K.M.G. COLLEGE OF ARTS AND SCIENCE
(AUTONOMOUS)

Approved by the Government of Tamil Nadu
Permanently Affiliated to Thiruvalluvar University, Vellore
Recognized under Section 2(f) and 12(B) of the UGC Act 1956
Accredited by NAAC (2nd Cycle) with (CGPA of 3.24/4) 'A' Grade

P.G. & RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Sc., INFORMATION TECHNOLOGY

SYLLABUS
(CHOICE BASED CREDIT SYSTEM)

Under

LEARNING OUTCOMES-BASED CURRICULUM

FRAMEWORK (LOCF)

(Effective for the Batch of Students Admitted from 2024-2025)

PREFACE

This course is designed to provide students with a working knowledge of computer concepts and essential skills necessary for work and communication in today's society. Students will learn safety, security, and ethical issues in computing and social networking. Students will also learn about input/output systems, computer hardware and operating systems. Students learn the basics of Database Management Systems (Access) as well as Personal Information Management software (Outlook). Students are also introduced to desktop publishing (Publisher), and video editing software (Movie Maker). Students will also be introduced to digital animation, 3D Design, and programming. Information Technology provides learners with a solid foundation in all major aspects of computing technology. The course covers Information Technology (IT) from the early days of computing to the current cloud computing, social media platforms, and beyond. Students will explore the fundamentals of networking, software, and programming. Students will learn to speak the complex language of information technology and gain an understanding of how to harness the power of sophisticated technology tools. The course includes pre-assessments, self-assessments, interactive exercises, videos, and games that appeal to a variety of learning styles. Narrative scenarios and case studies will give students opportunities to use critical thinking skills and apply their IT knowledge to real-world scenarios. Topics covered in this course include the evolution of information science, IT security, operating systems, computing architecture and design, programming languages, the software development life cycle, types of malware and computing attacks, networking, telecommunications, and the internet, networking devices and protocols, computer hardware and devices, database management, computing models, mobile computing, social media, cloud computing, e-commerce, ethics and IT, and IT policy and governance. The exposure to the industrial internship and MoUs with industries can open an avenue for a start-up and its progress would be followed regularly. The OBE based evaluation methods will reflect the true cognitive levels of the students as the curriculum is designed with course outcomes and cognitive level correlations as per BLOOM's Taxonomy.

In pursuit of the Higher Education Department Policy Note 2022-23 Demand 20, Section 1.4, Tamil Nādu State Council for Higher Education took initiative to revamp the curriculum. On 27 July 2022, a meeting was convened by the Member-Secretary Dr. S. Krishnasamy enlightening the need of the hour to restructure the curriculum of both Undergraduate and Post-graduate programmes based on the speeches at the Tamil Nādu Legislative Assembly Budget meeting by the Honourable Higher Education Minister Dr K. Ponmudy and Honourable Finance Minister Dr. P. Thiagarajan. At present there are three

different modes of imparting education in most of the educational institutions throughout the globe. Outcome Based Education, Problem Based Education, and Project Based Education.

Now our Honourable Higher Education Minister announced Industry Aligned Education. During discussion, Member Secretary announced the importance of question papers and evaluation as envisaged by the Honourable Chief Secretary to Government Dr, V. IraiAnbu. This is very well imbedded in Revised Bloom's Taxonomy forms three learning domains: the cognitive (knowledge), affective(attitude), and psychomotor (skill). This classification enables to estimate the learning capabilities of students.

Briefly, it is aimed to restructure the curriculum as student-oriented, skill-based, and institution industry- interaction curriculum with the various courses under "Outcome Based Education with Problem Based Courses, Project Based Courses, and Industry Aligned Programmes" having revised Bloom's.

ABOUT THE COLLEGE

The College was established in the new millennium 2000 by the vision of late Shri.K.M.Govindarajan fondly known as Iyah, with a mission to offer higher education in the fields of Arts and Science to the needy and the poor middle class students of this area and make them fully employable and economically self-reliant. With a humble beginning of launching an elementary school named Thiruvalluvar Elementary School in the year 1952, Iyah groomed it into a Higher Secondary School and later into a college. Education was his soul and breath. The college has grown into a full-fledged educational hub offering 12 Under Graduate Programmes, 8 Post Graduate Programmes, 5 M.Phil Research Programmes and 4 Ph.D Programmes. The college has been accredited with 'A' grade by NAAC in 2nd cycle and recognized under section 2(f) & 12(B) of the UGC act 1956. The College is permanently affiliated to Thiruvalluvar University. The College is also acquired the status of Autonomous from the academic year 2024-2025. The College is an associate member of ICT Academy and registered member of NPTEL and Spoken Tutorials of IIT Bombay. The college is also a member of INFLIBNET and NDL.

VISION OF THE COLLEGE

Empower young men and women by educating them in the pursuit of excellence, character building and responsible citizen.

MISSION OF THE COLLEGE

Offer higher education in the fields of Arts, Science & Management to the needy and make them fully self-dependent.

QUALITY POLICY OF THE COLLEGE

KMG Students achieve the best learning results and personal growth with modern education that equip them for working life and a changing society to become deserving citizens.

ABOUT THE DEPARTMENT

The Department of Computer Science was established in the year 2000 with a view to fulfill the dynamic needs of IT sector all over the world. The department is well equipped with all basic and latest resources. The department comprises of well qualified and dedicated faculty members. The Department aims to make the students use their intellectual caliber for effective and quick acquisition. The Department runs the following courses.

VISION OF THE DEPARTMENT

> ➢ To provide a pleasant and friendly environment for learning in discipline of computer science to mobilize students towards serving a globalized technological society.

MISSION OF THE DEPARTMENT

> ➢ To ensure that every student is proficient with necessary computer skills.

> ➢ To inculcate strong ethical values, professional behavior and leadership abilities in students character so as to work with a commitment to the progress of the nation.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

1. Professional Excellence: Graduates will demonstrate competency and excellence in their chosen fields of study, applying theoretical knowledge to practical situations effectively.

2. Character Development: Graduates will exhibit strong moral and ethical character, upholding values of integrity, honesty, and respect for others in both personal and professional endeavors.

3. Leadership and Citizenship: Graduates will emerge as responsible leaders and active citizens, contributing positively to their communities and society at large through their actions and initiatives.

4. Continuous Learning: Graduates will engage in lifelong learning and professional development activities, adapting to evolving technologies, methodologies, and societal needs.

5. Self-Dependency and Entrepreneurship: Graduates will possess the skills and mindset necessary to be self-reliant and entrepreneurial, capable of creating opportunities for themselves and others through innovation and initiative.

6. Effective Communication and Collaboration: Graduates will demonstrate proficiency in communication skills, both verbal and written, and exhibit the ability to collaborate effectively with diverse teams and stakeholders.

7. Global Perspective: Graduates will have a broad understanding of global issues and perspectives, demonstrating cultural sensitivity and adaptability in multicultural environments.

PROGRAM OUTCOMES (POs)

On successful completion of the programme, the students will be able to:

POs	Graduate Attributes	Statements
PO1	Disciplinary Knowledge	Acquire detailed knowledge and expertise in all the disciplines of the subject.
PO2	Communication Skills	Ability to express thoughts and ideas effectively in writing, listening and confidently Communicate with others using appropriate media
PO3	Critical Thinking	Students will develop aptitude Integrate skills of analysis, critiquing, application and creativity.
PO4	Analytical Reasoning	Familiarize to evaluate the reliability and relevance of evidence, collect, analyze and interpret data.
PO5	Problem Solving	Capacity to extrapolate the learned competencies to solve different kinds of non-familiar problems.
PO6	Employability and Entrepreneurial Skill	Equip the skills in current trends and future expectations for placements and be efficient entrepreneurs by accelerating qualities to facilitate startups in the competitive environment.
PO7	Individual and Team Leadership Skill	Capability to lead themselves and the team to achieve organizational goals and contribute significantly to society.
PO8	Multicultural Competence	Possess knowledge of the values and beliefs of multiple cultures and a global perspective.
PO 9	Moral and Ethical awareness/reasoning	Ability to embrace moral/ethical values in conducting one's life.
PO10	Lifelong Learning	Identify the need for skills necessary to be successful in future at personal development and demands of work place.

PROGRAM SPECIFIC OUTCOMES (PSOs)

On successful completion of the M.Sc., Information Technology, the students will be able to:

PSOs	Statements
PSO1	Posses the knowledge in the field of Information Technology through theory and practical
PSO2	Demonstrate high-level expertise in the fields Information Technology and research. Use software development tools, software systems, and modern computing platforms.
PSO3	Communicate Information Technology concepts, designs, solutions, implement effectively and also professionally.

Correlation Rubrics:

High	Moderate	Low	No Correlation
3	2	1	-

Mapping of PSOs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
PSO1	3	3	2	3	2	1	2	3	-	3
PSO2	3	2	2	2	3	3	2	1	-	3
PSO3	3	3	3	3	3	3	2	3	-	2

K.M.G. COLLEGE OF ARTS AND SCIENCE
(AUTONOMOUS)
Subject and Credit System- M.Sc., Information Technology
(Effective for the Batch of Students Admitted from 2024-2025)

Semester	Part	Category	Course Code	Course Title	Ins.Hrs/ Week	Credit	Maximum Marks		
							Internal	External	Total
SEMESTER - I	Part I	Core-1	APCIT11	Python Programming	7	5	25	75	100
		Core-2	APCPIT12	Python Programming - Practical	7	5	25	75	100
		Core-3	APCPIT13	Web Development using Word Press– Practical	6	4	25	75	100
		Elective I (Choose any One)	APEIT14A	Data structures	5	3	25	75	100
			APEIT14B	Compiler Design					
			APEIT14C	Natural Language Processing.					
			APEIT14D	Block Chain Technology					
		Elective II (Choose any One)	APEIT15A	Operating Systems.	5	3	25	75	100
			APEIT15B	Digital Computer Architecture.					
			APEIT15C	Human Computer Interaction.					
			APEIT15D	Big Data Analytics					
	Semester Total				30	20			
SEMESTER - II	Part I	Core-4	APCIT21	Database System	5	5	25	75	100
		Core-5	APCPIT22	RDBMS- Practical	6	5	25	75	100
		Core-6	APCPIT23	Mobile Development - Practical	6	4	25	75	100
		Elective III (Choose any One)	APEIT24A	Networks and Security	4	3	25	75	100
			APEIT24B	Cloud Computing					
			APEIT24C	Biometric Techniques					
		Elective IV (Choose any One)	APEIT25A	Software Engineering	4	3	25	75	100
			APEIT25B	Object Oriented Analysis and Design					
			APEIT25C	Software Project Management					
		SEC1	APSIT26	Skill Enhancement Course -SEC Mobile Development	3	2	25	75	100
	Part II	Compulsory Paper	APHR20	Human Rights	2	2	25	75	100
			APMOOC20	MOOC Course	-	2	-	100	100
	Semester Total				30	26			

Semester	Part	Category	Course Code	Course Title	Ins.Hrs/ Week	Credit	Maximum Marks		
							Internal	External	Total
SEMESTER - III	**Part - I**	Core-7	APCIT31	Advanced Java	6	5	25	75	100
		Core-8	APCPIT32	Advanced Java - Practical	6	5	25	75	100
		Core-9	APCIT33	Open Source Technologies	6	5	25	75	100
		Core-10	APCPIT34	Open Source Technologies - Practical	5	4	25	75	100
		Elective V (Choose any One)	APEIT35A	Research Methodology	4	3	25	75	100
			APEIT35B	Internet of Things					
			APEIT35C	Trends in computing					
		SEC2	APSIT36	Skill Enhancement Course –SEC Industry Module – Mini Project done with in the campus	3	2	25	75	100
		Compulsory	APIIT37	Internship/Industrial Activity	-	2	100	-	100
		Semester Total			**30**	**26**			
SEMESTER - IV	**Part - I**	Core-11	APCIT41	Net with C# Programming	6	5	25	75	100
		Core-12	APCPIT42	Net with C# Programming-Practical	6	5	25	75	100
		Core-13	APPIT43	Project with viva voce-Industry related project and carried out in the industry	10	7	25	75	100
		Elective VI (Choose any One)	APEIT44A	Intelligent Systems	4	3	25	75	100
			APEIT44B	Introduction to Robotics			25	75	100
			APEIT44C	Virtual and Augmented Reality			25	75	100
		SEC3	APSIT45	Professional Competency Skill Enhancement Course Term Paper & Seminar Presentation – Staff supervisor should select and assign different Advanced Technology topics to the students. The students must give presentation of the allotted topic in the respective class hours. The document of the presentation of respective topic allotted to them must be prepared and submitted with soft binding (around 50 to 100 Pages). – Evaluation is done by the External examiners similar to Project Viva voce.	4	2	25	75	100
	Part II	Compulsory Paper	APEA40	Extension Activity	-	1	100	-	100
		Semester Total			**30**	**23**			

Consolidated Semester wise and Component wise Credit distribution

Parts	Semester-I	Semester-II	Semester-III	Semester-IV	Total Credits
Part-I	20	22	26	22	90
Part-II	-	4	-	1	5
Total	20	26	26	23	**95**

*Part I and Part II components will be separately taken into account for CGPA calculation and classification for the post graduate programme and has to be completed during the duration of the programme as per the norms, to be eligible for obtaining the PG degree.

COURSE DESCRIPTORS

Title of the Course	PYTHON PROGRAMMING	Hours/Week	7
Course Code	APCIT11	Credits	5
Category	CORE I	Year & Semester	I & I
Prerequisites	Basic understanding on object oriented programming concepts.	Regulation	2024

Objectives of the course:

➢ To acquire programming skills in core Python and to develop database applications in Python

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Core Python: Introduction - Python Basics: Comments - Statements and syntax - variable Assignment - Identifiers - Python objects : Built-in-types - Internal types - Standard Type operators - Standard type Built-in-functions. Numbers : Introduction to Numbers - Integers - Floating point numbers - Complex numbers - Operators - Built-in and factory functions – Conditionals and Loops -Sequences : Strings, Lists and Tuples	CO1	K1, K2
UNIT-II	Mapping and set types.- Functions and functional programming: Introduction - Calling functions - Creating functions - passing functions - Formal arguments - Variable - Length Arguments - Functional Programming - Variable Scope – Recursion	CO2, CO3	K1, K2
UNIT-III	Modules: Modules and Files – namespaces - Importing Modules - Features - Built-in functions. Object Oriented Programming: Introduction - Object Oriented Programming – Encapsulation Inheritance – Polymorphism - Errors and Exceptions: Introduction – Exceptions in Python.	CO2, CO3	K1, K2
UNIT-IV	GUI Programming: Introduction – Using Widgets: Core widgets- Generic widget properties – Labels – Buttons – Radio Buttons – Check Buttons – Text – Entry – List Boxes – Menus – Frame – Scroll Bars – Scale – Data Visualization using Grid and Graph.	CO4	K1, K2,K3,K5
UNIT-V	Database Programming: Connecting to a database using MySQL - Creating Tables - INSERT-UPDATE - DELETE - READ operations **Case Studies**: analyzing and visualizing data using Grid and Graph, Database Access with Python, Web Designing using Python.	CO5	K1,K2, K3, K6

Recommended Text Books
1. Wesley J. Chun, (2007), "Core Python Programming", Pearson Education, Second Edition – (Unit I,II,III).   2. 2. Charles Dierbach, (2015), "Introduction to Computer Science Using Python A Computational ProblemSolving Focus", Wiley India Edition- (Unit III- Object Oriented Programming)   3. 3. Martin C Brown, (2018), "The Complete Reference Python", McGraw Hill Education (India) Private Limited – (Unit IV)

Reference Books
1. Mark Lutz, (2013), "Learning Python Powerful Object Oriented Programming", O"reilly Media, 5 th Edition.   2. Timothy A. Budd, (2011), "Exploring Python", Tata MCGraw Hill Education Private Limited, First Edition.   3. Allen Downey, Jeffrey Elkner, Chris Meyers, (2012), "How to think like a computer scientist: learning with Python"

Website and e-learning source
1.http://interactivepython.org/courselib/static/pythond   2. http://www.ibiblio.org/g2swap/byteofpython/read/   3. http://www.diveintopython3.net/   4. http://docs.python.org/3/tutorial/index.html

Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able to

COs	CO Description	Cognitive Level
CO1	Explain the basic concepts in python language.	K1, K2
CO2	Apply the various data types and identify the usage of control statements, loops, functions and modules in python for processing the data	K1, K2
CO3	Analyze and solve problems using basic constructs and techniques of python.	K1, K2
CO4	Assess the approaches used in the development of interactive application.	K1, K2,K3,K5
CO5	To build real time programs using python	K1,K2, K3, K6

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	1	3	1	1	1	1	-	-	2	3	1	1
CO2	3	1	2	3	2	2	2	-	-	2	3	2	2
CO3	3	1	3	2	3	2	2	-	-	2	3	2	3
CO4	3	2	2	3	3	2	3	-	-	3	3	3	3
CO5	3	2	2	2	3	3	3	-	-	3	3	3	3

COURSE DESCRIPTORS

Title of the Course	PYTHON PROGRAMMING – PRACTICAL	Hours/Week	7
Course Code	APCIT12	Credits	5
Category	CORE II	Year & Semester	I & I
Prerequisites	Basic understanding of C, C++ and Java programming languages	Regulation	2024

Objectives of the course:

➢ This course gives practical experience in Python basics, Object Oriented programming like Classes, Inheritance, and Polymorphism, GUI Applications and Database connection.

S.No	List of Excersice	COs	Cognitive Levels
1	Python Basic programs	CO1	K1, K2
2	Control Structures	CO1	K1, K2
3	Lists	CO2	K2, K3
4	Functions and Recursions	CO1	K1, K2
5	Modules	CO1, CO2	K1, K2, K3
6	String Processing	CO1, CO2	K1, K2, K3
7	Dictionaries and Sets	CO1, CO2	K1, K2, K3
8	Classes and Objects using Machine learning Tools	CO3, CO4	K1, K2, K4,K5
9	Polymorphism using Machine learning Tools	CO3, CO4	K1, K2, K4,K5
10	Inheritance using Machine learning Tools	CO3, CO4	K1, K2, K4,K5
11	GUI Application with Data Visualization	CO4, CO5	K1, K2, K3, K5, K6
12	Working with Database	CO4, CO5	K1, K2, K3, K5, K6

Recommended Text Books

1. Wesley J. Chun, (2007), "Core Python Programming", Pearson Education, Second Edition

Reference Books

1. Mark Lutz, (2013), "Learning Python Powerful Object Oriented Programming", O"reilly Media, 5 th Edition.

2. Timothy A. Budd, (2011), "Exploring Python", Tata MCGraw Hill Education Private Limited, First Edition.

3. Allen Downey, Jeffrey Elkner, Chris Meyers, (2012), "How to think like a computer scientist: learning with Python"

4. Aditya Kanetkar , Yashavant Kanetkar,(2023) "Let us Python" – 6th Edition Publication: bpb

Website and e-learning source

1. http://interactivepython.org/courselib/static/pythonds
2. http://www.ibiblio.org/g2swap/byteofpython/read/
3. http://www.diveintopython3.net/
4. http://docs.python.org/3/tutorial/index.html
5. *https://youtu.be/eFByJkA3ti4?si=hqjcyt4sX2CpYe9m*

Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able to

COs	CO Description	Cognitive Level
CO1	Understand the significance of control statements, loops and functions in creating simple programs.	K1, K2
CO2	Apply the core data structures available in python to store, process and sort the data.	K2, K3
CO3	Analyze the real time problem using suitable python concepts	K2, K4
CO4	Assess the complex problems using appropriate concepts in python	K1, K2, K5
CO5	Develop the real time applications using python programming language.	K1, K2, K3, K6

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	1	1	2	2	2	-	-	3	3	2	3
CO2	3	2	1	2	2	2	2	-	-	2	2	2	3
CO3	3	2	2	3	3	2	3	-	-	3	3	2	3
CO4	3	2	3	3	3	3	3	-	-	3	2	2	2
CO5	3	2	3	3	3	3	3	-	-	3	2	2	2

COURSE DESCRIPTORS

Title of the Course	WEB DEVELOPMENT USING WORD PRESS - PRACTICAL	Hours/Week	6
Course Code	APCPIT13	Credits	4
Category	CORE III	Year & Semester	I & I
Prerequisites	Basic understanding on HTML and CSS	Regulation	2024

Objectives of the course:

➢ The primary course objective of this paper is to learn the fundamentals of basic web concepts, HTML, DHTML, JavaScript and Word Press

UNITS	Contents	COs	Cognitive Levels
For each UNIT at least 2 Lab exercises should be carried out using the specified components in the syllabus			
UNIT-I	Introduction to HTML - Lists - Adding Graphics to HTML Documents - Tables -Linking Documents - Frames- Developing HTML Forms	CO1	K1, K2
UNIT-II	Dynamic HTML - Cascading Style Sheets - Use of SPAN Tag - External Style Sheets -Use of DIV Tag - Developing Websites	CO1, CO2	K1, K2, K3
UNIT-III	Introduction to JavaScript - JavaScript in Web Pages - Advantages - Writing JavaScript into HTML - Basic Programming Techniques - Operators and Expressions- JavaScript Programming Construct: Conditional Checking, Controlled Loops, Functions: Built-in Functions, User-Defined Functions - Placing Text in a Browser - Dialog Boxes.	CO2, CO3	K1,K2, K3, K4
UNIT-IV	JavaScript Document Object Model: Introduction - Understanding Objects in HTML - Handling Events using JavaScript. Forms used by a Website: Form Object - Built-in Objects.	CO2, CO4	K1,K2, K3, K5
UNIT-V	Word Press: Installation - Stetting and administration- Word press: Theming basics - Our First Word Press Website - Theme Foundation - Menu and navigation - Home page - Dynamic Sidebars and Widgets - Page - archive Page results - Testing and Launching	CO5	K1,K2,K3, K6

Recommended Text Books

    1. Ivan N. Bayross, (2005), Web Enabled Commercial Applications Development Using HTML, DHTML, JavaScript, perlCGI, 3rd Edition, BPB Publications. (Unit I, II, III and IV)

    2. Jesse Friedman,(2012), Web Designer's Guide to WordPress: Plan, Theme, Build, Launch (Voices That Matter), 1st Edition , New Riders. (Unit V)

Reference Books

    1. N.P. Gopalan, J. Akilandeswari, (2009), Web Technology: A Developer"s Perspective, Eastern Economy Edition, PHI Learning Private Limited.

    2. Deitel&Deitel, (2000), Internet and World Wide Web How to program, Prentice Hall.

    3. Jon Duckett, (2004), Beginning Web Programming with HTML, XHTML, and CSS, Wiley Publishing, Inc.

Website and e-learning source

    1. http://www.sergey.com/web_course/content.html

    2. http://www.pageresource.com/jscript/index.html

    3. http://www.peachpit.com/guides/content.aspx

    4. https://www.tutorialspoint.com/wordpress/index.html

Course Learning Outcomes (for Mapping with POs and PSOs)

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Identify the tools which will be suitable for the requirement of the webpage.	K1, K2
CO2	Implement Java script and Style Sheets effectively in the Web Pages	K1,K2, K3
CO3	Analyze the different tools and built-in functions available to be applied in the webpage	K1,K2, K3, K4
CO4	Rate the design and effectiveness of the Web Pages created.	K1,K2, K3, K5
CO5	Design and publish a website using Word press	K1,K2, K3, K6

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	1	1	-	-	2	2	2	3
CO2	3	2	2	1	2	1	1	-	-	2	3	2	3
CO3	3	2	3	3	3	2	2	-	-	3	2	3	1
CO4	3	1	3	3	3	3	3	-	-	3	3	3	3
CO5	3	1	3	3	3	3	3	-	-	3	3	3	1

COURSE DESCRIPTORS

Title of the Course	DATA STRUCTURES	Hours/Week	5
Course Code	APEIT14A	Credits	3
Category	ELECTIVE I (EC1)	Year & Semester	I & I
Prerequisites	Basic understanding of programming and foundational concepts in computer science	Regulation	2024

Objectives of the course:

➢ To become familiar with the various data structures and their applications and to increase the understanding of basic concepts of the design and use of algorithms.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction and Overview: Definitions – Concept of Data Structures – Overview of Data Structures – Implementation of Data Structures – Arrays: Definition – One Dimensional Array – Multidimensional Arrays: Two Dimensional Array – Sparse Matrices – Three dimensional and n-dimensional Arrays – Stacks : Introduction – Definition – Representation of Stack – Operations on Stack – Applications of Stacks: Evaluation of Arithmetic Expressions – Implementation of Recursion - Tower of Hanoi Problem	CO1, CO2	K1, K2
UNIT-II	Queues: Introduction – Definition – Representation of Queues – Various Queue Structures : Circular Queue – Deque – Priority Queue – Applications of Queues : Simulation – CPU Scheduling in a Multiprogramming Environment – Round Robin Algorithm – Linked Lists: Single Linked List – Circular Linked List – Double Linked List – Circular Double Linked List – Applications of Linked List: Polynomial Representation	CO2, CO3	K1, K2, K3, K4
UNIT-III	Trees: Basic Terminologies – Representation of Binary Tree: Linear Representation – Linked Representation – Operations: Traversals – Types of Binary Trees: Expression Tree – Binary Search Tree – Splay tree	CO3, CO4	K3, K4
UNIT-IV	Sorting: Bubble Sort, Insertion Sort, Selection Sort, Shell Sort – Quick Sort - Merge Sort - Radix Sort - Heap Sort – Searching: Linear Search - Binary Search	CO3, CO4	K3, K4
UNIT-V	Graphs: Introduction – Graph representation and its operations – Path Matrix – Graph Traversal - Application of DFS – Shortest Path Algorithm - Minimum Spanning Tree : Prim''s Algorithm – Kruskal''s Algorthim - Greedy – Knapsack – Back Tracking – 8 Queens	CO4, CO5	K4, K5

Recommended Text Books

      1.Debasis Samantha (2013), Classic Data Structures, Second Edition, PHI Learning Private Limited.

      2. P. Sudharsan, J. John Manoj Kumar, C & Data Structures, Third Edition, RBA Publications. Unit 4:

Chapter 14, Unit 5: Chapter 13

      3. Ellis Horowitz, SartajSahni, Sanguthevar Rajeshakaran, (2007), Fundamentals of Computer

Algorithms, Second Edition, Universities Press (P) Limited

Reference Books

      1. Sara Baase, (1991), Computer Algorithms – Introduction to Design and Analysis, Addison- Wesley

Publishing Company 2. Robert Kruse, C.L.Tondo, Bruce Leung, Data Structures and Program Design

in C ,2nd Edition, PHI Publications.

Website and e-learning source

1. http://www.cs.sunysb.edu/~skiena/214/lectures/

 2. http://datastructures.itgo.com/graphs/dfsbfs.html

 3. http://oopweb.com/Algorithms/Documents/PLDS210/Volum eFrames.html

 4. http://discuss.codechef.com/questions/48877/data-structuresand-algorithms

 5. http://code.tutsplus.com/tutorials/algorithms-and-datastructures--cms-20437

Course Learning Outcomes (for Mapping with POs and PSOs)

    Students will be able to

COs	CO Description	Cognitive Level
CO1	Outline the basic data structures	K1
CO2	Identify the different operations and memory representations	K1, K2
CO3	Interpret different techniques with their complexities	K1, K2,K3, K4
CO4	Compare the applications of various data structures	K1, K2,K3, K4
CO5	Choose an algorithm to solve simple problems suited for appropriate situations	K1, K2,K3, K4, K5

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	1	1	-	-	1	3	3	3
CO2	3	2	2	2	2	1	1	-	-	1	2	3	1
CO3	3	1	2	3	3	2	1	-	-	3	2	2	3
CO4	3	2	3	3	3	2	2	-	-	3	3	2	1
CO5	3	1	3	3	3	2	2	-	-	3	2	3	3

COURSE DESCRIPTORS

Title of the Course	COMPILER DESIGN	Hours/Week	5
Course Code	APEIT14B	Credits	3
Category	ELECTIVE I (EC1)	Year & Semester	I & I
Prerequisites	Basic knowledge in one of the programming language and data structures	Regulation	2024

Objectives of the course:

➢ To acquire the knowledge about the compiler design and to understand the different phases of Compiler.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Compilers & Translators, Need of Translators, Structure of a Compiler, Phases, Lexical Analysis, Syntax Analysis, Intermediate Code Generation, Code Optimization, Code Generation, Book Keeping, A Symbol Table in brief, Semantic Analysis, L-value, r-values, Error Handling	CO1	K1, K2
UNIT-II	Rules of Lexical Analyser, Need for Lexical Analysis, Input Buffering, Preliminary Scanning, A simple Approach to the Design of Lexical Analysers, Transition Diagrams, Regular Expression, String & Languages, Finite Automata, Nondeterministic Automata, Deterministic Automata, From regular Expression to Finite Automata, Context free Grammars, Derivations & Parse Trees, Parsers, Shift Reduce Parsing, Operator-Precedence Parsing	CO1, CO2	K1, K2
UNIT-III	Symbol Table Management, Contents of a Symbol Table, Names & Symbol table records, reusing of symbol table spaces, array names, Indirection in Symbol Table entries, Data Structures for Symbol Tables, List, Self Organizing Lists, Search Trees, Hash Tables, Errors, Reporting Errors, Sources of Errors Syntactic Errors, Semantic Errors, Dynamic Errors, Lexical Phase Errors, Minimum Distance Matching, Syntactic Phase Error, Time of Detection, Ponic mode, Case study on Lex and Yacc	CO2	K1, K2
UNIT-IV	Principal Sources of Optimization, Inner Loops, Language Implementation Details Inaccessible to the User. Further Optimization, Algorithm Optimization, Loop Optimization , Code Motion, Induction Variables, Reduction in Strength, Basic Blocks, Flow Graphs, DAG Representation of Basic Blocks, Value Numbers & Algebraic Laws, Global Data Flow Analysis, Memory Management Strategies , Fetch Strategy, Placement Strategies, Replacement Strategies, Address Binding, Compile Time, Load Time, Execution Time, Static Loading, Dynamic Loading, Dynamic Linking	CO3, CO4	K2, K3, K4

| UNIT-V | Problems in Code Generation, a Simple Code Generator, Next-Use Information, Register Descriptors, Address Descriptors, Code Generation Algorithm, Register Allocation & Assignment, Global Register Allocation, Usage Counts, Register Assignment for Outer Loops, Register Allocation by Graph Coloring, Code Generation from DAG's, Peep-Hole Optimization, Redundant Loads & Stores, Un-Reachable Code, Multiple Jumps, Algebraic Simplifications, Use of Machine Idioms | CO4, CO5 | K3, K4, K5 |

Recommended Text Books
1. Compilers: Principles, Techniques & Tools, Second Edition by A. V. Aho, Monicas. Lam, Ravi Sethi, J. D. Ullman

Reference Books
1. Dhamdhere D.M., "Compiler Construction: Theory and Practice", McMillan India Ltd., 1983
2. Holub Allen, "Compiler Design in C", Prentice Hall of India, 1990

Website and e-learning source
1. https://www.geeksforgeeks.org/compiler-design-tutorials/
2. https://www.tutorialspoint.com/compiler_design/
3. https://www.javatpoint.com/compiler-tutorial
4. https://onlinecourses.nptel.ac.in/noc19_cs01/preview
5. http://ecomputernotes.com/compiler-design

Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able to

COs	CO Description	Cognitive Level
CO1	Identify the major phases of compilation and the functionality of LEX and YACC	K1, K2
CO2	Describe the functionality of compilation process and symbol table management.	K1, K2
CO3	Apply the various parsing, optimization techniques and error recovery routines to have a better code for code generation.	K2, K3
CO4	Analyze the techniques and tools needed to design and implement compilers.	K3, K4
CO5	Test a compiler and experiment the knowledge of different phases in compilation.	K4, K5

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	1	1	2	2	1	-	-	1	3	2	2
CO2	3	2	1	1	1	1	2	-	-	1	3	2	2
CO3	3	1	2	2	3	2	2	-	-	1	3	2	3
CO4	3	1	3	3	3	2	2	-	-	2	3	3	3
CO5	3	1	3	3	3	2	2	-	-	2	3	3	3

COURSE DESCRIPTORS

Title of the Course	NATURAL LANGUAGE PROCESSING	Hours/Week	5
Course Code	APEIT14C	Credits	3
Category	ELECTIVE I (EC1)	Year & Semester	I & I
Prerequisites	Basic understanding of natural language and linguistics	Regulation	2024

Objectives of the course:

➢ To learn the fundamentals of natural language processing and to understand the role of CFG, semantics of sentences and pragmatics.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction: Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM - Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance	CO1, CO2	K1, K2, K4
UNIT-II	Word Level Analysis: Unsmoothed N-grams, Evaluating Ngrams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rulebased, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models	CO3	K1, K2, K3
UNIT-III	Syntactic Analysis: Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs - Feature structures, Unification of feature structures	CO4	K1, K2, K5
UNIT-IV	Semantics and Pragmatics: Requirements for representation, FirstOrder Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selection restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary & Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods	CO2	K1, K2, K4
UNIT-V	Discourse Analysis and Lexical Resources: Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC)	CO4, CO5	K1, K2, K5, K6

Recommended Text Books

1. Daniel Jurafsky, James H. Martin;Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech; Pearson Publication; 2014.

2. Steven Bird, Ewan Klein and Edward Loper, ―Natural Language Processing with Python , First Edition, OReilly Media, 2009

Reference Books
1. Breck Baldwin, ―Language Processing with Java and LingPipe Cookbook, Atlantic Publisher, 2015. 2. Richard M Reese, ―Natural Language Processing with Java , O_Reilly Media, 2015. 3. Nitin Indurkhya and Fred J. Damerau, ―Handbook of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press, 2010. 4. Tanveer Siddiqui, U.S. Tiwary, ―Natural Language Processing and Information Retrieval, Oxford University Press, 2008.

Website and e-learning source
1. http://www.cse.iitb.ac.in/~pb/papers/nlp-iitb.pdf 2. https://www.nitk.ac.in/faculty/dr-sarika-jain 3. https://www.simplilearn.com/tutorials/artificial-intelligencetutorial/what-is-natural-language-processing-nlp 4. https://www.sas.com/en_us/insights/analytics/what-isnatural-language-processing-nlp.html 5. https://towardsdatascience.com/your-guide-to-naturallanguage-processing-nlp-48ea25

Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able to

COs	CO Description	Cognitive Level
CO1	Describe the concepts of morphology, syntax, semantics, discourse & pragmatics of natural language	K1,K2
CO2	Identify various linguistic and statistical features relevant to the basic NLP task, namely, spelling correction, morphological analysis, parsing and semantic analysis	K1,K2,K4
CO3	Classify the text into an organized group using a set of handicraft linguistic rules with appropriate NLP processes and algorithms	K1,K2,K3
CO4	Analyze the system with various language analysis methods and interpret the results	K1,K2,K5
CO5	Assess NLP systems, identify and suggest solutions for the shortcomings	K1,K2,K6

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	1	1	1	1	1	1	-	-	2	3	2	3
CO2	3	1	1	1	2	1	1	-	-	1	3	2	3
CO3	3	2	2	2	2	2	2	-	-	2	3	2	2
CO4	3	2	3	2	2	3	2	-	-	2	2	3	2
CO5	3	2	3	3	3	3	3	-	-	2	3	3	3

COURSE DESCRIPTORS

Title of the Course	BLOCKCHAIN TECHNOLOGY	Hours/Week	5
Course Code	APEIT14D	Credits	3
Category	ELECTIVE I (EC1)	Year & Semester	I & I
Prerequisites	Basic knowledge of networking and cyber security concepts	Regulation	2024

Objectives of the course:

➢ To study the basics of Blockchain technology, private and public Blockchain, and smart contract. This paper familiarizes the students to explore various aspects of Blockchain technology like application in various domains

UNITS	Contents	COs	Cognitive Levels
UNIT-I	**Introduction of Cryptography and Blockchain** : Definition of Blockchain - Blockchain Technology Mechanisms & Networks - Blockchain Origins - Objective of Blockchain - Blockchain Challenges - Transactions and Blocks - P2P Systems - Keys as Identity - Digital Signatures, Hashing, and public key cryptosystems - private vs. public Blockchain	CO1, CO2	K1, K2, K4
UNIT-II	**Bitcoin and Cryptocurrency** : Bitcoin Terminology- The Bitcoin Network - The Bitcoin Mining Process - Mining Developments - Bitcoin Wallets - Decentralization and Hard Forks - Ethereum Virtual Machine (EVM) - Merkle TreeDouble- Spend Problem - Blockchain and Digital CurrencyTransactional Blocks - Impact of Blockchain Technology on Cryptocurrency	CO3	K1, K2, K3
UNIT-III	**Introduction to Ethereum** : Introduction to Ethereum - Consensus Mechanisms- Metamask Setup - Ethereum Accounts - Transactions - Receiving Ethers- Smart Contracts	CO4	K1, K2, K5
UNIT-IV	**Introduction to Hyperledger and Solidity Programming** : Definition of Hyperledger - Distributed Ledger Technology & its Challenges - Hyperledger & Distributed Ledger Technology - Hyperledger Fabric -Hyperledger Composer - Solidity - Language of Smart Contracts - Installing Solidity & Ethereum Wallet - Basics of Solidity - Layout of a Solidity Source File & Structure of Smart Contracts - General Value Types	CO2	K1, K2, K4
UNIT-V	**Blockchain Applications :** Internet of Things -Medical Record Management System - Domain Name Service and Future of Blockchain -Alt Coins	CO4, CO5	K1, K2, K5, K6

Recommended Text Books

1. Imran Bashir, "Mastering Blockchain: Distributed Ledger Technology, Decentralization, and Smart Contracts Explained", Second Edition, Packt Publishing, 2018
2. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction" Princeton University Press, 2016
3. Antonopoulos and G. Wood, "Mastering Ethereum: Building Smart Contracts and Dapps", O'Reilly Publishing, 2018

Reference Books

1. Antonopoulos, Mastering Bitcoin, O'Reilly Publishing, 2014
2. D. Drescher, Blockchain Basics. Apress, 2017

Website and e-learning source

1. https://nptel.ac.in/courses/106/104/106104220/#
2. https://archive.nptel.ac.in/courses/106/105/106105235/
2. https://www.udemy.com/course/build-your-blockchain-az/
3. https://eduxlabs.com/courses/blockchain-technologytraining/?tab=tab-curriculum
4. https://www.geeksforgeeks.org/consensus-algorithms-inblockchain/
5. https://ec.europa.eu/programmes/erasmus-plus/project-resultcontent/eb79d492-327b-43d8-b479-dd0fd9fd4490/BLISS%2003 T3%20Unit%201%20slides%20v3.0%20final%20controled.pptx

Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able to

COs	CO Description	Cognitive Level
CO1	Understand and explore the working of Block chain technology	K1,K2
CO2	Identify the security and privacy implications of block chain technology	K1,K2
CO3	Apply the learning of solidity to build de-centralized apps on Ethereum	K1,K2,K3
CO4	Analyze the working of Smart Contracts and the working of Hyperledger	K1,K2,K4
CO5	Assess the methods relevant for design, development and operation of block chain based applications	K1,K2,K6

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	1	1	1	1	1	1	-	-	2	2	2	3
CO2	3	1	1	1	2	1	1	-	-	1	2	2	3
CO3	3	2	2	2	2	2	2	-	-	2	3	2	2
CO4	3	2	3	2	2	3	2	-	-	2	3	3	2
CO5	3	2	3	3	3	3	3	-	-	2	3	3	3

COURSE DESCRIPTORS

Title of the Course	OPERATING SYSTEMS	Hours/Week	5
Course Code	APEIT15A	Credits	3
Category	ELECTIVE II (EC2)	Year & Semester	I & I
Prerequisites	Basic understanding of working principles of computer and about hardware and software components	Regulation	2024

Objectives of the course:

➢ To develop fundamental knowledge of Operating systems, to become familiar with CPU Scheduling, memory and file management concepts, to learn concepts and programming techniques of Linux.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction : Evolution of Operating System - Structure - Processes - The Process Concepts - Inter Process Communication - IPC Problems - Scheduling Levels - Preemptive Vs Non- Preemptive Scheduling - Scheduling Algorithms: First Come First Served - Shortest Job First - Shortest Remaining Time Next - Three Level Scheduling - Round Robin Scheduling - Priority Scheduling -Multiple Queues - Shortest Process Next - Guaranteed Scheduling - Lottery Scheduling - Fair-Share Scheduling - Thread Scheduling	CO1, CO5	K1, K2, K4, K5
UNIT-II	Swapping - Virtual Memory - Page Replacement Algorithm - Segmentation	CO3, CO4	K1, K2, K3, K4
UNIT-III	Deadlock - Examples of Deadlock - Detection - Recovery - Avoidance - Prevention – Semaphore -Shared Memory	CO5	K1,K2, K4, K5
UNIT-IV	File System - Files - Directories - I/O Management - Disks - Disk Arm Scheduling Algorithm	CO5	K1,K2, K4, K5
UNIT-V	Introduction to Linux: Introducing Shell Programming - Linux File Systems - Linux File system calls - Implementation of Linux File systems - Linux Commands - Directory Oriented Commands - File Oriented Commands - Communication Oriented Commands- General Purpose Commands	CO2	K1,K2,K3

Recommended Text Books
1. Andrew S. Tanenbaum, (2001), Modern Operating Systems, 2nd Edition, Prentice Hall of India.
2. B.Mohamed Ibrahim, (2005) Linux Practical Approach, Firewall Media.

Reference Books
1. Silberchatz, Galvin, Gagne, (2003), Operating Systems Concepts, 6th Edition Wiley India Edition.
2. JhonGoerzen, (2002), Linux Programming Bible, 4th Edition, Wiley- dreamtech India (P) Ltd.

Website and e-learning source
1. https://www.webopedia.com/TERM/O/operating_system.html
2. https://www.tutorialspoint.com/operating_system/operating__system_tutorial.pdf
3. http://iips.icci.edu.iq/images/exam/AbrahamSilberschatz-Operating-System-Concepts---9th2012.12.pdf
4. https://www.informatics.indiana.edu/rocha/academics/i101/p dfs/os_intro.pdf
5. New folder

Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able to

COs	CO Description	Cognitive Level
CO1	Outline the fundamental concepts of an OS and their respective functionality	K1, K2
CO2	Demonstrate the importance of open-source operating system commands	K1, K2,K3
CO3	Identify and stimulate management activities of operating system	K1, K2, K3
CO4	Analyze the various services provided by the operating system	K1,K2, K4
CO5	Interpret different problems related to process, scheduling, deadlock, memory and files	K1, K2, K4, K5

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	1	1	-	-	2	3	3	3
CO2	3	1	1	2	1	2	1	-	-	2	2	3	2
CO3	3	2	2	2	2	2	2	-	-	2	3	2	3
CO4	3	2	2	3	3	2	2	-	-	2	2	3	2
CO5	3	3	3	3	3	3	3	-	-	3	3	3	3

COURSE DESCRIPTORS

Title of the Course	DIGITAL COMPUTER ARCHITECTURE	Hours/Week	5
Course Code	APEIT15B	Credits	3
Category	ELECTIVE II (EC2)	Year & Semester	I & I
Prerequisites	Basic knowledge in Digital Design and Computer Architecture	Regulation	2024

Objectives of the course:

➢ To provide a comprehensive introduction of the basic design of a computer and the interdependence and interoperation between the various components inside a computer.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Data Representation - Data Types - Number Systems - Decimal and Alphanumeric Representation - Complements - (r-1)‟s complement - (r‟s) complement - Fixedpoint Representation - Floating-point Representation - Binary Codes - Gray Codes - Decimal Codes - Alphanumeric Codes – Error Detection Codes	CO1	K1, K4
UNIT-II	Digital Computers - Logic Gates - Boolean Algebra - KMap Simplification - Combinational Circuits - Half Adder - Full Adder - SR, D, JK and T Flip Flops - Sequential Circuits - State Table - State Diagram - Digital Components: Integrated Circuits - Decoders - NAND Gate Decoder - Encoders - Multiplexers - Registers - Shift Registers - Binary Counters - Memory Unit	CO2, CO3, CO4	K1,K2, K3, K4
UNIT-III	Register Transfer and Micro-operations: Register Transfer Language - Register Transfer - Bus and Memory Transfers - Arithmetic Micro-operations - Logic Micro-operations - Shift Micro- operations - Arithmetic Logic Shift Unit. Computer Organization and Programming: Instruction Codes - Computer Registers - Computer Instructions - Timing and Control - Instruction Cycle - Memory Reference Instructions - Input-Output and Interrupt	CO4	K1,K2, K3, K4
UNIT-IV	Central Processing Unit: General Register Organization - Instruction Formats - Addressing Modes - Data Transfer and Manipulation - Program Control. I/O Organization: Peripheral Devices - I/O Interface - Asynchronous Data Transfer - Modes of Transfer - Priority Interrupt - DMA	CO4, CO5	K1,K2, K3, K4
UNIT-V	Memory Organization and CPU: Memory Hierarchy - Main Memory - Auxiliary Memory - Associative Memory - Cache Memory - Virtual Memory - Memory Management Hardware	CO5	K1,K2, K3, K4

Recommended Text Books

    1. M. Morris Mano, "Computer System Architecture", Prentice Hall of India, 2001

Reference Books

    1. John P. Hayes, "Computer Architecture and Organization", Tata McGraw Hill, 1996.

    2. V C Hamatcher et al, "Computer Organization", Tata McGraw Hill, 1996.

Website and e-learning source

    1. http://www.labri.fr/perso/strandh/Teaching/AMP/Common/Stran dh-Tutorial/Dir.html

    2. http://www.computer-pdf.com/architecture/

    3. http://www.uotechnology.edu.iq/depcse/lectures/3/

    4. http://www.csie.nuk.edu.tw/~kcf/course/ComputerArchitecture/

    5. http://www.ecs.csun.edu/~cputnam/Comp546/Putnam/Cach e%20Memory.pdf(UnitV: Cache Memory)

Course Learning Outcomes (for Mapping with POs and PSOs)

    Students will be able to

COs	CO Description	Cognitive Level
CO1	Demonstrate the fundamental concept of binary representation and codes, combinational circuits, Instruction formats, register operations and memory organization	K1, K4
CO2	Explain the various types of flip flops, different types of micro operations, as well as the addressing modes in the instruction set	K1,K2
CO3	Apply the various number conversion systems and simplification of equations using K-map	K1,K2,K3
CO4	Analyze the various design of combinational circuits and flip flops to design a computer	K1,K2,K3,K4
CO5	Distinguish the major components of a computer including CPU, memory, I/O and storage	K1,K2,K3,K4

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	1	1	1	1	1	-	-	-	1	2	3	2
CO2	3	1	1	1	2	2	-	-	-	1	3	2	2
CO3	3	2	2	2	2	2	2	-	-	2	3	3	2
CO4	3	2	3	3	2	2	2	-	-	2	2	3	3
CO5	3	2	3	3	3	3	3	-	-	2	3	3	2

COURSE DESCRIPTORS

Title of the Course	HUMAN COMPUTER INTERACTION	Hours/Week	5
Course Code	APEIT15C	Credits	3
Category	ELECTIVE II (EC2)	Year & Semester	I & I
Prerequisites	Understanding the impact of human factors and Computer Science fundamentals	Regulation	2024

Objectives of the course:

➢ To provide a comprehensive introduction of the basic design of a computer and the interdependence and interoperation between the various components inside a computer.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Foundations: The Human: Introduction-Input-Output Channels- Memory. The Computer: Introduction- Text Entry Devices- Display Devices-Memory. The Interaction: Introduction – Models of Interaction-Frameworks and HCI Ergonomics-Interaction Styles-Elements of the WIMP Interface-Interactivity - The Context of the Interactions	CO1	K1
UNIT-II	Design Process: Design Basics- Introduction - Process- User Focus-Scenarios- Navigation Design- Screen Design and Layout-Interaction and Prototyping. Design RulesIntroduction- Principles to Support Usability-GuidelinesGolden Rules and Heuristics-HCI Patterns	CO2	K1, K2, K3
UNIT-III	Implementation Support: Introduction - Elements of Windowing Systems - Programming the Application- Using Toolkits-User Interface Management Systems. Evaluation Techniques: What is an Evaluation- Goal of EvaluationEvaluation Through Expert Analysis-Choosing an Evaluation Method	CO3	K1, K2, K3,K4
UNIT-IV	Universal Design: Introduction - Universal Design Principles-Designing for Diversity. User Support: Introduction-Requirements of User Support-Approaches to User Support-Adaptive Help Systems-Designing User Support Systems	CO4	K1, K2, K5
UNIT-V	Models: Cognitive Models: Introduction-Goals and TaskLinguistic Models-Challenge of Display Based SystemPhysical and Device Models - Cognitive Architectu	CO5	K1, K2, K3,K4

Recommended Text Books

 1. Alan dix, Janet finlay, Gregory D. Abowd and Russell Beale,(2004),Human Computer Interaction, 3rd edition, Pearson Education

Reference Books

 1 John C. Caroll, (2002), Human Computer Interaction in the new millennium, Pearson Education

 2. Jenny Preece, Yvonne Rogers, Helen Sharp (2019), Interaction Design: Beyond Human–Computer Interaction,fifth edition, John Wiley & Sons In

Website and e-learning source

 1. http://courses.iicm.tugraz.at/hci/

 2. http://www.hcibook.com/hcibook/downloads/pdf/exercises.pdf

 3. http://www.idemployee.id.tue.nl/g.w.m.rauterberg/lectures.html

 4.http://user.medunigraz.at/andreas.holzinger/holzinger/papersen/HCI/Workshop/forISSEP%202005.pdf

 5. http://universaldesign.ie/What-is-Universal-Design/The7-Principles/ (Unit IV: Universal Design Principles)

Course Learning Outcomes (for Mapping with POs and PSOs)

 Students will be able to

COs	CO Description	Cognitive Level
CO1	Describe typical human–computer interaction (HCI) models, styles, and various historic HCI paradigms	K1
CO2	Identify the usability and the beneficiary factors of User support systems	K1, K2
CO3	Analyze the core theories, models and methodologies in the field of HCI	K1, K2, K3,K4
CO4	Evaluate interactive systems based on the human factor theories	K1, K2, K5
CO5	Elaborate an interactive system based on the design principles, standards and guidelines	K1, K2, K3,K4

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	1	-	-	-	2	3	2	2
CO2	2	3	3	2	2	2	-	-	-	1	3	2	2
CO3	3	2	3	2	2	1	2	-	-	3	3	3	2
CO4	2	3	3	2	2	2	-	-	-	2	2	3	3
CO5	3	2	2	3	2	2	1	-	-	2	3	2	3

COURSE DESCRIPTORS

Title of the Course	Big Data Analytics	Hours/Week	5
Course Code	APEIT15D	Credits	3
Category	ELECTIVE II (EC2)	Year & Semester	I & I
Prerequisites	Basic idea of Data warehousing, basic programming.	Regulation	2024

Objectives of the course:
- ➢ Understand the Big Data Platform and its Use cases, Map Reduce Jobs
- ➢ To identify and understand the basics of cluster and decision tree
- ➢ To study about the Association Rules, Recommendation System
- ➢ To learn about the concept of stream
- ➢ Understand the concepts of NoSQL Databases

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Evolution of Big data - Best Practices for Big data Analytics — Big data characteristics — Validating — The Promotion of the Value of Big Data — Big Data Use Cases- Characteristics of Big Data Applications — Perception and Quantification of Value - Understanding Big Data Storage — A General Overview of High-Performance Architecture — HDFS — Map Reduce and YARN — Map Reduce Programming Model	CO1	K1
UNIT-II	Advanced Analytical Theory and Methods: Overview of Clustering — K-means — Use Cases — Overview of the Method — Determining the Number of Clusters — Diagnostics — Reasons to Choose and Cautions .- Classification: Decision Trees — Overview of a Decision Tree — The General Algorithm — Decision Tree Algorithms — Evaluating a Decision Tree — Decision Trees in R — Naïve Bayes — Bayes Theorem — Naïve Bayes Classifier.	CO2	K1, K2, K3

UNIT-III	Advanced Analytical Theory and Methods: Association Rules — Overview — Apriori Algorithm — Evaluation of Candidate Rules — Applications of Association Rules — Finding Association& finding similarity - Recommendation System: Collaborative Recommendation- Content Based Recommendation — Knowledge Based Recommendation- Hybrid Recommendation Approaches.	CO3	K1, K2, K3,K4
UNIT-IV	Introduction to Streams Concepts — Stream Data Model and Architecture — Stream Computing, Sampling Data in a Stream — Filtering Streams — Counting Distinct Elements in a Stream — Estimating moments — Counting oneness in a Window — Decaying Window — Real time Analytics Platform(RTAP) applications — Case Studies — Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytics	CO4	K1, K2, K5
UNIT-V	**NoSQL Databases** : Schema-less Models : Increasing Flexibility for Data Manipulation-Key Value Stores- Document Stores - Tabular Stores - Object Data Stores - Graph Databases Hive - Sharding — Hbase — Analyzing big data with twitter — Big data for E-Commerce Big data for blogs — Review of Basic Data Analytic Methods using R.	CO5	K1, K2, K3,K4

Recommended Text Books

   AnandRajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.

Reference Books

1. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Morgan Kaufmann/El sevier Publishers, 2013

2. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley publishers, 2015.

Website and e-learning source

1. https://www.simplilearn.com

2. https://www.sas.com/en_us/insights/analytics/big-data-analytics.html

3. https://archive.nptel.ac.in/courses/106/104/106104189/

Course Learning Outcomes (for Mapping with POs and PSOs)

Students will be able to

COs	CO Description	Cognitive Level
CO1	Work with big data tools and its analysis techniques.	K1
CO2	Analyze data by utilizing clustering and classification algorithms.	K3, K4
CO3	Learn and apply different mining algorithms and recommendation systems for large volumes of data	K1, K2, K3
CO4	Perform analytics on data streams.	K1, K2, K4
CO5	Learn NoSQL databases and management.	K1, K2, K3

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	1	-	-	-	2	3	2	2
CO2	2	3	3	2	2	2	-	-	-	1	3	2	2
CO3	3	2	3	2	2	1	2	-	-	3	3	3	2
CO4	2	3	3	2	2	2	-	-	-	2	2	3	3
CO5	3	2	2	3	2	2	1	-	-	2	3	2	3