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 lab	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 Lab	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 Algorithms Lab	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 Science	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 - 5	AUCCA41	Programming in JAVA	5	5	25	75	100
	III	Core – 6	AUCPCA45	Practical: Programming in JAVA Lab	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 Lab	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 Lab	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 Lab	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 Lab	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	**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.	CO1 CO2 CO3	K1 K2 K3 K4
UNIT-IV	**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.	CO1 CO2 CO3 CO4	K1 K2 K3 K4 K5
UNIT-V	**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.	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)

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. 6. Program using Jump Statements. 7. Program using Functions. 8. Program using Recursion. 9. Program using Strings. 10. Program using Modules. 11. Program using Lists. 12. Program using Tuples. 13. Program using Dictionaries. 14. Program for File Handling.	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5 K6

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 Murugeshan (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 Pubications, 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. 2. Write a C++ program to demonstrate Class and Objects 3. Write a C++ program to demonstrate the concept of Passing Objects to Functions 4. Write a C++ program to demonstrate the Friend Functions. 5. Write a C++ program to demonstrate Constructor and Destructor	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5 K6

6. Write a C++ program to demonstrate Unary and Binary Operator Overloading 7. Write a C++ program to demonstrate: • Single Inheritance • Multilevel Inheritance • Multiple Inheritance 8. Write a C++ program to demonstrate Virtual Functions. 9. Write a C++ program to implement File Manipulation. 10. Write a C++ program to find the Biggest Number using Command Line Arguments		
Recommended Text Books E. Balagurusamy, "Object-Oriented Programming with C++", TMH 2013, 7th 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. P.Rizwan Ahmed, Programming in C++, Margham Pubications, 2016		
Website and E-Learning source 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	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

1. "Mastering HTML5 and CSS3 Made Easy", TeachUComp Inc., 2014.
2. Thomas Michaud, "Foundations of Web Design: Introduction to HTML & CSS"

Reference Books

1. "HTML and CSS: Design and Build Websites" by Jon Duckett
2. "HTML5: The Missing Manual" by Matthew MacDonald

Website and E-Learning source

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: Severs, 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, 4thEdition.

2. Adam Drozdek, "Data Structures and Algorithms in C++", Cengage Learning, 2012, 4th Edition

Reference Books

1. Thomas H.Cormen, Chales E. Leiserson, Ronald L.Rivest,Clifford Stein, "Introduction to Algorithms",Mc Graw Hill2009, 3rd Edition.
2. Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education 2003.
3. P Rizwan Ahmed, C++ and Data Structure, Margham Pubications, 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: Practicalsmay 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. 4. Write a program to implement Queue ADT operations using arrays. 5. Write a program to perform Tree Traversals. 6. Write a program to perform AVL Tree operations. 7. Write a program to implement the DFS of a graph. 8. Write a program to implement BFS of a graph. 9. Write a program to implement Bubble Sort. 10. Write a program to implement Insertion Sort.	CO1 CO2 CO3 CO4 CO5	K1 K2 K3 K4 K5 K6

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, 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	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

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/~lepennec/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 PHPversion.
- 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