & Assignments) and Attendance. 45 marks will be external assessment based on performance in examinations conducted by Panjab University.

Course Title: Practical Based on BCA-DSC-3 (Min)-302 Course code: BCA-DSC-3 (Min)-302P	
Course Outline	This course is designed to introduce students to various data structures and their basic operations, enabling them to apply these concepts to solve real-world problems.
Course Outcome	CO1: Understand the fundamental concepts of data structures and their applications. CO2: Implement linear data structures such as arrays, stacks, queues, and linked-lists. CO3: Apply non-linear data structures like trees and graphs to solve problems. CO4: Analyze and compare searching and sorting techniques. CO5: Develop efficient algorithms using appropriate data structures.
Student Learning Outcomes	<ul style="list-style-type: none"> • On completion of this course, the students will be able to: Choose appropriate data structure as applied to specified problem definition. • Handle various operations on different data structures. • Analyze the time and space complexity of different data structures and their associated algorithms, using Big O notation. • Identify and discuss the application of various data structures in real-world software development and systems.
Course content/Syllabus	<p style="text-align: center;">As prescribed by Panjab University</p> <p><u>List of Practicals: Implementation of Programs in C for Data Structures</u></p> <p>Implementation of Program to perform the following operations on an Array</p> <ul style="list-style-type: none"> • Traversal • Insertion • Deletion <ul style="list-style-type: none"> • Implementation of Program to sort the given list using: <ul style="list-style-type: none"> • Bubble Sort • Insertion Sort • Selection Sort • Merge sort • Quick sort • Implementation of Program to search an element using: <ul style="list-style-type: none"> • Linear search • Binary Search • Program to Implement Stack using an array • Program to implement Linear Queue using an array • Program to Implement Circular Queue using an array • Program to implement Linear Linked List • Program to implement Doubly Linked List • Program to perform Insertion in a Binary tree • Program to perform Deletion in a Binary tree • Program to perform Searching in a Binary tree • Program to perform Traversal in Graph

Required Text	<ol style="list-style-type: none"> 1. Schaum Lipschutz, “Data Structures with C”, Schaums’ Outlines Series, Indian Edition, 2nd Edition, 2017, Tata McGraw Hill. 2. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, “Fundamentals of Data Structures in C”, 2nd Edition, 2018, W.H. Freeman and Company. 3. “Data Structures Through C” by Yashavant Kanetkar, 4th Edition, 2022, BPB publication. 4. “Data Structures and Algorithms using C” by R. S. Salaria, 2nd Edition, 2022, Khanna Publishing.
Suggested Text, readings and Materials	<ul style="list-style-type: none"> • https://www.geeksforgeeks.org/dsa/searching-algorithms/ • https://www.w3schools.com/dsa/dsa_examples.php • https://www.geeksforgeeks.org/dsa/sorting-algorithms/ • https://www.geeksforgeeks.org/dsa/array-data-structure-guide/ • https://www.geeksforgeeks.org/dsa/linked-list-data-structure/
Pedagogy for Course Delivery	Practical Demonstration of the various tools, Practical Lab assignments to cover the topics, Quiz
Evaluation Criteria	50 marks will be external assessment based on performance in practical examinations conducted by Panjab University.

Course Title: Computer Oriented Numerical Methods Course Code: BCA-DSC-3 (Min)-303	
Course Outline	To Teach students essential techniques of numerical methods in order to solve complex mathematical problems with computer programs useful in various scientific and engineering applications
Course Outcome	CO1: Analyze errors and their propagation in numerical computations. CO2: Apply numerical methods to solve linear, non-linear, and differential equations. CO3: Use numerical techniques for integration and interpolation. CO4: Implement algorithms for numerical methods when analytical solutions are not possible.
Student Learning Outcomes	On successful completion of the course, students will be able to: <ul style="list-style-type: none"> • Understand the importance of error analysis and how errors propagate in numerical computing of mathematical problems. • Learn how to solve linear, non-linear equations, differential equations using numerical methods. • Learn how to integrate and interpolate for given set of data. • Learn algorithms to implement numerical methods when it's not possible to solve a problem analytically
Course content/Syllabus	<p style="text-align: center;">As prescribed by Panjab University</p> <p style="text-align: center;">UNIT - I</p> <p>Numerical and Error Analysis: Introduction, need of numerical methods, numerical analysis vs numerical methods ; Concept of exact and approximate numbers, accuracy and precision, significant digits ; Measures of Error: absolute error, relative error and percentage error; Types of error : blunder, modeling, inherent, numerical (round off, chopping and truncation) errors; Error Propagation in addition, subtraction, multiplication and division operations; Arithmetic of normalized floating point numbers and its error consequences.</p> <p style="text-align: center;">UNIT – II</p> <p>Types of Equations: Linear, quadratic, higher degree polynomial equations, transcendental equations.</p> <p>Non-Linear Equations: Methods to find solution of a non-linear equation: direct vs indirect method, bracketing vs open end iterative method; Choosing initial approximation: largest possible root, search bracket, search interval; Termination criteria; Intermediate value theorem; Algorithm and methods to find roots of a non-linear equation: Bisection Method, False position method, Newton Raphson Method, Birge Vieta Method.</p> <p style="text-align: center;">UNIT – III</p> <p>Simultaneous Linear Equations: Algorithm and methods to find solution of simultaneous linear equations: Direct Methods – Gauss Elimination Method, Concept of Pivoting, Gauss-Jordan Method; Iterative Method – Gauss Seidal Method.</p>

	<p>Interpolation: Need of interpolation, interpolation vs extrapolation; Finite Differences – forward, backward, divided difference tables; Methods to interpolate for given value using Newton’s Forward Difference Method, Newton’s Backward Difference Method, Newton’s Divided Difference Method and Lagrange’s Method. Concept of Inverse Interpolation.</p> <p style="text-align: center;">UNIT – IV</p> <p>Numerical Integration: Methods and algorithm of Newton-Cotes Integration Formulae: Trapezoidal Rule, Simpson’s 1/3rd Rule, Simpson’s 3/8th Rule.</p> <p>Ordinary Differential Equations: Methods and algorithm to find solution of ODEs using Euler’s Method, Runge–Kutta Methods - 2nd order & 4th order, Predictor Corrector Method - Modified Euler’s Method.</p>
Required Text	Precize Computer Oriented Numerical Methods by Dr. G S Sandhu, First World Publications
Suggested Text, readings and Materials	<ol style="list-style-type: none"> 1. Salaria, R.S.: Computer Oriented Numerical Methods: Theory, Problems, Algorithms & Implementation Using C, C++ & Python Languages, Sixth Edition, Khanna Publishers, New Delhi, 2023. 2. Rajaraman, V.: Computer Oriented Numerical Methods, 4th Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2019.
Pedagogy for Course Delivery	Lectures, discussions, Assignments, practical implementation
Evaluation Criteria	5 marks will be internal assessment based on the Mid-Semester Test, Academic Activity (Seminar, Project & Assignments) and Attendance. 45 marks will be external assessment based on performance in examinations conducted by Panjab University.

Course Title: Practical Based on BCA-DSC-3 (Min)-303 Course code: BCA-DSC-3 (Min)-303P	
Course Outline	To Teach students essential techniques of numerical methods in order to solve complex mathematical problems with computer programs useful in various scientific and engineering applications
Course Outcome	CO1: Analyze errors and their propagation in numerical computations. CO2: Apply numerical methods to solve linear, non-linear, and differential equations. CO3: Use numerical techniques for integration and interpolation. CO4: Implement algorithms for numerical methods when analytical solutions are not possible.
Student Learning Outcomes	On successful completion of the course, students will be able to: <ul style="list-style-type: none"> • Understand the importance of error analysis and how errors propagate in numerical computing of mathematical problems. • Learn how to solve linear, non-linear equations, differential equations using numerical methods. • Learn how to integrate and interpolate for given set of data. • Learn algorithms to implement numerical methods when it's not possible to solve a problem analytically.
Course content/Syllabus	As prescribed by Panjab University Programs in C/C++ for Numerical Methods: <ol style="list-style-type: none"> 1. Implementation of Program to find root of given nonlinear equation using: <ul style="list-style-type: none"> • Bisection Method • False Position Method • Newton Raphson Method • BirgeVieta method 2. Implementation of Program to find solution of simultaneous linear equations: <ul style="list-style-type: none"> • Gauss Elimination Method • Gauss Jordan Method • Gauss Seidal Method 3. Implementation of Program to interpolate for given value: <ul style="list-style-type: none"> • Equal Intervals: Newton's Forward Difference / Newton's Backward Difference Method • Unequal Intervals: Newton's Divided Difference Method / Lagrange's Method 4. Implementation of Program for Numerical Integration: <ul style="list-style-type: none"> • Trapezoidal Rule • Simpson's 1/3rd Rule / Simpson's 3/8th Rule 5. Implementation of Program to find solution of ODEs: <ul style="list-style-type: none"> • Runge-Kutta Method • Euler's Method
Required Text	Precize Computer Oriented Numerical Methods by Dr. G S Sandhu, First World Publications

Suggested readings and Materials	Text, and <ul style="list-style-type: none"> • Salaria, R.S.: Computer Oriented Numerical Methods: Theory, Problems, Algorithms & Implementation Using C, C++ & Python Languages, Sixth Edition, Khanna Publishers, New Delhi, 2023. • Rajaraman, V.: Computer Oriented Numerical Methods, 4th Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2019.
Pedagogy for Course Delivery	Practical Demonstration of the various methods, Practical Lab assignments to cover the topics, Quiz
Evaluation Criteria	50 marks will be external assessment based on performance in practical examinations conducted by Panjab University.

Course Title: Introduction to Machine Learning Course code: BCA-DSC-3 (Maj)-304	
Course Outline	The course aims at introducing basic concepts of machine learning and implementation of machine learning algorithms.
Course Outcome	CO1: Understand the basics of Machine Learning and its real-world applications. CO2: Apply data preprocessing, regression techniques, and data reduction methods. CO3: Implement supervised learning algorithm. CO4: Implement unsupervised learning algorithms and gain basic understanding of deep learning.
Student Learning Outcomes	On successful completion of the course, students will be able to: <ul style="list-style-type: none"> • Learning the basics of Machine Learning and its applications. • Understanding of data preprocessing, regression use in machine learning and data reduction. • Understanding of supervised learning algorithms and its implementation. • Understanding of unsupervised learning algorithms and its implementation. Basic understanding of deep learning.
Course content/Syllabus	<p style="text-align: center;">As prescribed by Panjab University</p> <p style="text-align: center;">UNIT - I</p> <p>Introduction: Concept of Machine Learning, Supervised and Unsupervised learning, training vs Test Data, Reinforcement learning, Designing a Learning System, Issues in Machine Learning, Applications of Machine Learning.</p> <p style="text-align: center;">UNIT - II</p> <p>Data Preprocessing: Understanding of data and its preprocessing, normalizing data, feature scaling and feature selection techniques, Overfitting, Data reduction using Principal Component Analysis.</p> <p style="text-align: center;">UNIT - III</p> <p>Supervised Learning: Concept of Classification, Decision tree, k-nearest neighbor, Naïve Bayes Classifier, Support Vector Machine, Neural Networks and backpropagation algorithm, Classification evaluation metrics.</p> <p style="text-align: center;">UNIT - IV</p> <p>Unsupervised Learning and Deep Learning: K-means Clustering, Limits of K-Means, DBSCAN, Concept of Deep Learning, Architecture of Convolutional Neural Networks and Recurrent Neural Networks.</p>
Required Text	<ol style="list-style-type: none"> 1. Andreas. C. Müller and S. Guido, "Introduction to Machine Learning with Python," O'Reilly, 2017. 2. Amanda. Casari and Alice. Zheng, "Feature Engineering for Machine Learning," O'Reilly Media, Inc., 2018, 27 3. Sharma, A., Essentials of AI and Soft Computing, PHI Learning, 2024 4. Mitchell, T.M., Machine Learning, McGraw Hill Education, 2017

Suggested Text, readings and Materials	<ol style="list-style-type: none"> 1. Ian Goodfellow, Yoshua. Bengio, and Aaron. Courville, "Deep Learning," MIT Press, 2016 2. Alpaydin, E., Introduction to Machine Learning, MIT press, Fourth edition, 2020.
Pedagogy for Course Delivery	Interactive theory sessions, assignment and projects, discussions, Seminars, class presentation by groups of students, self-study sessions.
Evaluation Criteria	10 marks will be internal assessment based on the Mid-Semester Test, Academic Activity (Seminar, Project & Assignments) and Attendance. 90 marks will be external assessment based on performance in examinations conducted by Panjab University.

Course Title: English-3 Course Code: AEC-3-301	
Course Outline	The subject aims at providing in-depth knowledge of grammar, structural English, effective writing, and how language varies over time, across social situations and social groups.
Course Outcome	CO1: Creating an emotive association with the spirit of language. CO2: To be proficient in articulating thoughts and communicating ideas in English language CO3: To participate in debates and discussions where ideas are tested and sharpened and honing the skill of public speaking CO4: Students should be able to hold meaningful conversations CO5: Student should be able to effectively use English language to meet professional and personal goals.
Student Learning Outcomes	On successful completion of the course, students will be able to: <ul style="list-style-type: none"> • Understanding of grammatical constructions. • Understanding of Language in various perspectives. • Developing the students' taste for writing good and correct English.
Course content/Syllabus	As prescribed by Panjab University UNIT - I Nature (Listening, Speaking, Reading, Writing, Vocabulary) Pg. 49-62 UNIT - II Power (Listening, Speaking, Reading, Writing, Vocabulary) Pg. 63-76 UNIT - III Growth (Listening, Speaking, Reading, Writing, Vocabulary) Pg. 77-90
Required Text	Edward de Chazal & Louis Rogers Oxford EAP, A Course in English for Academic Purposes, Intermediate/B1+ (First published in 2013, Rpt. 2022)
Pedagogy for Course Delivery	<ul style="list-style-type: none"> • The paper requires 4 hours of practical per week during which students will be taught and explained the theory of communication through practical and hands-on training in various aspects of communication. • The practical evaluation, which carries 15 marks, will be done by an external examiner either from the same institution/department or from outside.
Evaluation Criteria	05 marks will be internal assessment based on the Mid-Semester Test, Academic Activity (Seminar, Project & Assignments) and Attendance. Practical examination will be of 15 marks. 30 marks will be based on performance in examinations conducted by Panjab University.

Course Title: Web Development/ Designing Course code: CSA-MDC-103/203/303	
Course Outline	This course aims to equip students with the ability to choose the right development environment, build interactive web applications, and use essential tools for dynamic web development.
Course Outcome	CO1: Identify suitable programming environments for developing dynamic client-side and server-side web applications. CO2: Plan, develop, debug, and implement interactive client-side and server-side applications. CO3: Identify and use appropriate tools for building dynamic web applications.
Student Learning Outcomes	On successful completion of the course, students will be able to: <ul style="list-style-type: none"> • Students are able to develop a dynamic web page by the use of JavaScript and HTML.
Course content/Syllabus	<p style="text-align: center;">As prescribed by Panjab University</p> <p style="text-align: center;">Unit - I</p> <p>World Wide Web: Web Browsers - Markup Languages - Style Sheet Technologies - Client-Side, Server Side – HTML – Headings – Links-Images – Lists - Tables - Forms, Frames, Cascading style Sheets</p> <p style="text-align: center;">Unit - II</p> <p>JavaScript: Introduction - Simple Program, Decision Making. Equality and Relational Operators - Control Statements - Functions - Programmer Defined Functions, JavaScript Global Functions, Recursion</p> <p style="text-align: center;">Unit - III</p> <p>Arrays: References and Reference Parameters, Passing Arrays to Functions, Multidimensional Array Objects of JavaScript: Window Object - Document Object.</p> <p style="text-align: center;">Unit - IV</p> <p>Forms Object: Text Boxes and Text Areas - Buttons, Radio Buttons, Check Boxes, Select Object, Other Object: Data Object- Math Object- String Object- Arrays- Worked Examples</p> <p>Practical Syllabus: Create Webpages in HTML Links, Images, Lists, Tables, Forms, Frames, Cascading style sheets Creating Webpages in JavaScript, Simple Program, Decision Making, Equality and Relational Operators - Control Statements-Functions-Programmer Defined Functions, JavaScript Global Functions, Recursion-Arrays Create web pages in JavaScript-Window Object-Document object-Forms- Object, Text Boxes and Text Areas, Buttons, Radio Buttons, Check Boxes, Select Object, Other Object, Data Object, Math Object, String Object, Arrays, Worked Examples</p>
Required Text	<ol style="list-style-type: none"> 1. Learning Mike McGrath, JavaScript, Dream, Tech Press, 1st Edition 2006. 2. Jennifer Robinson, Learning Web Design, O Reilly, 2018 3. Melani and Kyrnin’s “HTML, CSS, JavaScript All in One”, Pearson, 2018

Suggested Text, readings and Materials	<ul style="list-style-type: none"> • https://www.w3schools.com/php/php_exercises.asp • https://www.geeksforgeeks.org/php/php-form-processing/ • https://www.w3schools.com/js/js_functions.asp • https://www.geeksforgeeks.org/javascript/javascript-arrays/
Pedagogy for Course Delivery	Interactive theory sessions, assignment, self-study sessions.
Evaluation Criteria	10 marks will be internal assessment based on the Academic Activity (Seminar, Project & Assignments) and Attendance. 65 marks will be external assessment based on performance in examinations conducted by Panjab University.

Course Title: Introduction to Information Technology Course code: CSA-MDC-104/204/304	
Course Outline	To familiarize students with IT fundamentals and evaluate how advances in information technology impact markets and organizational change.
Course Outcome	CO1: To provide knowledge of the basics of the Windows Operating System. CO2: To enable students to perform various operations in Windows OS. CO3: To develop proficiency in MS Word, MS PowerPoint, MS Excel, and MS Access.
Student Learning Outcomes	On successful completion of the course, students will be able to: <ul style="list-style-type: none"> • Knowledge about the basics of Windows Operating System. • Learning various operations of Windows OS. • Knowledge of MS Word, MS PowerPoint, MS Excel, MS Access
Course content/Syllabus	<p style="text-align: center;">As prescribed by Panjab University</p> <p style="text-align: center;">UNIT I</p> <p>Introduction: Evolution of Computers, Windows and Unix. Fundamentals of windows, anatomy of windows, Operations on window: Opening, Minimizing, Maximizing, Moving, Resizing, closing; Windows Explorer, Folders: Creating, deleting, copying, renaming folders, folder properties; Icons, Menu, Taskbar, Control panel, Recycle bin.</p> <p style="text-align: center;">UNIT II</p> <p>Word Processing Package: Basics of Word Processing; Word Processing Basics; Text creation, Manipulation, Finding and replacing, Formatting of text; Printing of word document, Page Layout: Margin setting, Alignments, Adding Borders and shading, Adding Headers and Footers, setting up Multiple columns, working with tables, Spell check, Auto Correct, Grammar facility, Mail merge.</p> <p style="text-align: center;">UNIT III</p> <p>Spreadsheet Package: Worksheet Basics, Data Entry in Cells: Entry of numbers, text and formulae, moving data in a worksheet, moving around in a worksheet, Selecting Data Range. Using the interface (Toolbars, Menus), Editing Basics, working with workbooks, Cell referencing: Absolute, Relative and Mixed; Formatting and Calculations: using Autofill, Working with Formulae, Creating Chart and graphs.</p> <p style="text-align: center;">UNIT IV</p> <p>Presentation Packages: Basics, General Features, Creating a presentation, Different types of slide views, Master Slides and its use, Formatting Slides: slide design, Layout and background; Animation effect, Transition effect, timing effects, Macros.</p> <p>Database Package: Introduction to Database, Tables, Data Types, Attributes, Records; Overview of MS- ACCESS Creating Database, Creating Tables, Data types, Creating forms and queries.</p>
Required Text	<ol style="list-style-type: none"> 1. Priti Sinha and P.K. Sinha: Computer Fundamentals, BPB Publications, 2004 2. V. Rajaraman and N. Adabala: Fundamentals of Computers, PHI, 2014
Suggested Text, readings and Materials	<ol style="list-style-type: none"> 1. R. K. Texali: PC Software made simple, McGraw Hill., 2017

Pedagogy for Course Delivery	Interactive theory sessions, assignment, self-study sessions.
Evaluation Criteria	10 marks will be internal assessment based on the Academic Activity (Seminar, Project & Assignments) and Attendance. 65 marks will be external assessment based on performance in examinations conducted by Panjab University.

Course Title: Backend Web Development Course code: CSA-SEC-103/203/303	
Course Outline	The course aims to introduce the basic concepts and techniques of server-side web programming. The student shall be able to develop interactive and dynamic websites using HTML, PHP, and MySQL.
Course Outcome	CO1: Understand the working principles of the internet and its core protocols. CO2: Apply server-side programming techniques in PHP for accessing server data. CO3: Validate backend data by using GET and POST methods for client-server data communication.
Student Learning Outcomes	On successful completion of the course, students will be able to: <ul style="list-style-type: none"> • Build interactive and dynamic websites. • Write the server-side programming techniques with PHP for accessing the contents to/from the server. • Learn to validate server-side/backend data.
Course content/Syllabus	<p style="text-align: center;">As prescribed by Panjab University</p> <p style="text-align: center;">UNIT I</p> <p>Introduction to Internet Technologies: Internet, Internet protocols: TCP/IP, HTTP, DNS, SMTP., IP addressing, Domain Name System (DNS), Hypertext Markup Language (HTML).</p> <p>Web Programming: JavaScript programming fundamentals, Front-end scripting vs server-side scripting.</p> <p style="text-align: center;">UNIT II</p> <p>Introduction to PHP: Basic Syntax, defining variables and constants, data types, operators and expressions, decision making statements, looping constructs, mixing decisions and looping with HTML.</p> <p>String Handling: Creating a string and accessing its content, searching and replacing the content of a string, formatting a string, and string built-in functions.</p> <p style="text-align: center;">Unit-III</p> <p>Handling HTML Form with PHP: Creating a form, submitting data to the server at the backend using GET and POST methods, GET vs POST methods, create a student registration form and login form using server-side validation.</p> <p style="text-align: center;">Unit-IV</p> <p>Database Connectivity with MySQL: Connectivity with database, database creation, creating tables, insertion and retrieval of the data from the database, and data manipulation.</p>
Required Text	<ol style="list-style-type: none"> 1. "HTML and CSS: Design and Build Websites" by Jon Duckett. 2. "JavaScript and JQuery: Interactive Front-End Web Development" by Jon Duckett. 3. Nixon, R., Learning PHP, MySQL & JavaScript with jQuery, CSS and HTML5, O'Reilly, 2018.
Suggested Text, readings and Materials	<ol style="list-style-type: none"> 1. Murach J, Murach's, PHP and MySQL, 2nd Edition, Mike Murach & Associates, 2014. 2. Holzner S., PHP: The Complete Reference, McGraw Hill, 2017

Pedagogy for Course Delivery	Interactive practical sessions, assignment, self-study sessions.
Evaluation Criteria	10 marks will be internal assessment based on the Academic Activity (Seminar, Project & Assignments) and Attendance. Practical examination will be of 65 marks