K.M.G. COLLEGE OF ARTS AND SCIENCE

(AUTONOMOUS)

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

P.G. & RESEARCH DEPARTMENT OF COMPUTER SCIENCE

B.Sc., Computer Science

SYLLABUS

(CHOICE BASED CREDIT SYSTEM)

Under

LEARNING OUTCOMES-BASED CURRICULUM

FRAMEWORK (LOCF)

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

PREFACE

Computer Science is the study of quantity, structure, space and change, focusing on problem solving, application development with wider scope of application in science, engineering, technology, social sciences etc. throughout the world in last couple of decades and it has carved out a space for itself like any other disciplines of basic science and engineering. Computer science is a discipline that spans theory and practice and it requires thinking both in abstract terms and in concrete terms. Nowadays, practically everyone is a computer user, and many people are even computer programmers. Computer Science can be seen on a higher level, as a science of problem solving and problem solving requires precision, creativity, and careful reasoning. Computer science has a wide range of specialties. These include Computer Architecture, Software Systems, Graphics, Artificial Intelligence, Computational Science, and Software Engineering. Computer Science is practiced by mathematicians, scientists and engineers. Mathematics, the origins of Computer Science, provides reason and logic. Science provides the methodology for learning and refinement. Engineering provides the techniques for building hardware and software. Programme Outcome, Programme Specific Outcome and Course Outcome Computer Science is the study of quantity, structure, space and change, focusing on problem solving, application development with wider scope of application in science, engineering, technology, social sciences etc. The key core areas of study in Mathematics include Algebra, Analysis (Real & Complex), Differential Equations, Geometry, and Mechanics. The Students completing this programme will be able to present Software application clearly and precisely, make abstract ideas precise by formulating them in the Computer languages. Completion of this programme will also enable the learners to join teaching profession, enhance their employability for government jobs, jobs in software industry, banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises. 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 and 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 programmes. The college has been accredited with 'A' grade by NAAC in 2nd cycle and recognized under section 2(f) & 12(B) of the UGC act 1956. The College is permanently affiliated to Thiruvalluvar University. The College is also acquired the status of Autonomous from the academic year 2024-2025. The College is an associate member of ICT Academy and registered member of NPTEL and Spoken Tutorials of IIT Bombay. The college is also a member of INFLIBNET and NDL.

VISION OF THE COLLEGE

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

MISSION OF THE COLLEGE

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

QUALITY POLICY OF THE COLLEGE

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

ABOUT THE DEPARTMENT

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

VISION OF THE DEPARTMENT

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

MISSION OF THE DEPARTMENT

- To ensure that every student is proficient with necessary computer skills.
- To inculcate strong ethical values, professional behavior and leadership abilities in students character so as to work with a commitment to the progress of the nation.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

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

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

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

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

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

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

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

PROGRAM OUTCOMES (POs)

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

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

PROGRAM SPECIFIC OUTCOMES (PSOs)

On successful completion of the B.Sc., Computer Science, the students will be able to:

PSOs	Statements
PSO1	Demonstrate proficiency in different computing technology and software tools.
PSO2	Enhance and increase their knowledge power of computers and internet
PSO3	Demonstrate knowledge of computer networks, database systems, operating system, software engineering, and theory of computing, and be able to apply this knowledge to implement real-life tasks more efficiently.

Correlation Rubrics:

High	Moderate	Low	No Correlation
3	2	1	-

Mapping of PSOs with POs:

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

K.M.G. COLLEGE OF ARTS AND SCIENCE

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Subject and Credit System- B.Sc., Computer Science

(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	AUCCS11	Object Oriented Programming Concepts Using C+	5	5	25	75	100
	III	Core – 2	AUCPCS12	Practical : Object Oriented Programming Concepts Using C++ LAB	5	5	25	75	100
		Elective-I (Choose any one)	AUEMA13B	Numerical Methods-I	4	3	25	75	100
			AUEMA13C	Discrete Mathematics- I					
	IV	Skill Enhancement	AUSCS14	Introduction to HTML	2	2	25	75	100
	IV	Foundation Course	AUFCS15	Problem Solving Technique	2	2	25	75	100
				Semester Total	**30**	**23**			
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	AUCCS21	Data Structures and Algorithm	5	5	25	75	100
	III	Core – 4	AUCPCS22	Practical: Data Structures and Algorithm Lab	5	5	25	75	100
	III	Elective-II	AUEMA23B	Numerical Methods-II	4	3	25	75	100
			AUEMA23C	Discrete Mathematics – II					
	IV	Skill Enhancement	AUSCS24	Office Automation	2	2	25	75	100
	IV	Skill Enhancement	AUSCS25	PHP Programming	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 - III	I	Language	AULT30 / AULU 30	General Tamil – III / Urdu - III	6	3	25	75	100
	II	English	AULE30	English – III	6	3	25	75	100
	III	Core - 5	AUCCS31	Python Programming	5	5	25	75	100
	III	Core – 6	AUCPCS32	Python Programming Lab	5	5	25	75	100
	III	Elective-III (Choose any One)	AUEMA33B	Statistical Methods and their Applications – I	3	3	25	75	100
			AUEPH33B	Physics-I					
	IV	Skill Enhancement	AUSCS34	Fundamentals of Information Technology	1	1	25	75	100
	IV	Skill Enhancement	AUSCS35	Understanding Internet	2	2	25	75	100
	IV	Compulsory	AUES30	Environmental Studies	2	2	25	75	100
				Semester Total	**30**	**24**			
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	AUCCS41	Java Programming	5	5	25	75	100
	III	Core – 8	AUCPCS42	Practical: Java Programming Lab	5	5	25	75	100
	III	Elective-IV (Choose any One)	AUEMA43B	Statistical Methods and their Applications – II	4	3	25	75	100
			AUEPH43B	Physics-II					
	IV	Skill Enhancement	AUSCS44	Web Designing	2	2	25	75	100
	IV	Skill Enhancement	AUSCS45	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	AUCCS51	Operating System	4	3	25	75	100
	III	Core – 10	AUCCS52	Data Base Management System	4	3	25	75	100
	III	Core – 11	AUCPCS53	Operating System Lab	4	3	25	75	100
	III	Core – 12	AUCPCS54	Practical: Data Base Management System Lab	4	3	25	75	100
	III	Core – 13	AUPCS55	Project with Viva voce	4	4	25	75	100
	III	Elective-V (Choose any One)	AUECS56A	Introduction to Data Science	4	3	25	75	100
			AUECS56B	Artificial Intelligence					
			AUECS56C	Computer Networks					
	III	Elective-VI (Choose any One)	AUECS57A	Data Mining and warehousing	4	3	25	75	100
			AUECS57B	Mobile Computing					
			AUECS57C	Natural Language Processing					
	IV	Compulsory	AUVE50	Value Education	2	2	25	75	100
	IV	Compulsory	AUICS58	Internship / Industrial Training (Summer vacation at the end of IV semester activity)	-	2	100	-	100
	Semester Total				**30**	**26**			
SEMESTER - VI	III	Core – 14	AUCCS61	Machine Learning	4	3	25	75	100
	III	Core – 15	AUCCS62	Data Analytics using R programming	4	3	25	75	100
	III	Core – 16	AUCPCS63	Machine Learning Lab	5	3	25	75	100
	III	Core – 17	AUCPCS64	Practical: Data Analytics using R programming Lab	5	3	25	75	100
	III	Elective-VII (Choose any One)	AUECS65A	IOT and its Application	5	3	25	75	100
			AUECS65B	Cloud Computing					
			AUECS65C	Software Project Management					
	III	Elective-VIII (Choose any One)	AUECS66A	Software Testing	5	3	25	75	100
			AUECS66B	Cryptography					
			AUECS66C	Robotics and its Applications					
	IV	Skill Enhancement Course	AUSCS67	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	03	03	03	3	-	-	12
Part-II	03	03	03	3	-	-	12
Part-III	13	13	13	13	19	21	92
Part-IV	4	4	5	4	4	3	24
Part-V	-	-	-	-	-	-	-
Total	23	23	24	23	23	24	**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	Object Oriented Programming Concepts Using C++	**Hours/Week**	05
Course Code	AUCCS11	**Credits**	05
Category	Core-1	**Year & Semester**	I & I
Prerequisites	Fundamental Understanding of C++	**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,
- 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
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.	CO2, CO5	K1,K2
UNIT-III	Operator Overloading: Overloading unary, binary operators – Overloading Friend functions –type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchal, Hybrid, Multi path inheritance – Virtual base Classes – Abstract Classes.	CO3	K1,K2

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.	CO3, CO4	K1,K2,K3
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 – Miscellaneous functions.	CO5	K1,K2,K3, K4

Recommended Text Books

1. *E. Balagurusamy, "Object-Oriented Programming with C++", TMH 2013, 7th Edition.*
2. *John Smiley "Learn to Program with C++",2002, 1st Edition.*
3. *Robert Lafore "Object oriented programming in C++",2017*

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*
4. *K.R Venugopal, Rajkumar,T.Ravishankar,"Mastering in C++",Tata McGraw Hill Education Publication 1997.*

Website and e-learning source

1) https://alison.com/course/introduction-to-c-plus-plus-programming
2) *https://archive.nptel.ac.in/courses/106/105/106105151/*

Course Learning Outcomes (for Mapping with POs and PSOs)

Upon completion of the course the students would be able to:

COs	CO Description	Cognitive Level
CO1	Remember the program structure of C++ with its syntax and semantics	K1
CO2	Understand the programming principles in C++ (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	K1,K2
CO3	Apply the programming principles learnt in realtime problems	K1,K2
CO4	Analyze the various methods of solving a problem and choose the best method	K1,K2,K3
CO5	Code, debug and test the programs with appropriate test cases	K1,K2,K3,K4

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

COURSE DESCRIPTORS

Title of the Course	Object Oriented Programming Concepts Using C++ Lab	**Hours/Week**	05
Course Code	AUCPCS12	**Credits**	05
Category	Core-2	**Year & Semester**	I & I
Prerequisites	Fundamental Understanding of C++	**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.

S.No	List of Exercise	COs	Cognitive Levels
01	To calculate area and volume of a Room by using Class and Objects in C++	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
02	To process the marks obtained by a student using constructor and destructor	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
03	To find the volume of Cuboid,Cylinder,Cube using function overloading, default arguments and inline function	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
04	To print the length of a box using friend function.	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
05	To find the real and imaginary of complex number using operator overloading	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
06	To find the square and cube of given numbers using inheritance	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
07	To find the Biggest and Smallest Number using Command Line Arguments	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

08	To Copy the file contents of one file into another file using C++ .	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
09	To find the area of square and circle using virtual function.	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
10	To create simple calculator using class templates	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
11	To Add and Subtract two numbers using function template	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
12	To find the Numerator and Demonstrator using Exception Handling (divide by zero)	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

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
CO2	Understand the programming principles in C++ (data types, operators, branching and looping, arrays, functions, structures, pointers and files)	K1, K2
CO3	Apply the programming principles learnt in realtime problems	K1, K2,K3
CO4	Analyze the various methods of solving a problem and choose the best method	K1, K2,K3, K4
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	3	2	2	1	2	1	-	-	2	3	2	3
CO2	3	2	2	1	2	1	1	-	-	1	3	2	2
CO3	3	2	2	1	2	2	2	-	-	1	2	3	3
CO4	3	3	2	2	1	2	1	-	-	1	3	2	2
CO5	3	3	3	1	2	1	1	-	-	1	3	3	3

COURSE DESCRIPTORS

Title of the Course	NUMERICAL METHODS-I	Hours/Week	04
Course Code	AUEMA13B	Credits	03
Category	ELECTIVE COURSE -I	Year & Semester	I & I
Prerequisites	12thStandard Mathematics	Regulation	2024

Objectives of the course:

- To Solve Practical Technical Problems using various Numerical Method Formulas
- To derive appropriate Numerical Methods to solve Algebraci,Transcendental Equations
- To know the Numerical Methods of Solving Simultaneous Linear Equations
- To Acquire Knowledge about Forward Difference and Backward Differences and their Relationship Knowledge about Central Difference Operators and Problems based on Various Central Difference Formulae

UNITS	Contents	COs	Cognitive Levels
UNIT-I	**Curve Fitting- Principle of Least square** Fitting of straight line $y = ax + b$ parabola$y = ax^2 + bx + c$ exponential curves of forms$y = ax^b, y = e^{bx}$, and $y = ab^x$.	CO1	K1,K2,K3
UNIT-II	**The solution of numerical algebraic and transcendental Equations:** Bisection method – Iteration Method – Regula Falsi Method – Newton– Raphson method	CO2	K1,K2,K3
UNIT-III	**Solution of simultaneous linear algebraic equations:** Gauss elimination method – Gauss Jordan method – Method of Triangularization – Gauss Jacobi method – Gauss Seidel method.	CO3	K1,K2,K3
UNIT-IV	**Finite differences** Operators Δ, ∇and E - relation between them — factorial polynomials. **Interpolation with equal intervals:** Gregory-Newton forward and backward- interpolation formulas.	CO4	K1,K2,K3
UNIT-V	**Central differences formulae** OperatorsΔ, ∇ and E relation with the other operators. Gauss forward and backward formulae, Stirling's formula and Bessel's formula.	CO5	K1,K2,K3

Recommended Text Books

1. P.Kandasamy, K.Thilagavathy (2003) Calculus of Finite differences &Numerical Analysis, S. Chand & Company Ltd., New Delhi-55.

Reference Books

1. B.D. Gupta.(2001) *Numerical Analysis.*Konark Pub. Ltd., Delhi
2. M.K. Venkataraman. (1992) *Numerical methods for Science andEngineering* National Publishing Company, Chennai.
3. S. Arumugam. (2003) *Numerical Methods*, New Gamma Publishing,Palayamkottai.
4. H.C. Saxena. (1991) *Finite differences and Numerical analysis* S.Chand& Co., Delhi

Website and e-learning source

https://nptel.ac.in/courses/111107105

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	Solve the problems of fitting of straight lines, parabolas and the different form of exponential curves	K1,K2,K3
CO2	Solve algebraic equations using various methods .	K1,K2,K3
CO3	Estimate the solution of simultaneous linear equations using different numerical methods	K1,K2,K3
CO4	Define basic concept of operators Δ, ∇and E.	K1,K2,K3
CO5	Estimate the solution of central difference formula.	K1,K2,K3,

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

COURSE DESCRIPTORS

Title of the Course	DISCRETE MATHEMATICS-I	Hours/Week	04
Course Code	AUEMA13C	Credits	03
Category	ELECTIVE COURSE -I	Year & Semester	I & I
Prerequisites	12th Standard Mathematics	Regulation	2024

Objectives of the course:

- To make the students understand the Mathematical Logic and truth table.
- To know about how and when to use set theory.
- To understand the discrete structure, storage structure.
- To understand the methods of Relations and ordering.
- To understand the functions, classifications, and types.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	**Mathematical logic-:** Connectives, well formed formulas, Tautology,Equivalence of formulas, Tautological implications, Duality law, Normal forms.	CO1	K1,K2,K3
UNIT-II	**Set Theor**y: Basic Concept of Set Theory – Operations on Sets – Venn Diagram	CO2	K1,K2,K3
UNIT-III	**Representation of Discrete Structure** : Data Structure – Storage Structure -Sequential Allocation – Pointers and Linked Allocation – An Application of Bit Represented Sets	CO3	K1,K2,K3
UNIT-IV	**Relations and Ordering:** Relations – Properties of Binary Relations in a set – Relation Matrix and the Graph of a Relation – Partition and Covering of a set – Equivalence Relations – Compatibility Relations – Composition of Binary Relations –Partial Ordering – Partially Ordered set.	CO4	K1,K2,K3
UNIT-V	**Functions** Definitions of functions and its Classification – Types – Examples – Composition of functions – Inverse functions – Binary and nary operations – Characteristic function of a set – Hashing functions –Recursive functions	CO5	K1,K2,K3

Recommended Text Books

1. Discrete Mathematical Structures with applications to computer Science J.P Tremblay and R.P Manohar (Mc.Graw Hill, 1997.)

Reference Books

1. P.R. Vittal,Mathematical Foundations– Margham Publication,Chennai.

2.Discrete Mathematics-Oscar Levin(3rd Edition)

Website and e-learning source

https://nptel.ac.in/courses/106106094
https://nptel.ac.in/courses/111107058

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	Solve problems in Mathematical logic and truth table	K1,K2,K3
CO2	Know and understand about set theory.	K1,K2,K3
CO3	Know and understand about discrete structure, storage structure.	K1,K2,K3
CO4	Know and understand about Relations and Ordering	K1,K2,K3
CO5	Understand the functions, classification and types.	K1,K2,K3,

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

COURSE DESCRIPTORS

Title of the Course	Introduction to HTML	**Hours/Week**	2
Course Code	AUSCS14	**Credits**	2
Category	Skill Enhancement Course SEC-1	**Year & Semester**	I & I
Prerequisites	How to code with HTML	**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 are Internet–Web browsers–What is Webpage –HTML Basics: Understanding tags. Block level text elements :Headings-paragraph(tag)–Font-style elements:(bold, italic, font, small, strong, strike, big tags)	CO1	K1,K2
UNIT-II	Lists: Types of lists: Ordered, Unordered– Nesting Lists–Other tags: Marquee, HR, BR- Using Images –Creating Hyper-links	CO2, CO3	K1,K2
UNIT-III	Tables: Creating basic Table, Table elements, Caption–Table and cell alignment–Row span, Col span–Cell padding.	CO2, CO4, CO5	K1,K2, K3
UNIT-IV	Frames: Frameset–Targeted Links–No frame–Forms: Input, Text area, Select, Option.	CO5	K1,K2,K3, K6
UNIT-V	HTML5 : Introduction to HTML5 – HTML5 Canvas – HTML5 Audio and Video – Introduction to CSS – CSS rules – Style types – CSS selectors – CSS colors.	CO4, CO5	K1,K2,K3, K6

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

3. *Thomas A.Powell" the complete reference HTML & CSS",fifth edition,2017.*

Website and e-learning source

1) https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf
2) https://www.w3schools.com/html/default.asp
3) *https://youtu.be/h_RftxdJTzs?si=G_32g2Y9lF8Rm8eN*

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
CO2	Knows Design concept. Concept 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	K1,K2,K3
CO5	Understand the Concept of adding images and creating the table	K1,K2,K3,K6

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

COURSE DESCRIPTORS

Title of the Course	Problem Solving Techniques	**Hours/Week**	2
Course Code	AUFCS15	**Credits**	2
Category	Foundation course	**Year & Semester**	I & I
Prerequisites	Analysis & Design	**Regulation**	2024

Objectives of the course:

- Familiarize with writing of algorithms, fundamentals of C and philosophy of problem solving.
- LO2 Implement different programming constructs and decomposition of problems into functions.
- LO3 Use data flow diagram, Pseudo code to implement solutions.
- Define and use of arrays with simple applications.
- Understand about operating system and their uses.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction: Introduction of Computers- CPU, Memory, Secondary storage devices, Input Devices and Output devices. 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, Interpreters and Compilers.	CO1	K1
UNIT-II	Data: Data types, Input and Output, Arithmetic Operators, Hierarchy of operations and Output - Program Development Cycle (PDC).Structured Programming: Algorithms and its importance, Flowcharts, Pseudocode, Coding, documenting and testing a program, Modular Programming.	CO2	K1,K2
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
UNIT-IV	Data: Numeric Data and Character Based Data. Arrays: One Dimensional Array - Two Dimensional Arrays – Strings as Arrays of Characters.	CO4	K1,K2

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

Recommended Text Books

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

Reference Books

2. R.S.Salaria "Programming for problem solving" First Edition 2022.

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 this course, students will

COs	CO Description	Cognitive Level
CO1	Study the basic knowledge of Computers and programming languages.	K1
CO2	Study the data types and arithmetic operations. Know about the algorithms. Develop program using flow chart and pseudocode.	K1,K2
CO3	Determine the various operators. Explain about the structures. Illustrate the concept of Loops	K1,K2
CO4	Study about Numeric data and character-based data. Explain about Arrays.	K1,K2
CO5	Explain about DFD , Illustrate program modules, Creating and reading Files	K1,K2,K3

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

COURSE DESCRIPTORS

Title of the Course	Data Structure and Algorithms	**Hours/Week**	05
Course Code	AUCCS21	**Credits**	05
Category	Core – 3	**Year & Semester**	I & II
Prerequisites	Basic knowledge of common programming concepts	**Regulation**	2024

Objectives of the course:

- To understand the concepts of ADTs.
- To learn linear data structures-lists, stacks, queues.
- To learn Tree structures and application of trees.
- To learn graph strutures and 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 - operations- Insertion, Deletion .	CO1	K1
UNIT-II	Stack ADT-Operations- Applications- Evaluating arithmetic expressions – Conversion of infix to postfix expression-Queue ADT-Operations- Circular Queue.	CO2	K1,K2
UNIT-III	Tree ADT-Binary Tree ADT-expression trees-applications of trees- binary search tree ADT- insertion and deletion operations binary-tree traversals	CO3	K1,K2
UNIT-IV	Definition- Representation of Graph-Types of graph-Breadth first traversal – Depth first traversal	CO4	K1,K2

UNIT-V	Searching-Linear search-Binary search-Sorting-Bubble sort-Selection sort-Insertion sort- Basics of Hash Functions.	CO5	K1,K2,K3

Recommended Text Books

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

Reference Books

1. Thomas H.Cormen,ChalesE.Leiserson,RonaldL.Rivest, Clifford Stein, "Introduction to Algorithms", McGraw Hill 2009, 3rd Edition.
2. Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education 2003

Website and e-learning source

1) 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, Big O notation	K1
CO2	Understand basic data structures such as arrays, linked lists, stacks and Queues	K1,K2
CO3	Understand the concept of Trees & its operations	K1,K2
CO4	Solve problem involving graphs, trees and heaps	K1,K2
CO5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data	K1,K2,K3

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

COURSE DESCRIPTORS

Title of the Course	Practical: Data Structures and Algorithm Lab	**Hours/Week**	05
Course Code	AUCPCS22	**Credits**	05
Category	Core – 4	**Year & Semester**	I & II
Prerequisites	Basic knowledge of common programming concepts	**Regulation**	2024

Objectives of the course:

- To understand the concepts of ADTs
- To learn linear data structures-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

S.No	List of Exercise	COs	Cognitive Levels
01	Write a program to implement the List ADT using arrays and linked lists.	CO1	K1, K2
02	Write a program to implement the Stack ADT using arrays and linked lists in library management system	CO1, CO2	K1, K2
03	Write a program to implement the Queue ADT using arrays and linked list in Ticket Reservation System	CO1, CO2, CO4	K1,K2
04	Write a program that reads an infix expression, converts the expression to postfix form and then evaluates the postfix expression (use stack ADT).	CO1, CO2, C04	K1, K2, K3, K4

05	Write a program to perform the following operations: • Insert an element into a Doubly Linked List. • Delete an element from a Doubly Linked List. • Search for a key element in a Doubly Linked List.	CO1, CO2	K1, K2, K3, K4, K5
06	Write a program to perform the following operations: • Insert an element into a binary search tree. • Delete an element from a binary search tree. • Inorder, preorder and postorder Traversals of a binary search tree.	CO1, CO4	K1, K2, K3, K4, K5
07	Write a programs for the implementation of BFS and DFS for a given graph.	CO4	K1, K2, K3, K4, K5
08	Write a programs for implementing the following searching methods: • Linear search • Binary search.	CO5	K1, K2, K3, K4, K5
09	Write a programs for implementing the following sorting methods: • Bubble sort • Selection sort • Insertion sort	CO5	K1, K2, K3, K4, K5

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, Big O notation	K1
CO2	Understand basic data structures such as arrays, linked lists, stacks and queues	K1, K2
CO3	Describe the hash function and concepts of collision and its resolution Methods	K1, K2,K3
CO4	Solve problem involving graphs, trees and heaps	K1, K2,K3, K4
CO5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data	K1, K2,K3,K4, K5

Recommended Text Books

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

Reference Books

1. Thomas H.Cormen,ChalesE.Leiserson,RonaldL.Rivest, Clifford Stein, "Introduction to Algorithms", McGraw Hill 2009, 3rd Edition.
2. Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education 2003.

Website and e-learning source

1. *https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/*

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

COURSE DESCRIPTORS

Title of the Course	Office Automation	**Hours/Week**	2
Course Code	AUSCS24	**Credits**	2
Category	Skill Enhancement	**Year & Semester**	I & II
Prerequisites	Basic knowledge of fundamentals and office automation tools	**Regulation**	2024

Objectives of the course:

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

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introductory concepts: Memory unit– CPU-Input Devices: Key board, Mouse and Scanner. Output devices: Monitor, Printer .Introduction to Operating systems.	CO1	K1
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, merge.	CO2	K1,K2, K3
UNIT-III	Spread sheets: Excel– opening, entering text and data, Formulas– entering, Basic functions, Text functions, Logical functions, Math functions, Statistical functions, Date and Time functions.	CO1, CO2	K1,K2, K3, K4
UNIT-IV	Database Concepts: The concept of data base management system; Data field, records, and files, Database security, Basics of SQL Commands.	CO3	K1,K2

UNIT-V	Power point: Introduction to Power point - Features – Understanding slide typecasting &viewing slides – creating slide shows. Applying – Slide transition–Animation effects, audio inclusion, timers.	CO4, CO5	K1,K2,K3, K4, K5, K6

Recommended Text Books

1. Peter Norton,"Introduction to Computers"–TataMcGraw-Hill
2. Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, "Microsoft Office 2003", Tata McGrawHill

Reference Books

1. P.Rizwan Ahmed , Office Automation, Margham Publications, 2015.

Website and e-learning source

1) 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
CO2	Gain knowledge on Creating Documents, spreadsheet and presentation.	K1,K2, K3
CO3	Gain knowledge on Creating Documents, spreadsheet and presentation.	K1,K2, K3, K4
CO4	Demonstrate the understanding of different automation tools.	K1,K2
CO5	Utilize the automation tools for documentation, calculation and presentation purpose.	K1,K2,K3, K4, K5, K6

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

COURSE DESCRIPTORS

Title of the Course	PHP Programming	**Hours/Week**	2
Course Code	AUSCS25	**Credits**	2
Category	Skill Enhancement	**Year & Semester**	I & II
Prerequisites	Basic understanding of Programming, internet, database, HTML.	**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	Introduction to PHP -Basic Knowledge of websites -Introduction of Dynamic Website -Introduction to PHP -Syntax of PHP -Embedding PHP in HTML.	CO1	K1
UNIT-II	Introduction to PHP Variable -Understanding Data Types -Using Operators -Using Conditional Statements simple If(), if…..else(), If…else… else..if() and Switch() Statements	CO2	K2
UNIT-III	Looping –While Loop , for Loop - Creating an Array - Modifying Array - Processing Arrays – PHP functions	CO3	K4,K5
UNIT-IV	PHP File Operations - Reading data from a File –Writing Data into a file- Append Data into a file.	CO4	K4,K5

UNIT-V	Managing Sessions and Using Session Variables -Destroying a Session - Storing Data in Cookies -Setting Cookies.	CO5	K4,K5

Recommended Text Books

1. Head First PHP & MySQL: A Brain-Friendly Guide- 2009-Lynn mighley and Michael Morrison
2. The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications with PHPand 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.
3. P.Rizwan Ahmed, Open Source Programming, Margham Publications, 2018

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 this course, students will

COs	CO Description	Cognitive Level
CO1	Write PHP scripts to handle HTML forms	K1
CO2	Write regular expressions including modifiers, operators, and meta characters.	K2
CO3	Create PHP Program using the concept of array.	K4,K5
CO4	Create PHP programs that use various PHP library functions	K5
CO5	Manipulate files and directories.	K4

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