



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

DEPARTMENT OF COMPUTER APPLICATIONS

B.C.A.,

SYLLABUS

(CHOICE BASED CREDIT SYSTEM)

Under

LEARNING OUTCOMES-BASED CURRICULUM

FRAMEWORK (LOCF)

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

PREFACE

The curriculum of undergraduate Computer Applications has been designed to explain the concepts in various branches of Computer Applications such as Information Technology, Computer Networking, Software Engineering, Databases etc. The purpose of the outcome-based education is meant to provide an exposure to the fundamental aspects in different branches of Computer Science and its applications, keeping in mind the growing needs for higher education, employability, entrepreneurship and social responsibility. The periodical restructuring of the syllabi is carried out to fulfill the requirements of graduate attributes, qualification descriptors, programme learning outcomes and course outcomes. The programme also includes training to students for seminar presentation, preparation of internship reports, hands-on training in lab courses, skills to handle instruments, synthesis and its analysis, developing leadership qualities, organization and participation in the interdepartmental academic competitions. The allied papers provide a platform to strengthen the understanding of the core subjects. The non-major elective courses offer chances to learn and augment interest in other related fields. The outcome-based curriculum is intended to enrich the learning pedagogy to global standards. ICT enabled teaching-learning platforms are provided to students along with the interaction of international scientists. The seminars periodically delivered by industrialists, subject experts and former professors would certainly help the students to update with latest technology/trends in different fields of Computer Applications. 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.

ABOUT THE COLLEGE

The College was founded 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 & breath. The college has grown into a full fledged educational hub offering 12 graduate programmes, 8 post graduate programmes, 5 M.Phil research programmes and 4 Ph.D programme. 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 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 Applications 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 calibre for effective and quick acquisition.

VISION OF THE DEPARTMENT

To create a teaching, learning environment that will provide best opportunity for the students specifically from the rural area of Gudiyatham to meet the current challenges of the modern computing industry, to develop as competent professionals, to serve the computing industry and contribute to our nation's socio-economic progress.

MISSION OF THE DEPARTMENT

- To educate students at under graduate level (BCA) in the fundamental and advanced concepts of computing discipline.
- To promote practical skills in our students with an emphasis on ethics, interpersonal development and professional competency.
- To prepare them to pursue exemplary careers in industries, academia and research.
- To impart the ability to use the expertise in computing to meet the ever growing demands of the society.

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 B.C.A., the students will be able to:

PSOs	Statements
PSO1	Apply fundamental programming concepts and technologies.
PSO2	Demonstrate proficiency in utilizing various programming languages and development tools.
PSO3	Exhibit complex problems through algorithmic thinking, and collaborative skills for working effectively in multidisciplinary teams on software projects, knowledge in emerging trends and technologies in Computer Applications.

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	2	3	3	3	3	2	-	-	2
PSO2	3	2	3	3	3	3	2	1	-	2
PSO3	3	3	3	3	3	3	2	3	2	3

K.M.G. COLLEGE OF ARTS AND SCIENCE**(AUTONOMOUS)****Subject and Credit System- B.C.A.,****(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	I	Language	AULT10/ AULU10	General Tamil – I / Urdu - I	6	3	25	75	100
	II	English	AULE10	English – I	6	3	25	75	100
	III	Core – 1	AUCCA11	Python Programming	5	5	25	75	100
	III	Core – 2	AUCPCA15	Practical: Python Programming	5	5	25	75	100
	III	Elective -1 (Choose any one)	AUEMA12A	Statistical Methods & its Applications- I	4	3	25	75	100
			AUEMA12B	Numerical Methods					
	IV	SEC – 1	AUSCA13	Fundamentals of Information Technology	2	2	25	75	100
	IV	FC - 1	AUFCA14	Foundation Course – Structured Programming Language in C	2	2	25	75	100
			Semester Total	30	23				

Semester	Part	Category	Course Code	Course Title	Ins.Hrs / Week	Credit	Maximum Marks		
							Internal	External	Total
SEMESTER - II	I	Language	AULT20/ AULU20	General Tamil – II / Urdu -II	6	3	25	75	100
	II	English	AULE20	English – II	6	3	25	75	100
	III	Core - 3	AUCCA21	OOPS Concept Using C++	5	5	25	75	100
	III	Core – 4	AUCPCA25	Practical: C++ Programming	5	5	25	75	100
	III	Elective – 2 (Choose any one)	AUEMA 22A	Statistical Methods & its Applications- II	4	3	25	75	100
			AUEMA22C	Resource Management Techniques					
	IV	SEC 2	AUSCA23	Introduction to HTML	2	2	25	75	100
IV	SEC 3	AUSCA24	Understanding Internet	2	2	25	75	100	
Semester Total					30	23			
SEMESTER - III	I	Language	AULT30 / AULU30	General Tamil – III / Urdu - III	6	3	25	75	100
	II	English	AULE30	English – III	6	3	25	75	100
	III	Core - 5	AUCCA31	Data Structure and Algorithms	5	5	25	75	100
	III	Core – 6	AUCPCA35	Practical: Data Structure and Algorithm	5	5	25	75	100
	III	Elective – 3 (Choose any one)	AUECA32A	Introduction to Data Science	3	3	25	75	100
			AUECA32B	Office Automation					
	IV	SEC - 4	AUSCA33	Problem Solving Techniques	1	1	25	75	100
	IV	SEC - 5	AUSCA34	PHP Programming	2	2	25	75	100
	IV	Compulsory	AUES30	Environmental Studies	2	2	25	75	100
Semester Total					30	24			

Semester	Part	Category	Course Code	Course Title	Ins.Hrs / Week	Credit	Maximum Marks		
							Internal	External	Total
SEMESTER - IV	I	Language	AULT40 / AULU 40	General Tamil – IV / Urdu - IV	6	3	25	75	100
	II	English	AULE40	English – IV	6	3	25	75	100
	III	Core - 7	AUCCA41	Programming in JAVA	5	5	25	75	100
	III	Core – 8	AUCPCA45	Practical: Programming in JAVA	5	5	25	75	100
	III	Elective – 4 (Choose any one)	AUECA42A	Network Security	4	3	25	75	100
			AUECA42B	Multimedia System					
	IV	SEC - 6	AUSCA43	Web Designing	2	2	25	75	100
	IV	SEC - 7	AUSCA44	Cyber Forensics	2	2	25	75	100
			Semester Total	30	23				

Semester	Part	Category	Course Code	Course Title	Ins.Hrs / Week	Credit	Maximum Marks		
							Internal	External	Total
SEMESTER - V	III	Core – 9	AUCCA51	Operating systems	4	3	25	75	100
	III	Core – 10	AUCPCA55	Practical: Operating systems	4	3	25	75	100
	III	Core – 11	AUCCA52	Data Base Management System	4	3	25	75	100
	III	Core - 12	AUCPCA56	Practical: Data Base Management System	3	3	25	75	100
	III	Elective – 5 (Choose any one)	AUECA53A	Mobile Computing	4	3	25	75	100
			AUECA53B	Artificial Intelligence					
			AUECA53C	Big Data Analytics					
	III	Elective – 6 (Choose any one)	AUECA54A	Computer Networks	4	3	25	75	100
			AUECA54B	Software Testing					
			AUECA54C	Cryptography					
	III	Core – 13	AUCPCA57	Core/Project with Viva-voce	5	4	25	75	100
	IV	Compulsory	AUVE50	Value Education	2	2	25	75	100
IV	Compulsory	AUICA58	Internship/Industrial Training (Summer vacation at the end of IV semester activity)	-	2	100	-	100	
			Semester Total	30	26				

Semester	Part	Category	Course Code	Course Title	Ins.Hrs / Week	Credit	Maximum Marks		
							Internal	External	Total
SEMESTER - VI	III	Core – 14	AUCCA61	Machine Learning	4	3	25	75	100
	III	Core – 15	AUCPCA66	Practical: Machine Learning	4	3	25	75	100
	III	Core – 16	AUCCA62	Data Analytics using R Programming	5	3	25	75	100
	III	Core – 17	AUCPCA67	Practical: Data Analytics using R Programming	5	3	25	75	100
	III	Elective – 7 (Choose any one)	AUECA63A	IOT and its Applications	5	3	25	75	100
			AUECA63B	Software Project Management					
			AUECA63C	Enterprise Resource Planning					
	III	Elective – 8 (Choose any one)	AUECA64A	Natural Language Processing	5	3	25	75	100
			AUECA64B	Cloud Computing					
			AUECA64C	Robotics and its Applications					
	IV	SEC - 8	AUSCA65	Open Source Technology	2	2	25	75	100
IV	Compulsory	AUEA60	Extension Activity	-	1	100	-	100	
			Semester Total	30	21				

Consolidated Semester wise and Component wise Credit distribution

Parts	Semester-I	Semester-II	Semester-III	Semester-IV	Semester-V	Semester-VI	Total Credits
Part-I	3	3	3	3	-	-	12
Part-II	3	3	3	3	-	-	12
Part-III	13	13	13	13	22	18	92
Part-IV	4	4	5	4	4	3	24
Part-V	-	-	-	-	-	-	-
Total	23	23	24	23	26	21	140

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

COURSE DESCRIPTORS

Title of the Course	PYTHON PROGRAMMING	Hours/Week	05
Course Code	AUCCA11	Credits	05
Category	Core - 1	Year & Semester	I & I
Prerequisites	Higher secondary Computer Science / Maths / Accountancy	Regulation	2024

Objectives of the course:

- To make students understand the concepts of Python programming.
- To apply the OOPs concept in PYTHON programming.
- To impart knowledge on demand and supply concepts.
- To make the students learn best practices in PYTHON programming.
- To know the costs and profit maximization.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Basics of Python Programming: History of Python-Features of Python – Literal –Constants – Variables – Identifiers – Key words- Built – in Data Types –Output Statements – Input Statements - Comments – Indentation - Operators - Expressions - Type conversions. Python Arrays: Defining and Processing Arrays–Array methods.	CO1	K1 K2 K3
UNIT-II	Control Statements: Selection/Conditional Branching statements: if, if-else, nested if and if - elif- else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. Jump Statements: break, continue and pass statements.	CO1 CO2	K1 K2 K3 K4

UNIT-III	<p>Functions: Function Definition – Function Call – Variable Scope and its Lifetime-Return Statement. Function Arguments: Required Arguments, Key ordered Arguments, Default Arguments and Variable Length Arguments-Recursion. Python Strings: String operations- Immutable Strings - Built-in String Methods and Functions - String Comparison. Modules: import statement- The Python module – dir() function – Modules and Name space–Defining our on modules.</p>	CO1 CO2 CO3	K1 K2 K3 K4
UNIT-IV	<p>Lists: Creating a list – Access values in List - Updating values in Lists-Nested lists-Basic list operations - List Methods. Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples – Difference between lists and tuples. Dictionaries: Creating, Accessing, Updating and Deleting Elements in a Dictionary–Dictionary Functions and Methods – Difference between Lists and Dictionaries.</p>	CO1 CO2 CO3 CO4	K1 K2 K3 K4 K5
UNIT-V	<p>Python File Handling: Types of files in Python -Opening and Closing files-Reading and writing files: write() and write lines() methods- append() method–read() and read lines() methods – with keyword –Splitting words - File methods - File Positions – Renaming and deleting files.</p>	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5

Recommended Text Books

1. Reema Thareja,-Python Programming using problem solving approach, First Edition, 2017, Oxford University Press.
2. Dr.R.Nageswara Rao,- Core Python Programming, First Edition, 2017, Dreamtech Publishers.

Reference Books

1. VamsiKurama,-Python Programming: A Modern Approach, Pearson Education.
2. Mark Lutz, "Learning Python", Orielly.
3. Adam Stewarts, "Python Programming", Online.
4. Fabio Nelli, "Python Data Analytics", APress.
5. KennethA. Lambert,-Fundamentals of Python–First Programs,CENGAGE Publication.

Website and E-Learning source

1. <https://www.programiz.com/python-programming>
2. <https://www.guru99.com/python-tutorials.html>
3. https://www.w3schools.com/python/python_intro.asp
4. <https://www.geeksforgeeks.org/python-programming-language/>
5. [https://en.wikipedia.org/wiki/Python_\(programming_language\)](https://en.wikipedia.org/wiki/Python_(programming_language))

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	Learn the basics of python, Do simple programs on python, Learn how to use an array.	K1,K2,K3
CO2	Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.	K1,K2,K3,K4
CO3	Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules.	K1,K2,K3,K4
CO4	Work with List, tuples and dictionary, Write program using list, Tuples and dictionary.	K1,K2,K3,K4,K5
CO5	Usage of File handlings in python, Concept to reading and writing files, Do programs using files.	K1,K2,K3,K4,K5

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

COURSE DESCRIPTORS

Title of the Course	PYTHON PROGRAMMING LAB	Hours/Week	05
Course Code	AUCPCA15	Credits	05
Category	Core - 2	Year & Semester	I & I
Prerequisites	Higher secondary Computer Science / Maths / Accountancy	Regulation	2024

Objectives of the course:

- Be able to design and program Python applications.
- Be able to create loops and decision statements in Python.
- Be able to work with functions and pass arguments in Python.
- Be able to build and package Python modules for reusability.
- Be able to read and write files in Python.

Lab Exercises	COs	Cognitive Levels
1. Program using variables, constants, I/O statements in Python.		
2. Program using Operators in Python.		
3. Program using Arrays.		
4. Program using Conditional Statements.		
5. Program using Loops.	CO1	K1
6. Program using Jump Statements.	CO2	K2
7. Program using Functions.	CO3	K3
8. Program using Recursion.	CO4	K4
9. Program using Strings.	CO5	K5
10. Program using Modules.		K6
11. Program using Lists.		
12. Program using Tuples.		
13. Program using Dictionaries.		
14. Program for File Handling.		

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	Demonstrate the understanding of syntax and semantics of PYTHON programming.	K1, K2,K3
CO2	Identify the problem and solve using PYTHON programming techniques.	K1,K2,K3,K4
CO3	Identify suitable programming constructs for problem solving.	K1,K2,K3,K4
CO4	Analyze various concepts of PYTHON language to solve the problem in an efficient way.	K1,K2,K3,K4,K5,
CO5	Develop a PYTHON program for a given problem and test for its correctness.	K1,K2,K3,K4,K5,K6

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

COURSE DESCRIPTORS

Title of the Course	FUNDAMENTALS OF INFORMATION TECHNOLOGY	Hours/Week	02
Course Code	AUSCA13	Credits	02
Category	SEC -1	Year & Semester	I & I
Prerequisites	Higher secondary Computer Science / Maths / Accountancy	Regulation	2024

Objectives of the course:

- Understand basic concepts and terminology of information technology.
- Have a basic understanding of personal computers and their operation.
- Be able to identify data storage and its usage.
- Get great knowledge of software and its functionalities.
- Understand about operating system and their uses.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction to Computers - Generations of Computer – Data and Information – Components of Computer – Software – Hardware – InputDevices - Output Devices — Types of Operating System.	CO1 CO2 CO3 CO4 CO5	K1 K2
UNIT-II	MS Word: Introduction – Elements of Window – Files, Folders an Directories – Text Manipulating: Cut, Copy, Paste, Drag and Drop – Tex Formatting: Font – Style, Size, Face and Colors (Both foreground an background) – Alignment - Bullets and Numbering - Header and footer watermark – inserting objects (images, other application document) – Table creation – Mail merge.	CO1 CO2 CO4	K1 K2

UNIT-III	Ms Excel: Introduction – Inserting rows and columns – Sizing rows and columns – Implementing formulas – Generating series - Functions in excel –Creation of Chart – Inserting objects – Filter – Sorting – Inserting worksheet.	CO1 CO2 CO4	K1 K2 K3 K4
UNIT-IV	MS PowerPoint: Introduction – Slides Manipulation (Inserting new, Copy, paste, delete and duplicate slides) – Slide show– Types of Views – Types of Animations – Inserting Objects – Implementing multimedia (Video and Audio) – Templates (Built-in and User-Defined).	CO1 CO2 CO4	K1 K2 K3 K4
UNIT-V	Internet: Introduction to Internet and Intranet – Services of Internet - Domain Name – URL – Browser – Types of Browsers – Search Engine - E- Mail – Basic Components of E-Mail –.How to send group mail. E- Commerce: Digital Signature – Digital Currency – Online shopping and transaction	CO1 CO2 CO3 CO4	K1 K2

Recommended Text Books

1. Anoop Mathew, S. Kavitha Murugesan (2009), “ Fundamental of Information Technology”, Majestic Books.
2. Alexis Leon, Mathews Leon,” Fundamental of Information Technology”, 2nd Edition.
3. S. K Bansal, “Fundamental of Information Technology”.

Reference Books

1. Bhardwaj Sushil Puneet Kumar, “Fundamental of Information Technology”.
2. GG WILKINSON, “Fundamentals of Information Technology”, Wiley-Blackwell.
3. Ravichandran , “Fundamentals of Information Technology”, Khanna Book Publishing.

Website and E-Learning source

1. <https://testbook.com/learn/computer-fundamentals>
2. <https://www.tutorialsmate.com/2020/04/computer-fundamentals-tutorial.html>
3. <https://www.javatpoint.com/computer-fundamentals-tutorial>
4. https://www.tutorialspoint.com/computer_fundamentals/index.htm
5. <https://www.nios.ac.in/media/documents/sec229new/Lesson1.pdf>

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	Learn the basics of computer, Construct the structure of the required things in computer, learn how to use it.	K1,K2
CO2	Gain knowledge on Creating Documents, spreadsheet and presentation.	K1,K2
CO3	Demonstrate the understanding of different tools in word, excel and PowerPoint.	K1,K2, K3,K4
CO4	Utilize the automation tools for documentation, calculation and presentation purpose.	K1,K2,K3,K4
CO5	Gain knowledge in internet technology and identify the component parts of E-Commerce.	K1,K2

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

COURSE DESCRIPTORS

Title of the Course	STRUCTURED PROGRAMMING LANGUAGE IN C	Hours/Week	02
Course Code	AUFCA14	Credits	02
Category	FC - 1	Year & Semester	I & I
Prerequisites	Higher secondary Computer Science / Maths / Accountancy	Regulation	2024

Objectives of the course:

- To familiarize the students with the Programming basics and the fundamentals of C,
- Data types in C, Mathematical and logical operations.
- To understand the concept using if statements and loops.
- This unit covers the concept of Arrays.
- This unit covers the concept of Functions.
- To understand the concept of implementing pointers.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Overview of C: Importance of C, sample C program, C program structure, executing C program. Constants, Variables, and Data Types: Character set, C tokens, keywords and identifiers, constants, variables, data types, declaration of variables, Assigning values to variables—Assignment statement, declaring a variable and constant, as volatile .Operators and Expression.	CO1 CO2	K1 K2 K3
UNIT-II	Decision Making and Branching: Decision making with If, simple IF, IF ELSE, nested IF ELSE, ELSE IF ladder, switch, GOTO statement. Decision Making and Looping: While, Do While, For, Jumps in loops.	CO1 CO2 CO3	K1 K2 K3 K4

UNIT-III	Arrays: Declaration and accessing of one & two dimensional arrays, initializing two dimensional arrays, multi dimensional arrays.	CO1 CO2 CO3	K1 K2 K3 K4
UNIT-IV	Functions: The form of C functions, Return values and types, calling a function, categories of functions, Nested functions, Recursion, functions with arrays ,call by value, call by reference, storage classes-character arrays and string functions.	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4
UNIT-V	Pointers: definition, declaring and initializing pointers, accessing a variable through address and through pointer, pointer expressions, pointer increments and scale factor, pointers and arrays, pointers and functions, pointers and structures.	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5

Recommended Text Books

E.Balagurusamy,ProgramminginANSIC,FifthEdition,TataMcGraw-Hill,2010.

Reference Books

1. Byron Gottfried, Schaum’s Outline Programming with C, Fourth Edition, Tata McGraw -Hill, 2018.
2. Kernighan and Ritchie, The C Programming Language, Second Edition, Prentice Hall, 1998
3. Yashavant Kanetkar, Let Us C, Eighteenth Edition, BPB Publications, 2021.

Website and E-Learning source

1. <https://codeforwin.org/>
2. <https://www.geeksforgeeks.org/c-programming-language/>
3. <http://en.cppreference.com/w/c>
4. <http://learn-c.org/>
5. <https://www.cprogramming.com/>

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	Remember the program structure of C with its syntax and semantics.	K1,K2, K3
CO2	Understand the programming principles in C (datatypes, operators, branching and looping, arrays, functions, structures, pointers and files)	K1,K2,K3,K4
CO3	Apply the programming principles learnt in real-time problems.	K1,K2,K3,K4
CO4	Analyze the various methods of solving problem and choose the best method.	K1,K2,K3,K4
CO5	To write code, debug and test the programs with appropriate test cases.	K1,K2,K3,K4,K5

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

COURSE DESCRIPTORS

Title of the Course	Object Oriented Programming Concepts Using C++	Hours/Week	05
Course Code	AUCCA21	Credits	05
Category	Core - 3	Year & Semester	I & II
Prerequisites	Higher Secondary Computer Science / Mathematics / Accountancy	Regulation	2024

Objectives of the course:

- Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects
- Understand dynamic memory management techniques using pointers, constructors, destructors etc.
- Describe the concept of function overloading, operator overloading, virtual functions and polymorphism.
- Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming
- Demonstrate the use of various OOPs concepts with the help of programs

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction to C++ - key concepts of Object-Oriented Programming – Advantages – Object Oriented Languages – I/O in C++ - C++ Declarations. Control Structures : - Decision Making and Statements: If ..else, jump, goto, break, continue, Switch case statements - Loops in C++ :for, while, do - functions in C++ - inline functions – Function Overloading	CO1	K1 K2 K3
UNIT-II	Classes and Objects: Declaring Objects – Defining Member Functions – Static Member variables and functions – array of objects –friend functions – Overloading member functions – Bit fields and classes - Constructor and destructor with static members.	CO1 CO2	K1 K2 K3 K4

UNIT-III	Operator Overloading: Overloading unary, binary operators – Overloading Friend functions –type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchical, Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.	CO1 CO2 CO3	K1 K2 K3 K4
UNIT-IV	Pointers – Declaration – Pointer to Class , Object – this pointer – Pointers to derived classes and Base classes – Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object – Binding, Polymorphism and Virtual Functions.	CO1 CO2 CO3 CO4	K1 K2 K3 K4 K5
UNIT-V	Files – File stream classes – file modes – Sequential Read / Write operations – Binary and ASCII Files – Random Access Operation – Templates – Exception Handling - String – Declaring and Initializing string objects – String Attributes.	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5

Recommended Text Books

1. E. Balagurusamy, “Object-Oriented Programming with C++”, TMH 2013, 7th Edition.
2. “Object Oriented Programming with C++” by Reeme Thaeraja, by Oxford University Press.
3. Bjarne Stroustrup (the creator of C++), “Programming: Principles and Practice Using C++”, 2nd Edition.

Reference Books

1. Ashok N Kamthane, “Object-Oriented Programming with ANSI and Turbo C++”, Pearson Education 2003.
2. Maria Litvin& Gray Litvin, “C++ for you”, Vikas publication 2002.
3. P.Rizwan Ahmed, Programming in C++, Margham Publications, 2016

Website and E-Learning source

1. <https://alison.com/course/introduction-to-c-plus-plus-programming>

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	Being able to differentiate between structured and object-oriented programming	K1,K2,K3
CO2	Being able to understand OOP features like Inheritance, operator overloading, function overloading, and polymorphism	K1,K2,K3,K4
CO3	Apply the programming principles learnt in real time problems	K1,K2,K3,K4
CO4	Analyze the various methods of solving a problem and choose the best method	K1,K2,K3,K4,K5
CO5	Code, debug and test the programs with appropriate test cases	K1,K2,K3,K4,K5

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

COURSE DESCRIPTORS

Title of the Course	C++ PROGRAMMING LAB	Hours/Week	05
Course Code	AUCPCA25	Credits	05
Category	Core - 4	Year & Semester	I & II
Prerequisites	Higher Secondary Computer Science / Mathematics / Accountancy	Regulation	2024

Objectives of the course:

- Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.
- Understand dynamic memory management techniques using pointers, constructors, destructors, etc
- Describe the concept of function overloading, operator overloading, virtual functions and polymorphism.
- Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming
- Demonstrate the use of various OOPs concepts with the help of programs

Lab Exercises	COs	Cognitive Levels
1. Write a C++ program to demonstrate function overloading, Default Arguments and Inlinefunction.	CO1	K1
2. Write a C++ program to demonstrate Class and Objects	CO2	K2
3. Write a C++ program to demonstrate the concept of Passing Objects to Functions	CO3	K3
4. Write a C++ program to demonstrate the Friend Functions.	CO4	K4
5. Write a C++ program to demonstrate Constructor and Destructor	CO5	K5
		K6

<p>6. Write a C++ program to demonstrate Unary and Binary Operator Overloading</p> <p>7. Write a C++ program to demonstrate:</p> <ul style="list-style-type: none"> • Single Inheritance • Multilevel Inheritance • Multiple Inheritance <p>8. Write a C++ program to demonstrate Virtual Functions.</p> <p>9. Write a C++ program to implement File Manipulation.</p> <p>10. Write a C++ program to find the Biggest Number using Command Line Arguments</p>		
<p>Recommended Text Books E. Balagurusamy, “Object-Oriented Programming with C++”, TMH 2013, 7th Edition.</p>		
<p>Reference Books</p> <ol style="list-style-type: none"> 1. Ashok N Kamthane, “Object-Oriented Programming with ANSI and Turbo C++”, Pearson Education 2003. 2. Maria Litvin& Gray Litvin, “C++ for you”, Vikas publication 2002. P.Rizwan Ahmed, Programming in C++, Margham Publications, 2016 		
<p>Website and E-Learning source</p> <p>https://alison.com/course/introduction-to-c-plus-plus-programming</p>		

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	Remember the program structure of C++ with its syntax and semantics	K1, K2,K3
CO2	Understand the programming principles in C++ (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	K1,K2,K3,K4
CO3	Apply the programming principles learnt in real-time problems	K1,K2,K3,K4
CO4	Analyze the various methods of solving a problem and choose the best method	K1,K2,K3,K4,K5,
CO5	Code, debug and test the programs with appropriate test cases	K1,K2,K3,K4,K5,K6

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

COURSE DESCRIPTORS

Title of the Course	INTRODUCTION TO HTML	Hours/Week	02
Course Code	AUSCA23	Credits	02
Category	SEC- 2	Year & Semester	I & II
Prerequisites	Higher Secondary Computer Science / Mathematics / Accountancy	Regulation	2024

Objectives of the course:

- Insert a graphic within a web page.
- Create a link within a web page.
- Create a table within a web page.
- Insert heading levels within a web page.
- Insert ordered and unordered lists within a web page. Create a web page.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction: Web Basics: What is an Internet–Web browser–What is Webpage–HTML Basics: Understanding tags.	CO1	K1 K2
UNIT-II	Tags for Documentstructure (HTML,Head,BodyTag). Block level text elements:Headings – paragraph (tag)–Font-style elements:(bold, italic, font, small,strong, strike, big tags)	CO1 CO2	K1 K2
UNIT-III	Lists: Types of lists: Ordered, Unordered– Nesting Lists–Other tags: Marquee,HR, BR- Using Images –Creating Hyper-links.	CO1 CO2 CO3	K1 K2
UNIT-IV	Tables: Creating basic Table, Table elements, Caption–Table and cell alignment–Row span, Col span–Cellpadding	CO1 CO2 CO4	K1 K2 K3 K4 K5 K6

UNIT-V	Frames: Frameset–Targeted Links–No frame–Forms: Input, Text area, Select, Option	CO1 CO2 CO5	K1 K2 K3
Recommended Text Books			
<ol style="list-style-type: none"> 1. “Mastering HTML5 and CSS3 Made Easy”, TeachUComp Inc., 2014. 2. Thomas Michaud, “Foundations of Web Design: Introduction to HTML & CSS” 			
Reference Books			
<ol style="list-style-type: none"> 1. "HTML and CSS: Design and Build Websites" by Jon Duckett 2. "HTML5: The Missing Manual" by Matthew MacDonald 			
Website and E-Learning source			
<ol style="list-style-type: none"> 1. https://developer.mozilla.org/en-US/docs/Learn/HTML/Introduction_to_HTML 2. https://www.w3schools.com/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	Knows the basic concept in HTML Concept of resources in HTML	K1,K2
CO2	Knows Design concept. Concepts of Meta Data Understand the concept of save the files.	K1,K2
CO3	Understand the page formatting. Concept of list	K1, K2
CO4	Creating Links. Know the concept of creating link to email address and tables.	K1,K2,K3,K4,K5,K6
CO5	Concept of adding images, understanding frames and frameset	K1,K2,K3

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

COURSE DESCRIPTORS

Title of the Course	UNDERSTANDING INTERNET	Hours/Week	02
Course Code	AUSCA24	Credits	02
Category	SEC -3	Year & Semester	I & II
Prerequisites	Higher Secondary Computer Science / Mathematics / Accountancy	Regulation	2024

Objectives of the course:

- Knowledge of Internet
- Learning TCP/IP – Internet Technologies and Protocol
- Learning Internet connectivity.
- Learning internet networks
- Learning Electronic Mail

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Internet, Growth of Internet, Owners of the Internet, Anatomy of Internet, ARPANET and Internet history of the World Wide Web, basic Internet Terminology, Net etiquette. Internet Applications.	CO1	K1 K2 K3
UNIT-II	Packet switching technology, Internet Protocols: TCP/IP, Router, Internet Addressing Scheme: Machine Addressing (IP address) - Email protocols –SMTP, POP3, IMAp4,MIME6.	CO1 CO2	K1 K2 K3 K4
UNIT-III	Internet accounts by ISP: Telephone line options, Protocol options, Service options, Telephone line options – Dialup connections through the telephone system, dedicated connections through the telephone system, ISDN – Wireless Connection: Wi-Fi, Hotspot, and Modem.	CO1 CO2 CO3	K1 K2 K3 K4

UNIT-IV	Network definition, Common terminologies: LAN, WAN, Node, Host, Workstation, bandwidth, Interoperability, Network administrator, network security, Network Components: Servers, Clients, Communication Media, Types of network: Peer to Peer, Clients Server, Addressing in Internet: DNS, Domain Name and their organization	CO1 CO2 CO3 CO4	K1 K2 K3 K4 K5
UNIT-V	Email Networks and Servers - Structure of an Email – Email Address, Email Header, Body and Attachments - E-mailAddresses – Sending and Receiving E-Mail.	CO1 CO2 CO3 CO4 CO5	K1 K2 K3

Recommended Text Books

1. Greenlaw R and Hepp E “Fundamentals of Internet and www” 2nd EL, Tata McGrawHill,2007.
2. D. Comer, “The Internet Book”, Pearson Education, 2009

Reference Books

1. M. L. Young, ”The Complete reference to Internet”, Tata McGraw Hill, 2007.
2. B. Patel & Lal B. Barik, ” Internet & Web Technology “, Acme Learning Publishers.
3. Leon and Leon, “Internet for Everyone”, Vikas Publishing House.
4. P.Rizwan Ahmed, “Internet and Its Applications”, Margham publications, 2018.

Website and E-Learning source

1. https://www.tutorialspoint.com/internet_technologies/index.htm
2. <https://www.geeksforgeeks.org/introduction-to-internet/>

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	Know the basic concept in internet	K1,K2,K3
CO2	Know the concept of TCP/IP – Internet Technologies and Protocol	K1,K2,K3,K4
CO3	Understand the concept of Internet connectivity.	K1,K2, K3,K4
CO4	Know about internet networks	K1,K2,K3,K4, K5
CO5	Explore various types of internet-based applications, such as email clients, cloud storage solutions, and collaboration tools.	K1,K2,K3

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

COURSE DESCRIPTORS

Title of the Course	DATASTRUCTURES AND ALGORITHMS	Hours/Week	05
Course Code	AUCCA31	Credits	05
Category	Core - 5	Year & Semester	II & III
Prerequisites	Higher secondary Computer Science / Maths / Accountancy	Regulation	2024

Objectives of the course:

- To understand the concepts of ADTs.
- To learn linear datastructures - lists, stacks, queues.
- To learn Tree structures and application of trees.
- To learn graph structures and application of graphs.
- To understand various sorting and searching.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Abstract Data Types (ADTs)- List ADT-array-based implementation-linked list implementation singly linked lists-circular linked lists-doubly-linked lists-applications of lists-Polynomial Manipulation –All operations-Insertion-Deletion-Traversal.	CO2	K1 K2
UNIT-II	Stack ADT-Operations- Applications- Evaluating arithmetic expressions – Conversion of infix to postfix expression-Queue ADT-Operations-Circular Queue – Priority Queue- deQueue Applications of queues.	CO2	K1 K2 K3 K4
UNIT-III	Tree ADT- tree traversals – Binary Tree ADT- expression trees- Applications of trees- binary search tree ADT – Threaded Binary Trees - AVL Trees- B-Tree- B+ Tree – Heap-Applications of heap.	CO4	K1 K2 K3 K4

UNIT-IV	Definition- Representation of Graph- Types of graph-Breadth first traversal – Depth first traversal-Topological sort- Bi-connectivity– Cutvertex – Euler circuits – Applications of graphs.	CO4	K1 K2 K3 K4
UNIT-V	Searching- Linear search-Binary search-Sorting-Bubble sort- Selection sort- Insertion sort- Shell sort- Radix sort- Hashing - Hash functions – Separate chaining- Open Addressing - Rehashing Extendible Hashing	CO5	K1 K2 K3 K4

Recommended Text Books

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, Pearson Education 2014, 4th Edition.
2. Adam Drozdek, “Data Structures and Algorithms in C++”, Cengage Learning, 2012, 4th Edition

Reference Books

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, “Introduction to Algorithms”, McGraw Hill 2009, 3rd Edition.
2. Aho, Hopcroft and Ullman, “Data Structures and Algorithms”, Pearson Education 2003.
3. P Rizwan Ahmed, C++ and Data Structure, Margham Publications, 2015.

Website and E-Learning source

1. <https://www.programiz.com/dsa>
2. <https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/>

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	Understand the concept of Dynamic memory management, data types, algorithms, Linked List and Polynomial.	K1,K2
CO2	Understand basic data structures such as arrays, stacks and queues.	K1,K2,K3,K4
CO3	Understand, implement and analyze tree data structures and heap.	K1,K2,K3,K4
CO4	Solve problem involving graphs for efficient traversal.	K1,K2,K3,K4
CO5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.	K1,K2,K3,K4

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

COURSE DESCRIPTORS

Title of the Course	DATA STRUCTURE AND ALGORITHMS LAB [Note: Practicals may be offered through C/C++/Python]	Hours/Week	05
Course Code	AUCPCA35	Credits	05
Category	Core - 6	Year & Semester	II & III
Prerequisites	Higher secondary Computer Science / Maths / Accountancy	Regulation	2024

Objectives of the course:

- Understand fundamental data structures and their implementations.
- Develop efficient algorithms for searching, sorting, and problem-solving using data structures.
- Apply data structures and algorithms to solve real-world computational problems.
- Analyze the time and space complexity of various algorithms.
- Implement and test data structures and algorithms using a programming language.

Lab Exercises	COs	Cognitive Levels
1. Write a program to implement Singly Linked List ADT operations.		
2. Write a program to add two polynomials using Singly Linked List.		
3. Write a program to implement stack ADT operations using arrays.	CO1	K1
4. Write a program to implement Queue ADT operations using arrays.	CO2	K2
5. Write a program to perform Tree Traversals.	CO3	K3
6. Write a program to perform AVL Tree operations.	CO4	K4
7. Write a program to implement the DFS of a graph.	CO5	K5
8. Write a program to implement BFS of a graph.		K6
9. Write a program to implement Bubble Sort.		
10. Write a program to implement Insertion Sort.		

Recommended Text Books

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education 2014, 4th Edition.
2. Reema Thareja, "Data Structures Using C", Oxford Universities Press 2014, 2nd Edition

Reference Books

1. Thomas H.Cormen, Chales E.Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms",Mc Graw Hill 2009, 3rdEdition.
2. Aho, Hopcroft and Ullman,"Data Structures and Algorithms", Pearson Education 2003.
3. P Rizwan Ahmed, C++ and Data Structure, Margham Publications, 2015.

Website and E-Learning source

1. <https://www.programiz.com/dsa>
2. <https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/>

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	Develop proficiency in implementing fundamental data structures.	K1, K2,K3
CO2	Solve problems using sorting, searching, and graph traversal algorithms.	K1,K2,K3,K4
CO3	Evaluate the efficiency of algorithms using Big-O notation.	K1,K2,K3,K4,K5
CO4	Work with trees, heaps, and hash tables for optimized data management.	K1,K2,K3,K4
CO5	Design and implement real-world applications using appropriate data structures and algorithms.	K1,K2,K3,K4,K5,K6

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

COURSE DESCRIPTORS

Title of the Course	INTRODUCTION TO DATA SCIENCE	Hours/Week	03
Course Code	AUECA32A	Credits	03
Category	Elective - 3	Year & Semester	II & III
Prerequisites	Higher secondary Computer Science / Maths / Accountancy	Regulation	2024

Objectives of the course:

- To learn about basics of Data Science and Bigdata.
- To learn about overview and building process of Data Science.
- To learn about various Algorithms in Data Science.
- To learn about Hadoop Framework.
- To learn about case study of Data Science.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction: Benefits and uses – Facts of data – Data science process -Big data ecosystem and data science, Applications of Data science, Future of Data science	CO1	K1 K2
UNIT-II	The Data science process: Overview – research goals - retrieving data -Transformation – Exploratory Data Analysis – Model building.	CO2	K1 K2 K3
UNIT-III	Algorithms :Machine learning algorithms – Modeling process – Types – Supervised – Unsupervised - Semi-supervised.	CO3	K1 K2
UNIT-IV	Introduction to Hadoop : Hadoop framework – Spark – replacing MapReduce – NoSQL – ACID – CAP – BASE – types	CO4	K1 K2 K3

UNIT-V	Case Study: Prediction of Disease - Setting research goals - Data retrieval – preparation - exploration - Disease profiling - presentation and automation	CO5	K1 K2 K3 K4
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Recommended Text Books

1. Davy Cielen, Arno D. B. Meysman, Mohamed Ali, “Introducing Data Science”, manning publications 2016

Reference Books

1. Roger Peng, “The Art of Data Science”, lulu.com 2016.
2. Murtaza Haider, “Getting Started with Data Science – Making Sense of Data with Analytics”, IBM press, E-book.
3. Davy Cielen, Arno D.B. Meysman, Mohamed Ali, “Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools”, Dreamtech Press 2016.
4. Annalyn Ng, Kenneth Soo, “Numsense! Data Science for the Layman: No Math Added”, 2017,1st Edition.
- 5.Lillian Pierson, “Data Science for Dummies”, 2017 II Edition

Website and E-Learning source

1. <https://www.w3schools.com/datascience/>
2. https://en.wikipedia.org/wiki/Data_science
3. <http://www.cmap.polytechnique.fr/~lepenec/en/post/references/refs/>

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	Understand the basics in Data Science and Big data.	K1,K2
CO2	Understand overview and building process in Data Science.	K1,K2,K3
CO3	Understand various Algorithms in Data Science.	K1,K2
CO4	Understand Hadoop Framework in Data Science.	K1,K2,K3
CO5	Case study in Data Science.	K1,K2,K3,K4

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

COURSE DESCRIPTORS

Title of the Course	OFFICE AUTOMATION	Hours/Week	03
Course Code	AUECA32B	Credits	03
Category	Elective-3	Year & Semester	II & III
Prerequisites	Higher secondary Computer Science / Maths / Accountancy	Regulation	2024

Objectives of the course:

- To understand the basics of computer systems and its components.
- To understand and apply the basic concepts of a word processing package.
- To understand and apply the basic concepts of electronic spreadsheet software.
- To understand and apply the basic concepts of database management system.
- To understand and create a presentation using PowerPoint tool.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introductory concepts: Memory unit– CPU-Input Devices: Key board and Mouse Scanner. Output devices: Monitor, Printer. Introduction to Operating systems & its features: DOS– UNIX–Windows. Introduction to Programming Languages.	CO1	K1 K2 K3
UNIT-II	Word Processing: Open, Save and close word document; Editing text – tools, formatting, bullets Spell Checker - Document formatting – Paragraph alignment, indentation, headers and footers, numbering; Printing – Preview, options, mail merge, inserting images and tables.	CO2 CO4 CO5	K1 K2 K3 K4
UNIT-III	Spreadsheets: Excel–opening, entering text and data, formatting, navigating; Formulas – entering, handling and copying; Charts – creating, formatting and printing, analysis tables, preparation of financial statements, introduction to data analytics.	CO2 CO4 CO5	K1 K2 K3 K4

UNIT-IV	Introduction: Overview of MS-Access, Database Concepts: The concept of data base management system; Data field, records, and files, Sorting and indexing data; Searching records. Designing queries, and reports;	CO3 CO4 CO5	K1 K2 K3 K4
UNIT-V	Power point: Introduction to Power point - Features – Understanding slide type casting & viewing slides – creating slide shows. Applying special object – including objects & pictures – Slide transition – Animation effects, audio inclusion, timers.	CO3 CO4 CO5	K1 K2 K3 K4

Recommended Text Books

1. Peter Norton, “Introduction to Computers”– Tata McGraw - Hill.
2. P.Rizwan Ahmed, Office Automation, Margham Publications, 2019

Reference Books

1. Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, “Microsoft 2003”, Tata McGraw Hill.

Website and E-Learning source

1. <https://www.udemy.com/course/office-automation-certificate-course/>
2. <https://www.javatpoint.com/automation-tools>.

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	Possess the knowledge on the basics of computers and its components	K1,K2, K3
CO2	Gain knowledge on Creating Documents, spreadsheet and presentation.	K1,K2,K3,K4
CO3	Learn the concepts of Database and implement the Query in Database.	K1,K2,K3,K4
CO4	Demonstrate the understanding of different Automation tools.	K1,K2,K3,K4
CO5	Utilize the automation tools for documentation, calculation and presentation purpose.	K1,K2,K3,K4

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

COURSE DESCRIPTORS

Title of the Course	PROBLEM SOLVING TECHNIQUES	Hours/Week	01
Course Code	AUSCA33	Credits	01
Category	SEC - 4	Year & Semester	II & III
Prerequisites	Higher secondary Computer Science / Maths / Accountancy	Regulation	2024

Objectives of the course:

- To familiarize with writing of algorithms, fundamentals of C and philosophy of problem solving.
- To implement different programming constructs and decomposition of problems into functions.
- To use data flow diagram, Pseudo code to implement solutions.
- To define and use of arrays with simple applications
- To understand about operating system and their uses

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Types of Computers: PC, Workstation, Minicomputer, Main frame and Supercomputer. Software: System software and Application software. Programming Languages: Machine language, Assembly language, High- level language,4 GL and 5GL-Features of good programming language. Translators: Interpreters and Compilers.	CO1	K1 K2 K3
UNIT-II	Data: Data types, Input, Processing of data, Arithmetic Operators, Hierarchy of operations and Output. Different phases in Program Development Cycle (PDC).Structured Programming: Algorithm: Features of good algorithm, Benefits and drawbacks of algorithm. Flowcharts: Advantages and limitations of flowcharts, when to use Flowcharts, flowchart symbols and types of flowcharts. Pseudo code: Writing a pseudo code. Coding, documenting and testing a program: Comment lines and types of errors. Program design: Modular Programming.	CO2	K1 K2 K3 K4

UNIT-III	Selection Structures: Relational and Logical Operators - Selecting from Several Alternatives – Applications of Selection Structures. Repetition Structures: Counter Controlled Loops –Nested Loops– Applications of Repetition Structures	CO3	K1 K2 K3
UNIT-IV	Data: Numeric Data and Character Based Data. Arrays: One Dimensional Array - Two Dimensional Arrays – Strings as Arrays of Characters.	CO4	K1 K2 K3
UNIT-V	Data Flow Diagrams: Definition, DFD symbols and types of DFDs. Program Modules: Subprograms-Value and Reference parameters-Scope of a variable - Functions – Recursion. Files: File Basics-Creating and reading a sequential file- Modifying Sequential Files.	CO5	K1 K2 K3 K4

Recommended Text Books

1. Stewart Venit, “Introduction to Programming: Concepts and Design”, Fourth Edition, 2010, Dream Tech Publishers.

Reference Books

1. "Introduction to Algorithms" by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein (MIT Press, 3rd edition)
2. "Data Structures and Algorithms Made Easy: Data Structures and Algorithmic Puzzles" by Narasimha Karumanchi (2nd edition)

Website and E-Learning source

1. <https://www.codesansar.com/computer-basics/problem-solving-using-computer.htm>
2. <http://www.nptel.iitm.ac.in/video.php?subjectId=106102067>
3. http://utubersity.com/?page_id=876

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	Study the basic knowledge of Computers. Analyze the programming languages.	K1,K2, K3
CO2	Develop program using flow chart, pseudo code and determine the various operators.	K1,K2,K3,K4
CO3	Explain about the structures, concepts of loops, numeric data and character-based data.	K1,K2,K3
CO4	Analyze about Arrays. Explain about DFD	K1,K2,K3
CO5	Illustrate program modules. Creating and reading Files	K1,K2,K3,K4

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

COURSE DESCRIPTORS

Title of the Course	PHP PROGRAMMING	Hours/Week	02
Course Code	AUSCA34	Credits	02
Category	SEC - 5	Year & Semester	II & III
Prerequisites	Higher secondary Computer Science / Maths / Accountancy	Regulation	2024

Objectives of the course:

- To provide the necessary knowledge on basics of PHP.
- To design and develop dynamic, database-driven web applications using PHP version.
- To get an experience on various web application development techniques.
- To learn the necessary concepts for working with the files using PHP.
- To get a knowledge on OOPS with PHP.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Basic Knowledge of websites - Introduction of Dynamic Website - Introduction to PHP -Scope of PHP -XAMPP and WAMP Installation PHP Programming Basics -Syntax of PHP -Embedding PHP in HTML -Embedding HTML in PHP.	CO1	K1 K2 K3
UNIT-II	Introduction to PHP Variable -Understanding Data Types - Using Operators -Using Conditional Statements -If(), else if() and else if condition Statement. Switch() Statements -Using the while() Loop -Using the for() Loop PHP Functions.	CO2	K1 K2 K3 K4
UNIT-III	PHP Functions -Creating an Array - Modifying Array Elements - Processing Arrays with Loops - Grouping Form Selections with Arrays -Using Array Functions.	CO3	K1 K2 K3 K4

UNIT-IV	PHP Advanced Concepts -Reading and Writing Files -Reading Data from a File.	CO5	K1 K2 K3
UNIT-V	Managing Sessions and Using Session Variables -Destroying a Session -Storing Data in Cookies -Setting Cookies.	CO4	K1 K2 K3

Recommended Text Books

1. Head First PHP & MySQL: A Brain-Friendly Guide- 2009-Lynnmighley and Michael Morrison.
2. The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL- Alan Forbes

Reference Books

1. PHP: The Complete Reference-Steven Holzner.
2. DT Editorial Services (Author), “HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)”, Paperback 2016, 2ndEdition.

Website and E-Learning source

1. Open source digital libraries: PHP Programming
2. <https://www.w3schools.com/php/default.asp>

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	Write PHP scripts to handle HTML forms	K1,K, K3
CO2	Write regular expressions including modifiers, operators, and metacharacters.	K1,K2,K3,K4
CO3	Create PHP Program using the concept of array.	K1,K2,K3,K4
CO4	Create PHP programs that use various PHP library functions	K1,K2,K3
CO5	Manipulate files and directories.	K1,K2,K3

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

COURSE DESCRIPTORS

Title of the Course	PROGRAMMING IN JAVA	Hours/Week	05
Course Code	AUCCA41	Credits	05
Category	Core - 7	Year & Semester	II & IV
Prerequisites	Higher secondary Computer Science / Maths / Accountancy	Regulation	2024

Objectives of the course:

- To understand the principles of Object-Oriented Programming (OOP) and their advantages.
- To develop proficiency in Java features, data types, operators, and control statements.
- To apply object-oriented principles for structured and reusable code design.
- To implement effective error management, multithreading, and file handling mechanisms for Java applications.
- To design interactive graphical user interfaces and Swing components for enhanced user interaction.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction to OOPS: Paradigms of Programming Languages – Basic concepts of Object Oriented Programming – Differences between Procedure Oriented Programming and Object Oriented programming - Benefits of OOPs – Application of OOPs. Java: History – Java features – Java Environment – JDK – API. Introduction to Java: Types of java program – Creating and Executing a Java program – Java Tokens- Java Virtual Machine (JVM) – Command Line Arguments –Comments in Java program.	CO1	K1, K2
UNIT-II	Elements: Constants – Variables – Data types - Scope of variables – Type casting – Operators: Special operators – Expressions – Evaluation of Expressions. Decision making and branching statements- Decision making and Looping– break – labeled loop – continue Statement. Arrays: One Dimensional Array – Creating an array – Array processing – Multidimensional Array – Vectors – Array List – Advantages of Array List over Array Wrapper classes.	CO2	K1, K2, K3, K4

UNIT-III	Class and objects: Defining a class – Methods – Creating objects – Accessing class members – Constructors – Method overloading – Static members –Nesting of Methods – this keyword – Command line input. Inheritance: Defining inheritance –types of inheritance– Overriding methods – Final variables and methods – Final classes – Final methods - Abstract methods and classes – Visibility Control- Interfaces: Defining interface – Extending interface - Implementing Interface - Accessing interface variables.	CO3	K1, K2, K3
UNIT-IV	Packages: Java API Packages – System Packages – Naming Conventions –Creating & Accessing a Package – Adding Class to a Package – Hiding Classes. Exception Handling: Limitations of Error handling – Advantages of Exception Handling - Types of Errors – Basics of Exception Handling – try blocks – throwing an exception – catching an exception – finally statement. Multithreading: Creating Threads – Life of a Thread – Defining & Running Thread – Thread Methods – Thread Priority – Synchronization –Implementing Runnable interface – Thread Scheduling.	CO4	K1, K2, K3, K4
UNIT-V	I/O Streams: File – Streams – Advantages - The stream classes – Byte streams –Character streams. Applets: Introduction – Applet Life cycle – Creating & Executing an Applet –Applet tags in HTML – Parameter tag – Aligning the display - Graphics Class: Drawing and filling lines – Rectangles – Polygon – Circles – Arcs – Line Graphs – Drawing Bar charts AWT Components and Even Handlers: Abstract window tool kit – Event Handlers – Event Listeners – AWT Controls and Event Handling: Labels – Text Component – Action Event – Buttons – Check Boxes – Item Event – Choice– Scrollbars – Layout Managers- Input Events – Menus. Swing: Introduction to Swing – Swing Components.	CO5	K1, K2, K3, K4, K5

Recommended Text Books

1. E. Balagurusamy, —Programming with Java, Tata Mc-Graw Hill, 5th Edition.
2. Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition, 2010
3. Gary Cornell, Core Java2 Volume I – Fundamentals, AddisonWesley, 1999

Reference Books

1. Head First Java, O’Rielly Publications.
2. Y. Daniel Liang, Introduction to Java Programming, 7th Edition, Pearson Education India, 2010
3. P. Rizwan Ahmed, Java Programming, 3rd Edition, Margham Publications, 2017

Website and E-Learning source

1. <https://javabeginnerstutorial.com/core-java-tutorial>
2. <http://docs.oracle.com/javase/tutorial>
3. <https://www.coursera.org>
4. <https://www.geeksforgeeks.org/java>
5. <https://www.tutorialspoint.com/java>

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	Remember the concepts of OOPS.	K1, K2
CO2	Apply Java syntax and control structures to develop simple programs.	K1, K2, K3, K4
CO3	Implement classes, inheritance, and interfaces for modular programming.	K1, K2, K3
CO4	Utilize exception handling, multithreading, and file I/O in applications.	K1, K2, K3, K4
CO5	Develop interactive user interfaces using Applets, AWT, and Swing.	K1, K2, K3, K4, K5

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

COURSE DESCRIPTORS

Title of the Course	PROGRAMMING IN JAVA LAB	Hours/Week	05
Course Code	AUCPCA45	Credits	05
Category	Core - 8	Year & Semester	II & IV
Prerequisites	Higher secondary Computer Science / Maths / Accountancy	Regulation	2024

Objectives of the course:

- To provide fundamental knowledge of object-oriented programming.
- To equip the student with programming knowledge in Core Java from the basics up.
- To enable the students to know about Event Handling.
- To enable the students to use String Concepts.
- To equip the student with programming knowledge into create GUI using AWT controls.

Lab Exercises	COs	Cognitive Levels
1. Write a Java program that prompts the user for an integer and then prints out all the prime numbers up to that Integer.		
2. Write a Java program to multiply two given matrices.		
3. Write a Java program that displays the number of characters, lines and words in a text.		
4. Generate random numbers between two given limits using Random class and print messages according to the range of the value generated.		
5. Write a program to do String Manipulation using Character Array and perform the following string operations:	CO1	K1
a. String length	CO2	K2
b. String Concatenation	CO3	K3
c. Reverse a string	CO4	K4
6. Write a threading program which uses the same method asynchronously to print the numbers 1 to 10 using Thread1 and to print 90 to 100 using Thread2.	CO5	K5
7. Write a program to demonstrate the use of following exceptions.		K6
a. Arithmetic Exception		
b. Array Index Out of Bound Exception.		
8. Write a program to accept a text and change its size and font include bold italic options. Use frames and controls.		

<p>9. Write a Java program that handles all mouse events and shows the event.</p> <p>10. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +,-,*,% operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.</p>		
<p>Recommended Text Books</p> <ol style="list-style-type: none"> 1. E. Balagurusamy, —Programming with Javal, Tata Mc-Graw Hill, 5th Edition. 2. Herbert Schildt, The Complete Reference, Tata McGraw Hill,NewDelhi,7thEdition,2010 3. Gary Cornell, CoreJava2 VolumeI – Fundamentals, Addison Wesley,1999 		
<p>Reference Books</p> <ol style="list-style-type: none"> 1. Head First Java, O’Rielly Publications. 2. Y.Daniel Liang, Introduction to Java Programming, 7th Edition, Pearson Education India, 2010. 3. P.Rizwan Ahmed, Java Programming, 3rd Edition, Margham Publications, 2017. 		
<p>Website and E-Learning source</p> <ol style="list-style-type: none"> 1. https://javabeginnerstutorial.com/core-java-tutorial 2. http://docs.oracle.com/javase/tutorial 3. https://www.coursera.org 4. https://www.geeksforgeeks.org/java 5. https://www.tutorialspoint.com/java 		

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	Apply control structures to solve problems in Java.	K1, K2, K3, K4
CO2	Implement array and matrix operations using Java programming.	K1, K2, K3, K4, K5
CO3	Utilize file and string handling techniques for text processing.	K1, K2, K3, K4, K5
CO4	Demonstrate the use of classes, threads, and exception handling for execution.	K1, K2, K3, K4
CO5	Design graphical user interfaces using AWT and Swing components.	K1, K2, K3, K4, K5, K6

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

COURSE DESCRIPTORS

Title of the Course	NETWORK SECURITY	Hours/Week	04
Course Code	AUECA42A	Credits	03
Category	Elective - 4	Year & Semester	II & IV
Prerequisites	Higher secondary Computer Science / Maths / Accountancy	Regulation	2024

Objectives of the course:

- To familiarize on the model of network security, Encryption techniques.
- To understand the concept of Number Theory, theorems.
- To understand the design concept of cryptography and authentication.
- To develop experiments on algorithm used for security.
- To understand about virus and threats, firewalls, and implementation of Cryptography.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Model of network security – Security attacks, services and attacks – OSI security architecture – Classical encryption techniques – SDES – Block cipher Principles-DES – Strength of DES – Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – RC4 - Differential and linear cryptanalysis – Placement of encryption function – traffic confidentiality.	CO1	K1 K2
UNIT-II	Number Theory – Prime number – Modular arithmetic – Euclid’s algorithm - Fermet’s and Euler’s theorem – Primality – Chinese remainder theorem – Discrete logarithm – Public key cryptography and RSA – Key distribution – Key management – Diffie Hellman key exchange – Elliptic curve cryptography	CO2	K1 K2 K3 K4
UNIT-III	Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – SHA - HMAC – CMAC - Digital signature and authentication protocols – DSS.	CO3	K1 K2 K3 K4

UNIT-IV	Authentication applications – Kerberos – X.509 Authentication services - E- mail security – IP security - Web security.	CO4	K1 K2 K3 K4
UNIT-V	Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles – Trusted systems – Practical implementation of cryptography and security.	CO5	K1 K2 K3 K4

Recommended Text Books

1. William Stallings, “Cryptography & Network Security”, Pearson Education, Fourth Edition 2010.
2. Vijay T.Patil, PrasanthD.Somwanshi, “ Network Security”,Nirali Prakashan .
3. Charlie Kaufman ,Radia Perlman, Mike Speciner, “ Network Security”, Pearson Publications, Second Edition.

Reference Books

1. Charlie Kaufman, Radia Perlman, Mike Speciner,“Network Security,Private communication in public world”,PHI Second Edition,2002
2. Bruce Schneier, Neils Ferguson, “Practical Cryptography”, Wiley Dreamtech India Pvt Ltd, First Edition, 2003.
3. Douglas R Simson “Cryptography Theory and practice”,CRC Press, First Edition,1995
4. P.Rizwan Ahmed, Cryptography, Margham Publications, 2014.

Website and E-Learning source

1. <https://www.javatpoint.com/computer-network-security>
2. https://www.tutorialspoint.com/information_security_cyber_law/network_security.htm
3. <https://www.geeksforgeeks.org/network-security/>

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	Understand the fundamental concepts, models, and techniques of network security.	K1, K2
CO2	Apply number theory concepts to design and analyze cryptographic algorithms.	K1, K2, K3, K4
CO3	Implement public key cryptography, key management, and exchange mechanisms.	K1, K2, K3, K4
CO4	Evaluate authentication methods for secure communication.	K1, K2, K3, K4, K5
CO5	Analyze and apply security mechanism in practical scenarios.	K1, K2, K3, K4

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

COURSE DESCRIPTORS

Title of the Course	MULTIMEDIA SYSTEM	Hours/Week	04
Course Code	AUECA42B	Credits	03
Category	Elective – 4	Year & Semester	II & IV
Prerequisites	Higher secondary Computer Science / Maths / Accountancy	Regulation	2024

Objectives of the course:

- To understand the definition of Multimedia.
- To study about the Image File Formats, Sounds Audio File Formats.
- To understand the concepts of Animation and Digital Video Containers.
- To study about the Stage of Multimedia Project.
- To understand the concept of Ownership of Content Created for Project Acquiring Talent.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Multimedia Definition-Use Of Multimedia Delivering Multimedia-Text: About Fonts and Faces - Using Text in Multimedia -Computers and Text Font Editing and Design Tools Hypermedia and Hypertext.	CO1	K1 K2
UNIT-II	Images: Plan Approach - Organize Tools - Configure Computer Workspace -Making Still Images - Color - Image File Formats. Sound: The Power of Sound-Digital Audio-Midi Audio Midivs. Digital Audio Multimedia System Sounds Audio File Formats Vaughan's Law of Multimedia Minimums - Adding Sound to Multimedia Project.	CO2	K1 K2
UNIT-III	Animation: The Power of Motion-Principles of Animation-Animation by Computer - Making Animations that Work. Video: Using Video - Working with Video and Displays-Digital Video Containers-Obtaining Video Clips -Shooting and Editing Video.	CO3	K1 K2 K3

UNIT-IV	Making Multimedia: The Stage of Multimedia Project - The Intangible Needs -The Hardware Needs - The Software Needs - An Authoring Systems Needs Multimedia Production Team.	CO4	K1 K2 K3
UNIT-V	Planning and Costing: The Process of Making Multimedia-Scheduling-Estimating - RFPs and Bid Proposals. Designing and Producing - Content and Talent: Acquiring Content Ownership of Content Created for Project Acquiring Talent.	CO5	K1 K2 K3 K4

Recommended Text Books

1. TayVaughan,"Multimedia: Making It Work",8th Edition, Osborne/McGraw Hill,2001.
2. S. Ashifa Begum, "Multimedia Systems".
3. Gaurav Bhatnagar& K. Ramanathan, "Introduction to Multimedia Systems", Academic Press (Elsevier), 1st Edition, 2012.

Reference Books

1. Ralf Steinmetz &Klara Nahrstedt "Multimedia Computing, Communication & Applications", Pearson Education, 2012.
2. Ze-Nian Li & Mark S. Drew (with Jiangchuan Liu in later editions), "Fundamentals of Multimedia",Springer, 2nd Edition, 2014

Website and E-Learning source

1. [Multimedia Systems with features or characteristics – GeeksforGeeks](#)
2. [Multimedia Introduction](#) - Tutorialpoint

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	Understand the concepts, importance, application and the process of developing multimedia.	K1, K2
CO2	Understand about image related processing.	K1, K2
CO3	Understand the framework of frames and bit images to animations	K1, K2, K3
CO4	Explain about the multimedia projects and stages of requirement in phases of project.	K1, K2, K3
CO5	Apply concept of cost involved in multimedia planning, designing, and producing.	K1, K2, K3, K4

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

COURSE DESCRIPTORS

Title of the Course	WEB DESIGNING	Hours/Week	02
Course Code	AUSCA43	Credits	02
Category	SEC - 6	Year & Semester	II & IV
Prerequisites	Higher secondary Computer Science / Maths / Accountancy	Regulation	2024

Objectives of the course:

- To understand the basics of HTML and its components.
- To study about the Graphics in HTML.
- To understand and apply the concepts of XML and DHTML.
- To understand the concept of JavaScript.
- To identify and understand the goals and objectives of the Ajax.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	HTML: HTML-Introduction-tag basics- page structure-adding comments working with texts, paragraphs and line break. Emphasizing test- heading and horizontal rules-list-font size, face and color-alignment links-tables-frames.	CO1	K1 K2 K3 K4
UNIT-II	Forms & Images Using Html: Graphics: Introduction-How to work efficiently with images in web pages, image maps, GIF animation, adding multimedia, data collection with html forms textbox, password, list box, combo box, text area, tools for building web page front page.	CO2	K1 K2 K3
UNIT-III	XML & CSS: Cascading style sheet (CSS) what is CSS-Why we use CSS-adding CSS to your web pages-Grouping styles-extensible markup language (XML).	CO3	K1 K2 K3

UNIT-IV	Dynamic HTML & DOM: Document object model (DOM)- Accessing HTML & CSS through DOM Dynamic content styles & positioning Event bubbling-data binding. JavaScript: Client-side scripting, What is JavaScript, How to develop JavaScript, simple JavaScript, variables, functions, conditions, loops and repetition.	CO4	K2 K3 K4
UNIT-V	Advance script, JavaScript and objects, JavaScript own objects, the DOM and web browser environments, forms and validations.	CO5	K2 K3 K4

Recommended Text Books

1. Pankaj Sharma, “Web Technology”, SkKataria& Sons Bangalore 2011.
2. Mike Mcgrath, “Java Script”, Dream Tech Press 2006, 1st Edition.
3. Achyut S Godbole &AtulKahate, “Web Technologies”, 2002, 2nd Edition.

Reference Books

1. Laura Lemay, RafeColburn , Jennifer Kyrnin, “Mastering HTML, CSS & Javascript Web Publishing”, 2016.
2. DT Editorial Services (Author), “HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)”, Paperback 2016, 2nd Edition.

Website and E-Learning source

1. NPTEL & MOOC courses titled Web Design and Development.
2. <https://www.geeksforgeeks.org>

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	Develop working knowledge of HTML	K1, K2, K3, K4
CO2	Develop Web pages using Hypertext Markup Language (HTML).	K1, K2, K3
CO3	Optimize page styles and layout with Cascading Style Sheets (CSS).	K1, K2, K3
CO4	Develop a java script.	K2, K3, K4
CO5	Develop web application using Ajax.	K2, K3, K4

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

COURSE DESCRIPTORS

Title of the Course	CYBER FORENSICS	Hours/Week	02
Course Code	AUSCA44	Credits	02
Category	SEC - 7	Year & Semester	II & IV
Prerequisites	Higher secondary Computer Science / Maths / Accountancy	Regulation	2024

Objectives of the course:

- To understand the definition of computer forensics fundamentals.
- To study about the Types of Computer Forensics Evidence.
- To understand and apply the concepts of Duplication and Preservation of Digital Evidence.
- To understand the concepts of Electronic Evidence and Identification of Data.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Overview of Computer Forensics Technology: Computer Forensics Fundamentals: What is Computer Forensics Use of Computer Forensics in Law Enforcement, Computer Forensics Services, Types of Computer. Forensics Technology: Types of Business Computer Forensic, Technology – Types of Military Computer Forensic Technology – Types of Law Enforcement – Computer Forensic.	CO1	K1 K2
UNIT-II	Computer Forensics Evidence and capture: Data Recovery: Data Recovery Defined, Data Back-up and Recovery, The Role of Back – up in Data Recovery, The Data –Recovery Solution. Evidence Collection and Data Seizure: Collection Options, Obstacles, Types of Evidence	CO2	K1 K2
UNIT-III	Duplication and Preservation of Digital Evidence: Processing steps, Legal Aspects of collecting and Preserving Computer forensic Evidence. Computer image Verification and Authentication: Special needs of Evidential Authentication.	CO3	K1 K2 K3

UNIT-IV	Computer Forensics Analysis: Discovery of Electronic Evidence: Electronic Document Discovery: A Powerful New Litigation Tool. Identification of Data: Time Travel, Forensic Identification and Analysis of Technical	CO4	K1 K2 K3 K4
UNIT-V	Reconstructing Past Events: How to Become a Digital Detective, Useable File Formats, Unusable File Formats, Converting Files. Networks: Network Forensics Scenario, a technical approach, Destruction of E-Mail, Damaging Computer Evidence.	CO5	K1 K2 K3 K4

Recommended Text Books

1. JohnR.Vacca,“ComputerForensics:ComputerCrimeInvestigation”,3/E,FirewallMedia, New Delhi, 2002.
2. Marie-Helen Maras, “Computer Forensics: Cybercriminals, Laws, and Evidence”, Jones & Bartlett Learning, 2nd Edition, 2014.

Reference Books

- 1.Nelson,PhillipsEnfinger,Steuart,“ComputerForensicsandInvestigations”Enfinger,Steuart, CENGAGE Learning, 2004
- 2.Anthony Sammes and Brian Jenkinson,“Forensic Computing: A Practitioner& #39;s Guide”, Second Edition,Springer–VerlagLondonLimited,2007
- 3.Robert M.Slade,“Software Forensics Collecting Evidence from the Scene of a Digital Crime”, TMH2005.

Website and E-Learning source

1. <https://www.vskills.in>
2. <https://www.hackingarticles.in/best-of-computer-forensics-tutorials/>

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	Remember the concepts of Computer Forensics Technology	K1, K2
CO2	Understand Computer Forensics Evidence and capture	K1, K2
CO3	Demonstrate Duplication and Preservation of Digital Evidence	K1, K2, K3
CO4	Analyze Computer Forensics	K1, K2, K3, K4
CO5	Reconstructing Past Events	K1, K2, K3, K4

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

COURSE DESCRIPTORS

Title of the Course	OPERATING SYSTEMS	Hours/Week	04
Course Code	AUCCA51	Credits	03
Category	Core - 9	Year & Semester	III & V
Prerequisites	Foundation in C Programming, Data Structure and Computer Architecture	Regulation	2024

Objectives of the course:

- To understand the structure and functions of operating systems.
- To understand the principles of scheduler, scheduler algorithms and Deadlock.
- To learn various memory management schemes.
- To understand the memory management services.
- To study I/O management, File system and Mass Storage Structure.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction: Basic Concepts of Operating System – Services of Operating System – Operating System Types – Computer System Operation – I/O Structure – Storage Structure – Memory Hierarchy – System Components – System Calls – System Programs – System Design and Implementation – Introduction to Process – Process State – Process Control Block – Process Scheduling – Operations on Process – Inter process Communication – Communication in Client/Server Systems – Threads.	CO1	K1, K2
UNIT-II	CPU Scheduler: Types of CPU Scheduler – Scheduling Criteria – Scheduling Algorithms – Semaphores – Classic Problems of Synchronization – Basic Concept of Deadlocks – Deadlock Characterization – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery of Deadlock.	CO2	K3, K4
UNIT-III	Memory Management: Memory Management – Basics Concept of Memory – Address Binding – Logical and Physical Address Space – Memory Partitioning – Memory Allocation – Paging – Segmentation – Segmentation and Paging – Protection – Fragmentation – Compaction – Demand Paging – Page Replacement Algorithm – Classification of Page Replacement Algorithm.	CO3	K2, K3

UNIT-IV	File System: File System Storage – File Concept– File Access Methods – Directory Structure – File Sharing – File Protection – File System Implementation – File System Structure – Allocation Methods – Free Space Management – Mass Storage Structure – Disk structure – Disk Scheduling and Management – RAID Levels.	CO4	K2, K3, K4
UNIT-V	UNIX System: UNIX System – A Case Study – LINUX System – Case Study – Design Principles – Process Management – Scheduling – Memory Management – File Systems – Security.	CO5	K3, K4, K5

Recommended Text Books

1. Operating System Concepts” –Abraham Silberschatz Peter B. Galvin, G. Gagne, Sixth Edition, Addison Wesley Publishing Co., 2003.
2. “Operating System” – Willam Stalling, Fourth Edition, Pearson Education, 2003.

Reference Books

1. Operating systems – Internals and Design Principles”, W. Stallings, 6th Edition, Pearson.
2. “Modern Operating Systems”, Andrew S. Tanenbaum, Second Edition Addison Wesley, 2001.
3. “Fundamentals of Operating System”, Prof. R. Sriddhar, Dynaram Publication, Bangalore Company.

Website and E-Learning source

1. <https://www.geeksforgeeks.org/operating-systems/operating-systems/>
2. https://www.tutorialspoint.com/operating_system/index.htm

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	Understand OS concepts and process management.	K1, K2
CO2	Analyze CPU scheduling and deadlock handling.	K3, K4
CO3	Apply memory management techniques.	K2, K3
CO4	Analyze file systems and disk management.	K2, K3, K4
CO5	Evaluate UNIX/Linux system design.	K3, K4, K5

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

COURSE DESCRIPTORS

Title of the Course	OPERATING SYSTEMS LAB	Hours/Week	04
Course Code	AUCPCA55	Credits	03
Category	Core - 10	Year & Semester	III & V
Prerequisites	Programming knowledge, shell commands.	Regulation	2024

Objectives of the course:

- To learn about the basics of UNIX commands and shell programming.
- To understand the programming knowledge of scheduling algorithms.
- To understand the working of semaphores in operating system.
- To understand how to code various algorithm used in operating system.
- To understand how to code and working procedure of file management concepts in operating system.

Lab Exercises	COs	Cognitive Levels
1. Basics of UNIX commands.		
2. Shell Programming.		
3. Implement the following CPU scheduling algorithms a) Round Robin b) SJF c) FCFS		
4. Implement all file allocation strategies a) Sequential b) Indexed c) Linked	CO1	K1
5. Implement Semaphore.	CO2	K2
6. Implement all File Organization Techniques a) Single level directory b) Two level c) Hierarchical d) DAG	CO3	K3
7. Implement Bankers Algorithm for Dead Lock Avoidance	CO4	K4
8. Implement an Algorithm for Dead Lock Detection	CO5	
9. Implement the all page replacement algorithms a) FIFO b) LRU c) LFU		
10. Implement Shared memory and IPC		

<p>Recommended Text Books</p> <ol style="list-style-type: none"> 1. Operating System Concepts” –Abraham Silberschatz Peter B. Galvin, G. Gagne, Sixth Edition, Addison Wesley Publishing Co., 2003. 2. “Operating System” – Willam Stalling, Fourth Edition, Pearson Education, 2003.
<p>Reference Books</p> <ol style="list-style-type: none"> 1. Operating systems – Internals and Design Principles”, W. Stallings, 6th Edition, Pearson. 2. “Modern Operating Systems”, Andrew S.Tanenbaum, Second Edition Addison Wesley, 2001. 3. “Fundamentals of Operating System”, Prof. R. Sridhar, Dynaram Publication, Bangalore Company.
<p>Website and E-Learning source</p> <ol style="list-style-type: none"> 1. Web resources from NDL Library, E-content from open-source libraries.

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	Understand the basics of UNIX commands and shell programming.	K1, K2
CO2	Understand the programming knowledge of scheduling algorithms.	K1, K2
CO3	Demonstrate the working of semaphores in operating system.	K1, K2, K3
CO4	Analyze how to code various algorithm used in operating system.	K2, K3, K4
CO5	Apply how to code and working procedure of file management concepts in operating system.	K2, K3, K4

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

COURSE DESCRIPTORS

Title of the Course	DATABASE MANAGEMENT SYSTEM	Hours/Week	04
Course Code	AUCCA52	Credits	03
Category	Core - 11	Year & Semester	III & V
Prerequisites	Basic knowledge of programming, data structure and basic file systems	Regulation	2024

Objectives of the course:

- To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.
- To understand the concepts of database management system, designs implement in Database models.
- To learn and understand to write queries using SQL, PL/SQL.
- To enable the students to learn the designing of database systems, foundation on the relational model of data and normal forms.
- To understand and apply PL/SQL programming concepts for developing efficient database applications.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Database Concepts: Database Systems - Data vs Information - Introducing the database -File system - Problems with file system – Database systems. Data models - Importance - Basic Building Blocks-Business rules – Evolution of Data models – Degrees of Data Abstraction.	CO1	K2, K3, K4
UNIT-II	Design Concepts: Relational database model - logical view of data - keys – Integrity rules – relational set operators – data dictionary and the system catalog – relationships – data redundancy revisited - Indexes - codd's rules. Entity relationship model – ER diagram.	CO2	K1, K2
UNIT-III	Normalization of Database Tables: Database tables and Normalization – The Need for Normalization –The Normalization Process – Higher level Normal Form. Introduction to SQL: Data Definition Commands – Data Manipulation Commands – SELECT Queries – Additional Data Definition Commands – Additional SELECT Query Keywords – Joining Database Tables.	CO3	K2, K3, K4, K5

UNIT-IV	Advanced SQL: Relational SET Operators: UNION – UNION ALL – INTERSECT - MINUS.SQL Join Operators: Cross Join – Natural Join – Join USING Clause – JOIN ON Clause – Outer Join. Sub Queries and Correlated Queries: WHERE – IN – HAVING – ANY and ALL – FROM. SQL Functions: Date and Time Function – Numeric Function – String Function – Conversion Function.	CO4	K1, K2, K3
UNIT-V	PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Variable Declaration – Assignment operation –Arithmetic operators. Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control statements. PL/SQL Cursors and Exceptions: Cursors – Implicit Cursors, Explicit Cursors and Attributes – Cursor FOR loops – SELECT...FOR UPDATE – WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.	CO5	K2, K3, K4, K5

Recommended Text Books

1. Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", Ninth Edition
2. Nilesh Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India, 2016.

Reference Books

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, “Database System Concepts”, Mc Graw Hill International Publication, VI Edition.
2. Shio Kumar Singh, “Database Systems, Pearson publications, II Edition.
3. P. Rizwan Ahmed, RDBMS, Margham Publications, 2016.

Website and E-Learning source

1. Web resources from NDL Library, E-content from open-source libraries.

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	Distinguish file system and DBMS, also compare various data models.	K2, K3, K4
CO2	Understand the basic concepts of Relational Data Model and Entity – Relationship Model.	K1, K2
CO3	Design database schema considering normalization and relationships within database.	K2, K3, K4, K5
CO4	Classify the different functions and various join operations to enhance the knowledge of handling multiple tables.	K1, K2, K3
CO5	Design Database operations and implement using PL/SQL programs, also develop programs using Cursors, Exceptions.	K2, K3, K4, K5

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

COURSE DESCRIPTORS

Title of the Course	DATABASE MANAGEMENT SYSTEM LAB	Hours/Week	03
Course Code	AUCPCA56	Credits	03
Category	Core - 12	Year & Semester	III & V
Prerequisites	Basic knowledge of relational database concepts and SQL commands.	Regulation	2024

Objectives of the course:

- To understand the concepts of DDL/DML/DCL/TCL commands.
- To understand the concepts of Join queries.
- To understand the concepts of exception handling.
- To understand the concepts of cursors.
- To understand the concepts of packages.

Lab Exercises	COs	Cognitive Levels
1. Execute a single line query and group functions. 2. Execute DDL Commands. 3. Execute DML Commands 4. Execute DCL and TCL Commands. 5. Implement the Nested Queries. 6. Implement Join operations in SQL 7. Write PL/SQL procedure for an application using exception handling. 8. Write PL/SQL procedure for an application using cursors. 9. Write a PL/SQL procedure for an application using functions. 10. Write a PL/SQL procedure for an application using package.	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4

Recommended Text Books

1. Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", Ninth Edition
2. Nilesh Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India, 2016.

<p>Reference Books</p> <ol style="list-style-type: none"> 1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, “Database System Concepts”, Mc Graw Hill International Publication, VI Edition. 2. Shio Kumar Singh, “Database Systems, Pearson publications, II Edition. 3. P. Rizwan Ahmed, RDBMS, Margham Publications, 2016.
<p>Website and E-Learning source</p> <ol style="list-style-type: none"> 1. Web resources from NDL Library, E-content from open-source libraries.

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	Design a database schema for a given problem domain.	K2, K3, K4, K5
CO2	Populate a database using SQL, DDL/DML Commands.	K2, K3, K4
CO3	Build well formed in String Date/Aggregate Functions.	K2, K3, K4
CO4	Implement a database query using Joins, Sub-Queries and Set Operations.	K2, K3
CO5	Design a Program in SQL including Objects (Functions, Procedures, and Triggers).	K2, K3, K4, K5

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

COURSE DESCRIPTORS

Title of the Course	MOBILE COMPUTING	Hours/Week	04
Course Code	AUECA53A	Credits	03
Category	Elective – 5	Year & Semester	III & V
Prerequisites	Fundamentals of operating systems, computer networks and data structures	Regulation	2024

Objectives of the course:

- To provide the knowledge on wireless communication fundamentals
- To study the basic concepts of medium access control and telecommunication System.
- To study a set of wireless networks.
- To study about mobile network layer.
- To study the basic concepts of wireless application protocol

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction–Applications–A short History of wireless Communications–Wireless Transmission – Frequencies for Radio transmission–Signals–Antennas–Signal Propagation–Multiplexing–Modulations–Amplitude shift keying–Frequency shift keying–Phase shift keying–Spread Spectrum	CO1	K1, K2, K3
UNIT-II	SDMA–FDMA–TDMA–Fixed TDM–Classical Aloha–CDMA–Global System for Mobile Communications –GPRS–Satellite Systems –Basics –Applications–Broadcast Systems – Digital Audio Broadcasting – Digital Video Broadcasting. learn development of applications in mobile computing platform.	CO2	K2, K3
UNIT-III	Infrared vs. Radio Transmission– Infrastructure Networks–Ad hoc Networks – IEEE 802.11 –System Architecture–Protocol Architecture–Bluetooth–User scenarios–Bluetooth Architecture–Introduction to Wireless ATM–Services–Location Reference Model	CO3	K1, K2
UNIT-IV	Mobile IP–Goals– Assumption–Entities and Terminology–IP Packet delivery–Agent advertisement and discovery–Registration–Tunnelling and encapsulation–Optimizations–Dynamic Host Configuration Protocol (DHCP)–Routing–DSDV–DSR–Alternative Metrics	CO4	K1, K2

UNIT-V	Introduction–Protocol Architecture–Wireless Markup Language (WML)–WML Script– Applications–Wireless Telephony Application (WTA) – Wireless Telephony Application Architecture.	CO5	K1, K2
Recommended Text Books			
1. “Mobile Communications, Jochen Schiller – PHI/Pearson Education, Second Edition, 2003			
Reference Books			
1. “Principles of Wireless Networks”, Kaveh Pahalavan, Prasanth Krishnamoorthy, PHI/Pearson Education, 2003			
2. “Mobile Computing, Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal– Tata McGraw Hill Publications, Second edition, 2010.			
3.P Rizwan Ahmed, Mobile Computing, Margham Publications, 2014			

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	Discuss the basic concepts of mobile computing.	K1, K2, K3
CO2	Explain the basics of mobile telecommunication system	K2, K3
CO3	Comprehend wireless LAN and cellular systems.	K1, K2
CO4	Understand protocols at network and transport layer	K1, K2
CO5	Understand protocols at network and transport layer	K1, K2

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

COURSE DESCRIPTORS

Title of the Course	ARTIFICIAL INTELLIGENCE	Hours/Week	04
Course Code	AUECA53B	Credits	03
Category	Elective - 5	Year & Semester	III & V
Prerequisites	Basic knowledge of programming and core computer application concepts.	Regulation	2024

Objectives of the course:

- To learn various concepts of AI Techniques.
- To learn various Search Algorithm in AI.
- To learn probabilistic reasoning and models in AI.
- To learn about Markov Decision Process.
- To learn various type of Reinforcement learning.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction: Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree.	CO1	K1, K2
UNIT-II	Search Algorithms: Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, best first search, A* algorithm, Game Search.	CO2	K1, K2
UNIT-III	Probabilistic Reasoning: Probability, conditional probability, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model.	CO3	K1, K2
UNIT-IV	Markov Decision process: MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs.	CO4	K1, K2
UNIT-V	Reinforcement Learning: Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning	CO5	K1, K2

Recommended Text Books

1. Stuart Russell and Peter Norvig, “Artificial Intelligence: A Modern Approach, 3rd Edition, Prentice Hall.
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, Tata McGraw Hill
3. P.Rizwan Ahmed, Artificial Intelligence, Margham Publications, 2014

Reference Books

1. Trivedi, M.C., “A Classical Approach to Artificial Intelligence”, Khanna Publishing House, Delhi.
2. SarojKaushik, “Artificial Intelligence”, Cengage Learning India, 2011
3. David Poole and Alan Mackworth, “Artificial Intelligence: Foundations for Computational Agents”, Cambridge University Press 2010

Website and E-Learning source

1. <https://github.com/dair-ai/ML-Course-Notes>
2. <https://web.cs.hacettepe.edu.tr/~erkut/ain311.f21/index.html>
3. https://www.toolify.ai/?gclid=CjwKCAjwvdajBhBEEiwAeMh1U6tlqU1LXIRFbcghL%20MZVwI_Cm4PkIRcDRE-VYq_wTDcuaQeq_bCHnhoCcm4QAvD_BwE

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	Explain the various concepts of AI Techniques.	K1, K2, K3
CO2	Describe various Search Algorithm in AI.	K1, K2, K3, K4
CO3	Discuss the probabilistic reasoning and models in AI.	K1, K2, K3, K4
CO4	Utilize the Markov Decision Process.	K1, K2, K3, K4
CO5	Discuss various type of Reinforcement learning Techniques.	K1, K2, K3, K4

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

COURSE DESCRIPTORS

Title of the Course	BIG DATA ANALYTICS	Hours/Week	04
Course Code	AUECA53C	Credits	03
Category	Elective - 5	Year & Semester	III & V
Prerequisites	Foundation in mathematics and programming skills	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, K2, K3
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	K2, K3, K4
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	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	K2, K3, K4
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
Recommended Text Books			
1. Anand Rajaraman 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. 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			

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

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

COURSE DESCRIPTORS

Title of the Course	COMPUTER NETWORKS	Hours/Week	04
Course Code	AUECA54A	Credits	03
Category	Elective - 6	Year & Semester	III & V
Prerequisites	Foundation in C Programming, Data Structure and Computer Architecture	Regulation	2024

Objectives of the course:

- To learn the basic concepts of Data communication and Computer network.
- To learn about wireless Transmission
- To learn about networking and data link layer.
- To study about Network communication.
- To learn the concept of Transport layer

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP Models – Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer – Theoretical Basis for Data Communication - Guided Transmission Media	CO1	K1, K2
UNIT-II	Wireless Transmission - Communication Satellites – Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues – Error Detection and Correction.	CO2	K1, K2, K3
UNIT-III	Elementary Data Link Protocols - Sliding Window Protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Bluetooth.	CO3	K1, K2
UNIT-IV	Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms – IP Protocol – IP Addresses – Internet Control Protocols.	CO4	K2, K3, K4
UNIT-V	Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection – Simple Transport Protocol – Internet Transport Protocols (ITP) - Network Security: Cryptography	CO5	K1, K2

Recommended Text Books

1. A. S. Tanenbaum, “Computer Networks”, 4th Edition, Prentice-Hall of India, 2008.

Reference Books

1. B. A. Forouzan, “Data Communications and Networking”, Tata McGraw Hill, 4th Edition, 2017
2. F. Halsall, “Data Communications, Computer Networks and Open Systems”, Pearson Education, 2008
3. D. Bertsekas and R. Gallager, “Data Networks”, 2nd Edition, PHI, 2008.
4. Lamarca, “Communication Networks”, Tata McGraw- Hill, 2002

Website and E-Learning source

2. https://en.wikipedia.org/wiki/Computer_network
3. [Computer Networks Referencing Guide · Computer Networks citation \(updated Mar 08 2026\) · Citationsy](#)

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	Understand the basics of Computer Network architecture, OSI and TCP/IP reference models.	K1, K2
CO2	Explain about the Telephone systems using wireless network.	K1, K2, K3
CO3	Understand the concept of MAC.	K1, K2
CO4	Analyze the characteristics of Routing and Congestion control algorithms.	K2, K3, K4
CO5	Understand network security and define various protocols such as FTP, HTTP, Telnet, DNS.	K1, K2

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

COURSE DESCRIPTORS

Title of the Course	SOFTWARE TESTING	Hours/Week	04
Course Code	AUECA54B	Credits	03
Category	Elective - 6	Year & Semester	III & V
Prerequisites	Basic knowledge of programming and core computer application concepts.	Regulation	2024

Objectives of the course:

- To study fundamental concepts in software testing.
- To discuss various software testing issues and solutions in software unit test, integration and system testing.
- To study the basic concept of Data flow testing and Domain testing.
- To Acquire knowledge on path products and path expressions.
- To learn about Logic based testing and decision tables.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction: Purpose–Productivity and Quality in Software–Testing Vs Debugging–Model for Testing–Bugs Types of Bugs – Testing and Design Style.	CO1	K1, K2, K3
UNIT-II	Flow / Graphs and Path Testing – Achievable paths – Path instrumentation Application Transaction Flow Testing Techniques.	CO2	K2, K3, K4
UNIT-III	Data Flow Testing Strategies - Domain Testing: Domains and Paths – Domains and Interface Testing.	CO3	K2, K3, K4
UNIT-IV	Linguistic –Metrics – Structural Metric – Path Products and Path Expressions. Syntax Testing Formats–Test Cases	CO4	K1, K2
UNIT-V	Logic Based Testing–Decision Tables–Transition Testing–States, State Graph, State Testing.	CO5	K1, K2, K3

Recommended Text Books

1. B. Beizer, "Software Testing Techniques", II Edn., Dream Tech India, New Delhi, 2003.
2. K.V.K. Prasad, "Software Testing Tools", Dream Tech. India, New Delhi, 2005

Reference Books

1. I. Burnstein, 2003, "Practical Software Testing", Springer International Edn.
2. E. Kit, 1995, "Software Testing in the Real World: Improving the Process", Pearson Education, Delhi.
3. P. Rizwan Ahmed, Software Testing, Margham Publications, 2016.

Website and E-Learning source

1. <https://www.javatpoint.com/software-testing-tutorial>
2. [Software Testing Tutorial](#)

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	Apply software testing knowledge and engineering methods	K1, K2, K3
CO2	Identify the needs of software test automation and develop a test tool to support test automation.	K2, K3, K4
CO3	Identify various software testing problems, and solve these problems by designing with selected software test models.	K2, K3, K4
CO4	Understanding the knowledge of contemporary issues in software testing, such as component-based software testing problems.	K1, K2
CO5	Use software testing methods and modern software testing tools for their testing projects.	K1, K2, K3

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

COURSE DESCRIPTORS

Title of the Course	CRYPTOGRAPHY	Hours/Week	04
Course Code	AUECA54C	Credits	03
Category	Elective – 6	Year & Semester	III & V
Prerequisites	Fundamentals of operating systems, computer networks and data structures	Regulation	2024

Objectives of the course:

- To understand the fundamentals of Cryptography
- To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity
- To understand the various key distribution and management schemes.
- To understand how to deploy encryption techniques to secure data in transit across data networks
- To design security applications in the field of Information technology

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction: The OSI security Architecture – Security Attacks – Security Mechanisms – Security Services – A model for network Security	CO1	K2, K3, K4
UNIT-II	Classical Encryption Techniques: Symmetric cipher model – Substitution Techniques: Caesar Cipher – Mono alphabetic cipher – Play fair cipher – Poly Alphabetic Cipher – Transposition techniques – Stenography	CO2	K3, K4
UNIT-III	Block Cipher and DES: Block Cipher Principles – DES – The Strength of DES –RSA: The RSA algorithm.	CO3	K2, K3, K4
UNIT-IV	Network Security Practices: IP Security overview - IP Security architecture – Authentication Header. Web Security: Secure Socket Layer and Transport Layer Security – Secure Electronic Transaction.	CO4	K3, K4
UNIT-V	Intruders – Malicious software – Firewalls.	CO5	K1, K2

<p>Recommended Text Books</p> <ol style="list-style-type: none"> 1. William Stallings, “Cryptography and Network Security Principles and Practices”.
<p>Reference Books</p> <ol style="list-style-type: none"> 1. Behrouz A. Foruzan, “Cryptography and Network Security”, Tata McGraw-Hill, 2007. 2. AtulKahate, “Cryptography and Network Security”, Second Edition, 2003, TMH. 3. M.V. Arun Kumar, “Network Security”, 2011, First Edition, USP. 4. P.Rizwan Ahmed, Cryptography, Margham Publications, 2014
<p>Website and E-Learning source</p> <ol style="list-style-type: none"> 1. https://www.tutorialspoint.com/cryptography/ 2. https://gpptools.tenderapp.com/kb/how-to/introduction-to-cryptography

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	Analyze the vulnerabilities in any computing system, to design a security solution.	K2, K3, K4
CO2	Apply the different cryptographic operations of symmetric cryptographic algorithms	K3, K4
CO3	Apply the different cryptographic operations of public key cryptography	K2, K3, K4
CO4	Apply the various Authentication schemes to simulate different applications.	K3, K4
CO5	Understand various Security practices and System security standards	K1, K2

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

COURSE DESCRIPTORS

Title of the Course	CORE / PROJECT WITH VIVA-VOCE	Hours/Week	05
Course Code	AUCPCA57	Credits	04
Category	Core - 13	Year & Semester	III & V
Prerequisites	Basic knowledge of programming and problem-solving skills.	Regulation	2024

Objectives of the course:

The course aims to

- Advance from an intellectually curious student to a creator/maker and an industry professional.
- Apply verbal and written communication skills to explain technical problemsolving techniques and solutions to an increasingly diverse and global audience.
- Collaborate within and across disciplinary boundaries to solve problems.
- Apply mathematical and/or statistical methods to facilitate problem solving.
- Exercise computational thinking over the entire software life cycle

SL	Area of Work	Maximum Marks
1.	PROJECTWORK: (i)Project Proposal and Plan	10
	(ii)Execution of the Project Proposal and Plan / Collection of data, Documentation and Presentation of the report.	40
2.	Viva Voce Examination	25
TOTAL		75

*CIA Marks = 25 marks (Project Review 1, Project Review2 and Project Review 3)

Guide lines for Documentation of Project

After completion of the project work, every student will submit a project report which should contain the following:

1. Cover Page (as per annexure1)
2. Title page (as per annexure1)
3. Declaration by the Student (as per annexure2)
4. Certificate by the Guide (as per annexure3)
5. Acknowledgment (The candidate may thank all those who helped in the execution of the project.)
6. Abstract (It should be in one page and include the purpose of the study; the methodology used and a summary of the major findings.)
7. Table of Contents
8. Detailed description of the project (This should be split in various chapters/sections with each chapter/section describing a project activity in totality). This portion of report should contain all relevant diagrams, tables, flow charts, software programs, print outs, photographs etc., which are properly labeled.
9. Conclusion & Recommendations
10. Appendices
 - Appendices are provided to give supplementary information, which if included in the main text may serve as a distraction and cloud the central theme.
 - Appendices should be numbered using Arabic numerals, e.g. Appendix 1, Appendix 2.
 - Appendices shall carry the title of the work reported and the same title shall be listed in the Contents page also
11. References (The listing of references should be typed 2 spaces below the heading “REFERENCES” in alphabetical order in single spacing left – justified. It should be numbered consecutively (in square [] brackets, throughout the text and should be collected together in the reference list at the end of the report. The references should be numbered in the order they are used in the text. The name of the author/authors should be immediately followed by the year and other details).

COURSE DESCRIPTORS

Title of the Course	INTERNSHIP / INDUSTRIAL TRAINING (Summer vacation at the end of IV semester activity)	Hours/Week	-
Course Code	AUICA58	Credits	02
Category	Compulsory	Year & Semester	III & V
Prerequisites	Basic knowledge of programming and practical skills.	Regulation	2024

Objectives of the course:

- Advance from an intellectually curious student to a creator / maker and an industry professional.
- Apply verbal and written communication skills to explain technical problem solving techniques and solutions to an increasingly diverse and global audience.
- Collaborate with in and across disciplinary boundaries to solve problems.
- Apply mathematical and / or statistical methods to facilitate problem solving.
- Exercise computational thinking over the entire software life cycle.

Internship / Industrial Training:

The students to undergo 2 weeks of Internship / Industrial Training in the Industry

Sl.No	Area of Work	Maximum Marks
1	a) Work Related performance –Work Attitude/ Academic preparation / problem solving ability / Adaptability / Overall Attendance / Progress towards learning goals	10
	b) Organizational skills–Time management skills / Planning skills / communication skills	20
	c) Relationship with others – Willingness to cooperate with co-works/ Ability to work with supervisor / Acceptance of constructive comments /Ability to take direction	20
2	Internship Report / Viva Voce Examination	25
	Total	75

*CIA Marks = 25 marks (Internship Review1, Review2 and Review3)

Guidelines of internship

- Internship should be of 2weeks duration.
- A student is expected to find internship by himself for herself. However, the institution should assist their students in getting internship in good organizations.
- **The home institution cannot be taken as the place of internship.**
- Internship can be on any topic covered in the syllabus mentioned in the syllabus, not restricted to the specialization.
- Internship can be done, in one of the following, but not restricted to, types of organizations:
 - Software development firms
 - Hardware / manufacturing firms
 - Any small scale industries, service providers like banks
 - Clinics / NGOs / professional institutions like that of CA, Advocate etc
 - Civic Depts like Ward office / post office / police station / punchayat.

Guidelines for making Internship Report

A student is expected to make a report based on the internship he or she has done in an organization. It should contain the following:

- **Certificate:** A certificate in the prescribed Performa (given in appendix 1) from the organization where the internship done.
- **Evaluation form:** The form filled by the supervisor or to whom the intern was reporting, in the prescribed Performa (given in appendix 2).
- **Title:** A suitable title giving the idea about what work the student has performed during the internship.
- **Description of the organization:** A small description of 1 to 2 pages on the organization where the student has interned
- **Description about the activities done by the section where the intern has worked:** A description of 2 to 4 pages about the section or cell of the organization where the intern actually worked. This should give an idea about the type of activity a new employee is expected to do in that section of the organization.

- **Description of work allotted and actually done by the intern:** A detailed description of the work allotted and actual work performed by the intern during the internship period. Intern may give a weekly report of the work by him or her if needed. It shall be of around 7 to 10 pages.
- **Self assessment:** A self assessment by the intern on what he or she has learnt during the internship period. It shall contain both technical as well as interpersonal skills learned in the process. It shall be of around 2 to 3 pages.

The internship report may be around 20 to 30 pages and this needs to be submitted to the external examiner at the time of University examination.

Appendix1

(Proforma for the certificate for internship in official letter head)

This is to certify that Mr / Ms _____ of
K.M.G College of Arts and Science (Autonomous), Gudiyattam, worked as an intern as part of
his/her B.C.A course in Computer Applications under Thiruvalluvar Univrsity. The particulars of
internship are given below:

Internship starting date: _____

Internship ending date: _____

Actual number of days worked: _____

Tentative number of hours worked: _____Hours

Broad area of work: _____

A small description of work done by the intern during the period:

Signature:

Name:

Designation:

Contact

Number:

E-Mail:

(Seal of the organization)

Appendix2

(Proforma for the Evaluation of the intern by the supervisor / to whom the intern
was reporting in the organization)

Professional Evaluation of intern

Name of in tern: _____

College / institution: _____

[Note: Give a score in the 1-5 scale by putting \surd in the respective cells]

S. No	Particular	Excellent	Very Good	Good	Moderate	Satisfactory
1	Attendance					
2	Punctuality					
3	Adaptability					
4	Ability to shoulder responsibility					
5	Ability to work in a team					
6	Written and oral communication Skills					
7	Problem solving Skills					
8	Ability to grasp new concepts					
9	Ability to complete task					
10	Quality of work done					

Comments:

Signature:

Name:

Designation:

Contact number:

Email:

(Seal of the organization)