

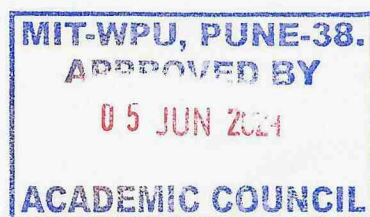
Syllabus

**Dr. Vishwanath Karad
MIT- World Peace University**

**FACULTY OF ENGINEERING AND
TECHNOLOGY**

**Bachelor of Computer Applications
BCA (Semester-III)**

BATCH: 2024-28



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Course Structure

Course Code	BCA10050				
Course Category	Program Foundation				
Course Title	Linear Algebra				
Teaching Scheme	Lectures	Tutorials	Laboratory/Practical	Project	Total
Weekly Load Hrs.	2	-			2
Credits	2	-		-	2
Assessment Schema Code	TT1				

Course Objectives:

This course provides an introduction to linear algebra topics. Emphasis is placed on the development of abstract concepts and applications for vectors, systems of equations, matrices, determinants, vector spaces, multi-dimensional linear transformations, eigenvectors, eigenvalues, diagonalization and orthogonality.

Course Outcomes:

After the completion of this course students will

1. Use analytical and graphical representations to apply vector operations in multiple dimensions.
2. Solve systems of linear equations using multiple manual and technology-based methods; these methods will include but are not limited to Gaussian and Gauss-Jordan.
3. Use eigenvalues, eigenvectors and diagonalization to solve problems in appropriate situations.
4. Use matrix operations and linear transformations to solve problems in appropriate situations.

Course Contents:

Unit 1: Matrix Algebra [6]

- Matrix Operations ,
- The Inverse of a Matrix
- Characterizations of Invertible Matrices ,
- Determinants

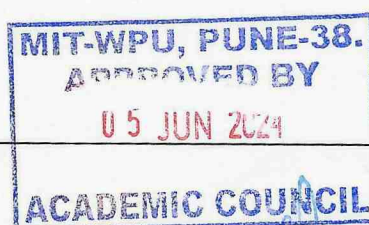
Unit 2: Systems of Linear Equations [6]

- Row Reduction and Echelon Forms
- Vector equations
- The Matrix equation $Ax = b$
- Solution Sets of Linear Systems
- Applications of Linear Systems
- Linear Independence
- Linear Transformations. Applications of linear transformation
- Linear Models

Unit 3: Vector Spaces [6]

- Vector Spaces and Subspaces
- Null, Column, and Row Spaces
- Basis
- Coordinate Transformations
- Dimension; Rank of a Matrix

Unit 4: Eigenvalues and Eigenvectors [6]



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- Eigenvalues and Eigenvectors
 - The Characteristic Equation
 - Diagonalization
 - Applications Quadratic forms
- Unit 5: Orthogonality [6]**
- Inner Product, Length, and Orthogonality
 - Orthogonal Sets
 - Orthogonal Projections

Learning Resources:

Elementary Linear Algebra by Stanley I. Grossman.

Introduction to Linear Algebra by SERGE LANG, Springer Verlag

Web Resources

Pedagogy:

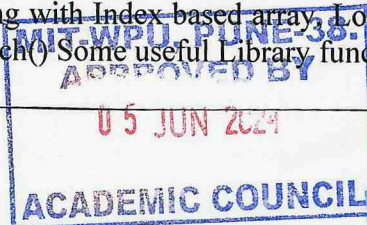
MIT-WPU, PUNE-38.
APPROVED BY
05 JUN 2024
ACADEMIC COUNCIL

M. Beck

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Course Structure

Course Code	BCA30020				
Course Category	Program Major				
Course Title	Advanced Web Technologies				
Teaching Scheme	Lectures	Tutorials	Laboratory / Practical	Project	Total
Weekly load hours	3	-	2	-	5
Credits	3	-	1	-	4
Assessment Scheme Code	TL3				
Pre-requisites: Need basics of web technologies and basics of Programming concepts.					
Course Objectives: <ol style="list-style-type: none">1. To understand Web programming concepts with respect to web browser and web server.2. To understand basics and lexical structure of PHP.3. Design skills of Web Applications Development using HTML, CSS, Javascript with PHP4. To develop object-oriented concepts of PHP.					
Course Outcomes: Student will able to <ol style="list-style-type: none">1. To create dynamic web pages using PHP2. Students will able to use built in array and string functions3. Students will able to use object oriented concepts to design web pages4. Students will able to handle files and directories					
Course Contents: Unit 1 : Introduction to PHP :10 Evaluation of PHP, Language Basics, Defining variable and constant, Data type Operator and Expression, Decisions & Loops, Capturing Form Data, Dealing with Multi-value filed, Generating File uploaded form, Redirecting a form after submission Unit 2 : Function & String: 10 What is a function, Define a function, Call by value and Call by reference, Variable function, Anonymous function, Recursive function, Creating and accessing String, Searching & Replacing String, Formatting String, Regular, expression & Pattern matching in Php, Splitting a string with a Regular, Expression, String Related Library function Unit 3 : Working with Array: 10 Anatomy of an Array, Creating index based and Associative array, Accessing array Element, Looping with Index-based array, Looping with associative array using each() and foreach() Some useful Library function.					



Unit 4 : Introduction to Object Oriented Programming: 10

Introduction, The new keyword and constructor, Destructor, Access method and, properties using \$this, variable, Public, private, protected properties and methods, Static properties and method, Instance of operator, Abstract method and class Interface Final

Unit 5: Working with file and Directories: 5

Understanding file& directory, Opening and closing a file, Copying, renaming and deleting a file, Working with directories, File Uploading & Downloading.

Learning Resources:**Text Books/Reference Books:**

7. Advanced Web Technologies, Rajinder J. Arora
8. ADVANCED WEB TECHNOLOGIES, SHALAKA SAKHREKAR, A B NIMBALKAR, Fifth Edition

Supplementary Reading:

6. Programming PHP by Rasmus Lerdorf and Kevin Tatroe, O'Reilly publication
7. Beginning PHP 5, Wrox publication
8. AJAX Black Book, Kogent solution
9. Mastering PHP, BPB Publication

Web Resources :**Weblinks:**

3. <http://www.w3schools.com>
4. <https://www.javatpoint.com/php-tutorial>
5. <https://www.php.net/>

MOOCs: Online courses for self-learning

Courses by NPTEL and MIT Open Courseware

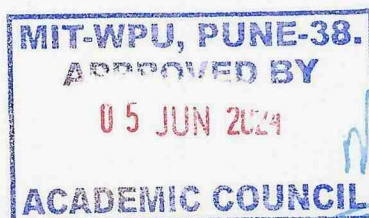
etc Pedagogy:

Participative Learning, discussions,

problem solving,

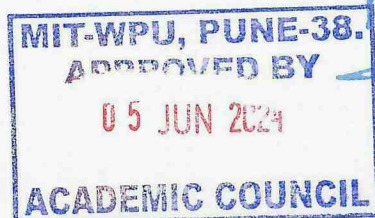
assignments,

Lab Assignment



Laboratory Experiments/Software Based Practical

Sr No.	Contents
1	Programs based on variable and constant, Data type Operator, Decisions & Loops, Capturing Form Data.
2	Programs based on Dealing with Multi-value files, Generating File uploaded forms, and Redirecting a form after submission.
3	Programs based on function Call by value and Call by reference, Variable function, Anonymous function, Recursive function.
4	Programs based on Creating and accessing String, Searching & Replacing String, Formatting String, Regular, expression & Pattern matching in PHP, Splitting a string with a Regular Expression, and related Library function
5	Programs on index and Associative array, multidimensional array Looping with associative array using each() and for each (), Some useful Array Library functions.
6	Programs based on constructor, Destructor, \$this, Public, private, protected properties and methods, Static properties and methods.
7	Programs based on Understanding files & directories, Opening and closing a file, Copying, renaming, and deleting a file, Working with directories, File Uploading & Downloading.



Course Structure

Course Code	BCA20040				
Course Category	Program Major				
Course Title	Data Structures using 'C'				
Teaching Scheme	Lectures	Tutorials	Laboratory/Practical	Project	Total
Weekly Load Hrs.	3	-	2-		5
Credits	3	-	1-	-	4
Assessment Schema Code	TL3				

Course Objectives:

1. To introduce the fundamental concept of data structures
2. To emphasize the importance of data structures in developing and implementing efficient algorithms.

Course Outcomes:

After completing this course, a student will be able to:

1. Describe how arrays, records, linked structures, stacks, queues, trees, are represented in memory and used by algorithms.
2. Describe common applications for arrays, records, linked structures, stacks, queues, and trees
3. Write programs that use arrays, records, linked structures, stacks, queues, trees, and graphs
4. Demonstrate different methods for traversing trees.
5. Compare alternative implementations of data structures with respect to performance.
6. Compare and contrast the benefits of dynamic and static data structures implementations.
7. Design and implement an appropriate hashing function for an application.

Course Contents:

Unit 1: Introduction [7]

- Self-referential structure
- Data Structures
- Primitive and Non-Primitive Data Structures
- Linear and Non-linear Structures.
- Algorithm, Analysis of algorithm, Big O notation.

Unit 2: Linked List [7]

- Representation –Static & Dynamic
- Singly Linked List Creation, Insertion (Begin, Middle, End), Printing, deleting (Begin, Middle, End) Traversing.



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- Doubly Linked list (Creation, Deletion)
- Circular Singly Linked list (Creation, Deletion)

Unit 3: Stack and Queue [7]

- Stack-Static and Dynamic Representation, Operation,
- Applications of Stack:-Evaluation of postfix expression, conversion of Infix expression to postfix form, Reversal of a string
- Queue -Static and Dynamic Representation, Operation, Priority Queue, Circular Queue (Implementation)

Unit 4: Trees [8]

- Definition
- Terminology
- Representation
- Binary tree
- Representation(Both)
- Binary Tree Traversal Inorder, Preorder, Postorder
- Binary Search Tree (Implementation)
- Heap
- AVL / Height Balanced tree

Unit 5: Graphs, Searching, Sorting: [9]

- Introduction, Graph Terminology,
- Representation of Graphs:-Adjacency matrix,Adjacency List.
- Graph Traversals :-DFS,BFS
- Shortest Path Algorithms.
- Searching and Sorting:**
- Searching,
- Types of Searching
- Sorting:-Types of sorting like bubble sort,insertion sort ,merge sort, selection sort, quick sort

Unit 6: Hashing: [7]

- Hash Function,
- Types of Hash Functions
- Collision
- Collision Resolution Technique(CRT),
- Perfect Hashing

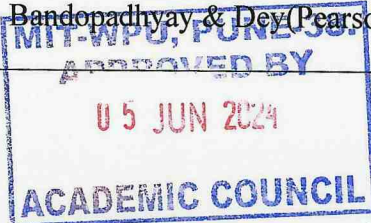
Learning Resources:

Text Books:

- "Introduction to Algorithms", Thomas H. Charles E. Leiserson, Ronald L. Rivest and Clifford Stein. Cormen 3rd Edition (The MIT Press) 3rd Edition
- Data Structures and Algorithms Made Easy, Narsimha Karumanchi
- Algorithms, Robert Sedgewick and Kevin Wayne.

Reference Books:

- Fundamentals of Data structures, . Horowitz and S. Sahani
- Introduction to Data Structures in C, Ashok N. Kamthane
- Data Structure Using C, Radhakrishnan and Shrivastav
- Data Structure Using C, Bandopadhyay & Dey (Pearson)



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Websites:

- <https://www.programiz.com/dsa>
- <https://www.w3schools.in/data-structures/intro>
- <https://www.youtube.com/watch?v=RBSGKIAvoiM>

Pedagogy:

- Participative Learning,
- Discussion
- Demonstrations
- Practical
- Assignment

Lab on Data structures

Sr.No	Practicals to be conducted on
1.	Implementation of arrays , pointers, structures, pointer to structure, array of pointers
2.	Implementation of linked list(singly,doubly,circular)
3	Implementation of Stack and Queue using arrays and linked list
4	Implementation of searching and sorting algorithms
5	Implementation of Tree
6	Implementation of Graph
7	Implementation of Hash functions

