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 ARTIFICIAL INTELLIGENCE

B.Sc., ARTIFICIAL INTELLIGENCE

SYLLABUS
(CHOICE BASED CREDIT SYSTEM)

Under

LEARNING OUTCOMES-BASED CURRICULUM

FRAMEWORK (LOCF)

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

PREFACE

Artificial intelligence or AI is the science that deals with the development of machines capable of thinking like a human brain. It focuses on the stimulation of human thought and behaviour in machines including learning from data, reasoning, and self correction. With the advent of technologies and applications (apps) that can gratify our wishes and cravings at the touch of our fingertips, BSc Artificial Intelligence has become a sought after course that offers excellent opportunities in the upcoming field of artificial intelligence and machine learning.

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

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

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

(i)Cognitive Domain
(Lower levels: K1: Remembering ; K2: Understanding ; K3: Applying; Higher levels: K4: Analysing ; K5: Evaluating; K6: Creating)
(ii) Affective Domain
(iii) Psychomotor Domain

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 Artificial Intelligence was established in the year 2023 with a view to fulfill the dynamic needs of corporate world in the field of Artificial Intelligence and Machine Leaning.

The department is well equipped with all basic and latest resources. The department comprises of well qualified and dedicated faculty members.

The Department runs the following courses.

UG Course

- o B.Sc., Artificial Intelligence

VISION OF THE DEPARTMENT

To develop young professionals from rural area in the field of Artificial Intelligence and Machine Leaning contributing globally to the benefit of industry and society.

MISSION OF THE DEPARTMENT

- Developing practically trained skilled professionals to meet the demands of the corporate world.

- Developing professionals with high ethical values and ability to solve real-life problems.

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., Artificial Intelligence, the students will be able to:

PSOs	Statements
PSO1	To learn, select, apply and create the theoretical knowledge of AI and Data Analytics along with practical knowledge to manage and solve societal problems
PSO2	Develop data analytics and data visualization skills, skills pertaining to knowledge acquisition, knowledge representation and knowledge engineering, and hence be capable of coordinating in projects.
PSO3	Evolve AI based efficient domain specific processes for effective decision making in several domains such as business and governance domains.

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

K.M.G. COLLEGE OF ARTS AND SCIENCE
(AUTONOMOUS)
Subject and Credit System- B.Sc., Artificial Intelligence
(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 / AULU 10	General Tamil - I / Urdu - I	6	3	25	75	100
	II	English	AULE10	English I	6	3	25	75	100
	III	Core – 1	AUCAI11	Programming for Problem Solving	5	5	25	75	100
	III	Core – 2	AUCPAI15	Practical - Problem Solving using C	5	5	25	75	100
	III	Elective-I	AUEMA12A	Statistical Methods and its applications	4	3	25	75	100
			AUEMA12C	Resource Management Techniques					
	IV	Skill Enhancement	AUSAI13	Introduction to HTML	2	2	25	75	100
	IV	Foundation Course	AUFAI14	Office Automation	2	2	25	75	100
				Semester Total	**30**	**23**			
SEMESTER – II	I	Language	AULT20 / AULU 20	General Tamil - II / Urdu - II	6	3	25	75	100
	II	English	AULE20	English II	6	3	25	75	100
	III	Core - 3	AUCAI21	Python Programming	5	5	25	75	100
	III	Core – 4	AUCPAI25	Practical II – Python Programming	5	5	25	75	100
	III	Elective-II	AUEMA22B	Numerical Methods	4	3	25	75	100
			AUEMA22D	Discrete Mathematics					
	IV	Skill Enhancement - 2	AUSAI23	Understanding Internet	2	2	25	75	100
	IV	Skill Enhancement -3	AUSAI24	PHP Programming	2	2	25	75	100
				Semester Total	**30**	**23**			

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	AUCAI31	Artificial Intelligence	5	5	25	75	100
	III	Core – 6	AUCPAI35	Practical III - Artificial Intelligence	5	5	25	75	100
	III	Elective-III	AUEAI32A	IOT and its Applications	3	3	25	75	100
			AUEAI32B	Introduction to Data Science					
	IV	Skill Enhancement - 4	AUSAI33	Software Engineering	1	1	25	75	100
	IV	Skill Enhancement - 5	AUSAI34	Operating System Design	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	AUCAI41	R Programming	5	5	25	75	100
	III	Core – 8	AUCPAI45	Practical III – R Programming	5	5	25	75	100
	III	Elective-IV	AUEAI42A	Data Mining	4	3	25	75	100
			AUEAI42B	Cloud Computing					
	IV	Skill Enhancement - 6	AUSAI43	Software Project Management	2	2	25	75	100
	IV	Skill Enhancement - 7	AUSAI44	Data Communication and Networking	2	2	25	75	100
				Semester Total	**30**	**23**			

III	Core – 9	AUCAI51	Machine Learning	4	3	25	75	100
III	Core – 10	AUCPAI55	Practical IV - Machine Learning	4	3	25	75	100
III	Core – 11	AUCAI52	Relational Data Base Management System	4	3	25	75	100
III	Core – 12	AUCPAI56	Practical V - RDBMS Lab using Oracle	3	3	25	75	100
III	Core – 13	AUCPAI57	Project with Viva voce	5	4	25	75	100
III	Elective - V	AUEAI53A	Natural Language Processing	4	3	25	75	100
		AUEAI53B	Cryptography					
		AUEAI53C	Quantitative Aptitude					
III	Elective VI	AUEAI54A	Software Testing	4	3	25	75	100
		AUEAI54B	Simulation and Modeling					
		AUEAI54C	Artificial Neural Networks					
IV	Compulsory	AUVE50	Value Education	2	2	25	75	100
IV	Compulsory	AUIAI58	Internship / Industrial Training (Summer vacation at the end of IV semester activity)	-	2	100	-	100
			Semester Total	**30**	**26**			
III	Core – 14	AUCAI61	Tensor Flow	4	3	25	75	100
III	Core – 15	AUCPAI66	Practical VI - Tensor Flow	4	3	25	75	100
III	Core – 16	AUCAI62	Deep Learning	5	3	25	75	100
III	Core – 17	AUCPAI67	Practical VI - Deep Learning	5	3	25	75	100
III	Elective-VII	AUEAI63A	Robotics and its Applications	5	3	25	75	100
		AUEAI63B	Agile Project Management					
		AUEAI63C	Mobile Adhoc Networks					
III	Elective-VIII	AUEAI64A	Big Data Analytics	5	3	25	75	100
		AUEAI64B	Financial Analytics					
		AUEAI64C	Virtual Reality Technology					
IV	Skill Enhancement - 8	AUSAI65	Ethical Hacking	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	Programming for Problem Solving	Hours/Week	05
Course Code	AUCAI11	Credits	05
Category	Core-1	Year & Semester	I & I
Prerequisites	Basics of Computer Science	Regulation	2024

Objectives of the course:

➢ Recognize the need for programming languages and problem solving techniques

➢ Apply memory management concepts and function based modularization

➢ Recognize the bugs in the C program

➢ Develop simple C programs to illustrate the applications of different data types such as arrays, pointers, functions.

➢ Develop programming skills to solve real time computational problems

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction to Programming: Introduction to computers, Computer characteristics, Hardware vs software, Steps to develop a rogram, Software development life cycle, Structured programming, Types of programming languages, Introduction to c, Developing a c program, Console input and output functions, Error diagnostics, Debugging techniques.	C01	K1, K6
UNIT-II	Operators and Expressions: Identifiers and keywords, Data types Constants, Variables, Declarations, Expressions, Statements, Arithmetic operators, Unary operators, Relational and logical operators, Assignment operators, Conditional operator Branching, ifelse statement, switch statement, goto statement, Looping, while statement, do- while statement, for statement, Nested control structures, break statement, continue statement.	CO2	K3
UNIT-III	Arrays and Strings: Defining an array, Processing an array, Multidimensional arrays, Searching algorithm, Linear search, Sorting algorithm, Bubble sort algorithm, Strings, Defining a string Initialization of strings, Reading and writing a string, Processing the strings.	CO3	K3,K4

UNIT-IV	Functions: Functions, Overview, Defining a function, Accessing a function, Function prototypes, Passing arguments to a function Passing arrays to functions, Recursion.	CO4	K6
UNIT-V	Pointers and Structures: Fundamentals, Pointer declarations Passing pointers to functions, Pointers and one dimensional arrays, Dynamic memory allocation, Operations on pointers, Defining a structure Processing a structure, Array of structures, Structures and pointers,Self-referential structures – File handling.	CO5	K6

Recommended Text Books

1. Byron Gottfried, "Schaum's Outline of Programming with C", 3rd edition, 2016, McGraw Hill Education (India), ISBN: 9780070145900

2. Balagurusamy, E "Programming in ANSI C", 7th edition, McGraw Higher Ed, 2016, ISBN:9789339219666

Reference Books

1. Yashavant Kanetkar, "Let Us C", 15th edition, 2016, Bpb Publications, ISBN:9788183331630

2. Herbert Schildit, "The Complete Reference C", 4th edition, 2017, McGraw Hill Education(India), 2017, ISBN:978007041183

3. Beulah Christalin Latha, Anuja Beatrice, Carolin Jeeva & Anita Sofia, Fundamentals of Computing and Programming, 1st edition, Pearson, 2018

4. Sumitabha Das, "Computer Fundamentals and C Programming", 18th edition, 2018, McGraw Hill Education (India), ISBN:9789387886070

5. Stephen G. Kochan, "Programming in C", 4th edition, 2015, ISBN: 9789332554665,

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	The Student can understand the fundamentals of computer and program development process and develop a program	K1,K6
CO2	The Student can prepare innovative solution for the problem using branching and looping statements.	K3
CO3	The Student can decompose a problem into functions and synthesize a complete program using divide and conquer approach.	K3,K4
CO4	The Student will be able to formulate algorithms and programs using arrays, pointers and structures	K6
CO5	The Student will be able to create a new application software to solve real world problems using file and structure.	K6

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

COURSE DESCRIPTORS

Title of the Course	Practical - Problem Solving using C Lab	Hours/Week	05
Course Code	AUCPAI15	Credits	05
Category	Core Practical	Year & Semester	I & I
Prerequisites	-	Regulation	2024

Objectives of the course:
➢ Understand the need for programming to solve computational problems.
➢ Discover the basic programming constructs to prepare the program.
➢ Analyze and interpret data using array, functions and pointers
➢ Recognize the bugs in the C program.
➢ Apply problem-solving skills to real-world scenarios

List of Practical	COs	Cognitive Levels
1. Implementation of Basic C programs	CO1	K2
2.Simple computational problems using arithmetic expressions and operators	CO4	K2
3. Problem solving using branching and logical expressions	CO3	K6
4. Iterative problems using Loops, while and for loops	CO3	K3
5.Implementation of linear searching, bubble sort, and Matrix Manipulation using Arrays	CO1	K2
6. Implementation of Text Processing using Strings	CO1	K2
7. Find Square Root, numerical differentiation, numerical integration using functions and recursion.	CO2	K1
8. Implementation of basic file operations	CO5	K2

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	Translate given algorithms to a working and correct program	K2
CO2	Identify and correct logical errors encountered at run time	K1
CO3	Create iterative as well as recursive programs.	K6
CO4	Represent data in arrays, strings and structures and manipulate them through a program.	K2
CO5	Declare pointers of different types and use them in defining self-referential structures.	K1

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

COURSE DESCRIPTORS

Title of the Course	INTRODUCTION TO HTML	Hours/Week	2
Course Code	AUSAI13	Credits	2
Category	Skill Enhancement - 1	Year & Semester	I & I
Prerequisites	-	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 Internet–Web browsers–What is Webpage–HTML Basics: Understanding tags.	CO1	K1,K2
UNIT-II	TagsforDocumentstructure(HTML,Head,BodyTag).Blockleveltextelements:Headings-paragraph(<p> tag)–Font-style elements:(bold, italic, font, small,strong, strike, big tags)	CO2	K1,K2
UNIT-III	Lists: Types of lists: Ordered, Unordered– Nesting Lists–Other tags: Marquee,HR, BR- Using Images –Creating Hyper-links.	CO3	K2
UNIT-IV	Tables: Creating basic Table, Table elements, Caption–Table and cell alignment–Row span, Col span–Cellpadding.	CO4	K6
UNIT-V	Frames: Frameset–Targeted Links–No frame–Forms: Input, Text area, Select, Option.	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"

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. Concept of Meta Data Understand the concept of save the files.	K1,K2
CO3	Understand the page formatting. Concept of list	K2
CO4	Creating Links. Know the concept of creating link to email address	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	3	3	2	2	2	-	-	-	1	2	2	2
CO2	3	2	2	2	2	2	-	-	-	1	2	2	2
CO3	3	2	2	2	2	2	-	-	-	1	2	2	2
CO4	3	3	2	2	2	2	-	-	-	1	2	2	2
CO5	3	2	2	2	2	2	-	-	-	1	2	2	2

COURSE DESCRIPTORS

Title of the Course	OFFICE AUTOMATION	Hours/Week	2
Course Code	AUFAI14	Credits	2
Category	FOUNDATION	Year & Semester	I & I
Prerequisites	-	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 &Its features: DOS– UNIX– Windows. Introduction to Programming Languages.	CO1	K1,K2
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, K6
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.	CO3	K1,K2
UNIT-IV	**Database Concepts:** The concept of data base management system; Data field, records, and files, Sorting and indexing data; Searching records. Designing queries, and reports; Linking of data files; Understanding Programming environment in DBMS; Developing menu drive applications in query language(MS–Access).	CO4	K2
UNIT-V	**Power point:** Introduction to Power point - Features – Understanding slide typecasting & viewing slides – creating slide shows. Applying special object – including objects & pictures – Slide transition– Animation effects, audio inclusion, timers.	CO5	K1,K2, K3,K6

Recommended Text Books

> PeterNorton,"IntroductiontoComputers"–TataMcGraw-Hill.

Reference Books

> Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, "Microsoft 2003", Tata McGrawHill.

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 competent	K1,K2
CO2	Gain knowledge on Creating Documents, spreadsheet and presentation.	K1,K2,K3, K6
CO3	Learn the concepts of Database and implement the Query in Database.	K1,K2
CO4	Demonstrate the understanding of different automation tools.	K2
CO5	Utilize the automation tools for documentation, calculation and presentation purpose.	K1,K2,K3,K6

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

COURSE DESCRIPTORS

Title of the Course	STATISTICAL METHODS AND ITS APPLICATIONS	Hours/Week	04
Course Code	AUEAI12A	Credits	03
Category	ELECTIVE COURSE -I	Year & Semester	I & I
Prerequisites	12th Standard Mathematics	Regulation	2024

Objectives of the course:
- Understand basic concepts of Statistical Methods
- Show an understanding of measures of location
- Show an understanding of measures of dispersion
- Show an Understand about Measures of Skewness
- Knowledge about correlation

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction - scope and limitations of statistical methods - classification of data -Tabulation of data- Diagrammatic and Graphical representation of data – Graphical, determination of Quartiles ,Deciles and Percentiles	CO1	K1,K2 K3
UNIT-II	Measures of location: Arithmetic mean, median, mode, geometric mean and Harmonic mean and their properties.	CO2	K1,K2 K3
UNIT-III	Measures of dispersion: Range, Quartile deviation, mean deviation, Standard deviation, combined Standard deviation, and their relative measures	CO3	K1,K2 K3
UNIT-IV	Measures of Skewness: Karl Pearson's, Bowley's, and kelly's and co-efficient of Skewness and kurtosis based on moments.	CO4	K1,K2 K3
UNIT-V	Correlation - Karl Pearson - Spearman's Rank correlation - concurrent deviation methods. Regression Analysis:Simple Regression Equations.	CO5	K1,K2 K3,K4

Recommended Text Books
1. Fundamental of Mathematical Statistics-S.C.Gupta &V.K.Kapoor-Sultan Chand
2. Statistical Methods-Snedecor G.W.& Cochran W.G.oxford &+DII

Reference Books
1. Elements of Statistics -Mode. E.B.-Prentice Hall
2. Statistical Methods-Dr.S.P.Gupta-Sultan Chand &Sons

Website and e-learning source
https://www.simplilearn.com/what-is-statistical-analysis-article

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 basics of statistical methods	K1,K2,K3
CO2	Understanding of measures of location	K1,K2,K3
CO3	Understanding of measures of dispersion	K1,K2,K3
CO4	Understand about Measures of skewness	K1,K2,K3
CO5	Understand about correlation, concurrent deviation method	K1,K2,K3,K4

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

COURSE DESCRIPTORS

Title of the Course	RESOURCE MANAGEMENT TECHNIQUES	Hours/Week	04
Course Code	AUEAI12B	Credits	03
Category	ELECTIVE COURSE –I	Year & Semester	I & I
Prerequisites	Higher Secondary Mathematics	Regulation	2024

Objectives of the course:

➢ To learn the basic concept of operation research theory which are frequently applied to business decision making
➢ To acquire the knowledge about linear programming problems
➢ Knowledge about simplex methods.
➢ To acquire knowledge about Mathematical formulation of transportation problem
➢ Knowledge about Mathematical formulation of transportation problem

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Development of OR -Definition of OR -Modelling in OR -general methods for solving OR models -Main characteristics and phases of OR study -tools, techniques and methods –scientific methods in OR – scope of OR.	CO1	K1,K2 K3
UNIT-II	Linear programming problems-Mathematical formulation of L.P.P.- slack and surplus variables -graphical solution of L.P.P.	CO2	K1,K2 K3
UNIT-III	Simplex methods- Computational procedure- Artificial variables Technique- two phase method-Duality in linear programming	CO3	K1,K2 K3
UNIT-IV	Mathematical formulation of assignment problem,-Method for solving The assignment problem.	CO4	K1,K2 K3

UNIT-V	Mathematical formulation of transportation problem-optimal solution of T.P.-Methods for obtaining initial feasible solution-optimal solution-Degeneracy in T.P.-Unbalanced T.P	CO5	K1,K2 K3,K4

Recommended Text Books

1. Operations Research-S.D.Sharma-KedarNath Ramnath&Co-1997.Chapter1to6(all sections)

Reference Books

1.OperationsResearchGupta,ManMohan,Gandhiswarup-Sulthand-ChandPublications
2.Ackoff R.L. and Sasieni M. W," Fundamentals of Operations Research", John Wiley and sons New York 1968
3.Chames A.CooperW.andHendersenA.,"IntroductiontoLinearProgramming",WileyandSons New York
4.Srinath L.S,"PERT and CPM principles and applications ",Affiliated East West Press Pvt.Ltd. New York.

Website and e-learning source
    htt11://ebooks.i11ude.in.011erationsresearch/
    htt11://ocw.mit.in/

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	To develop skills for decision making.	K1,K2,K3
CO2	To make use of Linear programming problems	K1,K2,K3
CO3	To make use of Simplex methods	K1,K2,K3
CO4	To make use of Mathematical formulation of assignment problem	K1,K2,K3
CO5	To utilize Mathematical formulation of transportation problem	K1,K2,K3,K4

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

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COURSEDESCRIPTORS

Title of the Course	Python Programming	Hours/Week	5
Course Code	AUCAI21	Credits	5
Category	Core - 3	Year & Semester	I & II
Prerequisites	Knowledge of Programming Language	Regulation	2024

Objectives of the course:

➢ To make students understand the concepts of Python programming.

➢ To apply the control structures in PYTHON programming.

➢ To impart knowledge on function, argument and modules in PYTHON.

➢ To make the students learn best practices in PYTHON programming

➢ To know the file handling in PYTHON.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	**Basics of Python Programming:** History of Python-Features of Python-Literal-Constants-Variables - Identifiers–Keywords-Built-in Data Types-Output Statements – Input Statements-Comments – Indentation- Operators-Expressions-Type conversions. **Python Arrays:** Defining and Processing Arrays – Array methods.	CO1	K1,K5
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**.**	CO2	K2, K6
UNIT-III	**Functions:** Function Definition – Function Call – Variable Scope and its Lifetime-Return Statement. **Function Arguments**: Required Arguments, Keyword 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 Namespace – Defining our own modules.	CO3	K3

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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.	CO4	K6, K4	
UNIT-V	**Python File Handling:** Types of files in Python - Opening and Closing files-Reading and Writing files: write() and writelines() methods-append() method– read() and readlines() methods –with keyword– Splitting words – File methods - File Positions-Renaming and deleting files.	CO5	K2, K3, K6	

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", FirstEdition,2017,Dreamtech Publishers.

Reference Books

VamsiKurama,"PythonProgramming:AModernApproach",PearsonEducation.

Website and e-learning source

https://www.programiz.com/python-programming
https://www.guru99.com/python-tutorials.html
https://www.w3schools.com/python2/python_intro.asp
https://www.geeksforgeeks.org/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	Illustrate the basics of python and Array, experimenting simple programs on python,	K1,K5
CO2	Summaries the concept of branching, Looping and jump statements, develop programs on Loops and jump statements.	K2, K6
CO3	Implementing Concept of function, function arguments, the concept strings, Significance of Modules, in various applications.	K3
CO4	Programming with the concept of List, tuples and dictionary in python and differentiate List, Tuple, Dictionary.	K6, K4
CO5	Interpreting the usage of File handlings in python, use the Concept of reading and writing files, Develop the programs using files.	K2, K3, K6

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

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COURSEDESCRIPTORS

Title of the Course	Python Programming Lab	Hours/Week	5
Course Code	AUCPAI25	Credits	5
Category	Core – 4 (Practical)	Year & Semester	I & II
Prerequisites	Knowledge of Programming Language	Regulation	2024

Objectives of the course:

➢ To design and program Python applications.

➢ To create loops and decision statements in Python.

➢ To work with functions and pass arguments in Python.

➢ To build and package Python modules for reusability.

➢ To read and write files in Python.

List of Practical	COs	Cognitive Levels
1. Program using variables, constants, I/O statements in Python.	CO1	K2
2. Program using Operators in Python.	CO1	K2
3. Program using Conditional Statements.	CO3	K3
4. Program using Loops.	CO3	K3
5. Program using Jump Statements.	CO3	K3
6. Program using Functions.	CO2	K1,K6
7. Program using Recursion.	CO2	K1,K6
8. Develop Python program for the following in Array a. To sort the given array elements b. To add given two matrix c. To transpose the given matrix	CO4	K4

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	CO	K

9. Develop Python program for the following without using String built-in functions
 	
    a. To calculate the length of the given string
 	
    b. To reverse the given string
 	
    c. To count and display the Vowels in the given string
 	
    d. To remove spaces from the given string
 	
    e. To convert the given string from lowercase to uppercase
	CO4	K4

10. Program using Modules.	CO4	K4
11. (a) Python program to find N largest elements from a Python List (b) Count occurrences of an element in a list	CO4	K4

12. Develop Python Program to do the following in Tuple
 	
    a. To demonstrate packing and unpacking
 	
    b. To check for membership with in and not in operators
 	
    c. Slicing operations
 	
    d. To concatenate more than one tuple in to a single tuple
	CO4	K4

13. Develop Python program for the following in Dictionary
 	
    a. To create a dictionary and add items
 	
    b. To modify existing values using keys
 	
    c. Update function
 	
    d. To print values only
    e. To print keys only
	CO4	K4

14. Develop Python program to create a file and Get number of characters, words, spaces and lines in a file.	CO5	K6

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

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

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COURSEDESCRIPTORS

Title of the Course	Understanding Internet	Hours/Week	2
Course Code	AUSAI23	Credits	2
Category	Skill Enhancement - 2	Year & Semester	I & II
Prerequisites		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, ARPA NET and Internet history of the World Wide Web, basic Internet Terminology, Net etiquette. Internet Applications– Commerce on the Internet, Governance on the Internet, Impact of Internet on Society Crime on/through the Internet.	CO1	K1
UNIT-II	Packet switching technology, Internet Protocols: TCP/IP, Router and Internet Addressing Scheme: Machine Addressing(IP address), E-mail Addresses, Resources Addresses.	CO2	K2
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, Protocol options – Shell, SLIP, PPP, Service options – E-mail, WWW, News Firewall.	CO3	K4, K3

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UNIT-IV	Network definition, Common terminologies: LAN, WAN, Node, Host, Workstation, bandwidth, Interoperability, Network administrator, network security, Network Components: Severs, Clients, Communication Media, Types ofnetwork:PeertoPeer,ClientsServer,AddressinginInternet:DNS,Domain Name and their organization.	CO4	K4,K1
UNIT-V	Email Networks and Servers, Email protocols–SMTP, POP3, IMAp4, MIME6, Structure of an Email – Email Address, Email Header, Body and Attachments.	CO5	K3,K6

Recommended Text Books

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

Reference Books

M.L.Young, "The Complete reference to Internet", Tata McGraw Hill,2007.

Website and e-learning source

https://www.geeksforgeeks.org/what-is-internet-definition-uses-working-advantages-and-disadvantages/

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	Summaries the basic concept in internet.	K1
CO2	Extract the concept of TCP/IP – Internet Technologies and Protocol	K2
CO3	Understand the concept of Internet connectivity.	K4, K3
CO4	Can be able to know about internet networks	K4,K1
CO5	Understand the concept of Electronic mail.	K3,K6

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

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COURSEDESCRIPTORS

Title of the Course	PHP Programming	Hours/Week	2
Course Code	AUSAI24	Credits	2
Category	Skill Enhancement -3	Year & Semester	I & II
Prerequisites		Regulation	2024

Objectives of the course:

➢ To make students understand the basic concepts of PHP.

➢ To apply the control structures in PHP programming.

➢ To impart knowledge on function and array in PHP.

➢ To make the students learn file handling in PHP.

➢ To know the OOP using PHP.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction to PHP -Basic Knowledge of websites -Introduction of Dynamic Website-Introduction to PHP Scope of PHP-XAMPP and WAMP Installation – PHP Programming Basics – Syntax of PHP.	CO1	K1,K6
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.	CO2	K3
UNIT-III	PHP Functions- PHP Functions- Creating an Array – Modifying Array Elements – Processing Arrays with Loops-Grouping Form Selections with Arrays -Using Array.	CO3	K2,K3
UNIT-IV	PHP Advanced Concepts- Reading and Writing Files-Reading Data from a File – Managing Sessions and Using Session Variables.	CO4	K2, K1
UNIT-V	OOPS Using PHP -OOPS Concept-Class, Object, Abstractions, Encapsulation, Inheritance, Polymorphism-Creating Classes and Object in PHP-Cookies and Session Management.	CO5	K2, K5

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Recommended Text Books
1. Head First PHP & MySQL: A Brain-Friendly Guide-2009-Lynn mighley and Michael Morrison. 2. P.Rizwan Ahmed, Open Source Programming, Margham Publications,Chennai,2017

Reference Books
1. The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications. 2. PHP: The Complete Reference – Steven Holzner.

Website and e-learning source
https://www.w3schools.com/php/   https://www.geeksforgeeks.org/php-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	Learn the basics of PHP, Create simple programs on PHP,	K1,K6
CO2	Develop program using selection statement, work with Looping an jump statements, Do programs on Loops and jump statements.	K3
CO3	Concept of function, function arguments, Implementing the concept array in various application,	K2,K3
CO4	Work with file and performing various file operations.	K2, K1
CO5	Understand and implement the concept of OOP using PHP	K2, K5

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

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COURSEDESCRIPTORS

Title of the Course	Artificial Intelligence	Hours/Week	05
Course Code	AUCAI31	Credits	05
Category	Core - 5	Year & Semester	II & III
Prerequisites	Basics of Algorithms	Regulation	2024

Objectives of the course:

➢ To describe the concepts of Artificial Intelligence.

➢ To understand the method of solving problems using Artificial Intelligence.

➢ To learn about Knowledge Representation.

➢ To understand the concept of Software Agents.

➢ To understand about various AI applications.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	**INTRODUCTION**: Introduction–Definition – Future of Artificial Intelligence – Characteristics of Intelligent Agents– Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.	CO1	K1, K2
UNIT-II	**PROBLEM SOLVING METHODS:** Problem solving Methods – Search Strategies- Uninformed – Informed – Heuristics – Local Search Algorithms and Optimization Problems – Searching with Partial Observations –Constraint Satisfaction Problems– Constraint Propagation–Backtracking Search–Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games	CO2	K1,K2
UNIT-III	**KNOWLEDGEREPRESENTATION:** First Order Predicate Logic– Prolog Programming – Unification – Forward Chaining – Backward Chaining – Resolution – Knowledge Representation –Onto logical Engineering –Categories and Objects – Events – Mental Events and Mental Objects–Reasoning Systems for Categories – Reasoning with Default Information	CO3	K3
UNIT-IV	**SOFTWAREAGENTS:** Architecture for Intelligent Agents– Agent communication – Negotiation and Bargaining – Argumentation among Agents –Trust and Reputation in Multi – agent systems.	CO4	K4
UNIT-V	**APPLICATIONS** AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware – Perception –Planning – Moving	CO5	K4, K5

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Recommended Text Books
Elaine Rich, Kevin Knight(2008), Shivsankar B Nair, Artificial Intelligence, Third Edition, Tata McGraw Hill Publication
Reference Books
Russel S,NorvigP(2010), Artificial Intelligence: A Modern approach, Third Edition, Pearson Education
Website and e-learning source
https://www.tpointtech.com/artificial-intelligence-ai https://www.geeksforgeeks.org/What-is-ai-artificial-intelligence/

Course Learning Outcomes (for Mapping with POs and PSOs)

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Understand the basics of the theory and practice of Artificial Intelligence as a discipline and about intelligent agents.	K1, K2
CO2	Understand search techniques and gaming theory.	K1,K2
CO3	The student will learn to apply knowledge representation techniques and problem solving strategies to common AI applications.	K3
CO4	Students will analyze various components of intelligent agent systems to enhance functionality and cooperation in complex environments.	K4
CO5	Student should analyze the fundamentals of pattern recognition and determine the steps required for it.	K4, K5

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

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COURSEDESCRIPTORS

Title of the Course	Artificial Intelligence Lab	Hours/Week	05
Course Code	AUCPAI35	Credits	05
Category	Core Course Practical III	Year & Semester	II & III
Prerequisites	Python Programming	Regulation	2024

Objectives of the course:

➢ To understand the concept of AI

➢ To understand various concept in python.

➢ To understanding Different AI Techniques

➢ To implement various AI techniques in real time problems.

➢ To understanding of Natural Language Tool Kit.

List of Practical	COs	Cognitive Levels
Write a python program to implement Breadth First Search Traversal.	CO1	K2
Write a python program to implement Water Jug Problem.	CO1	K2
Write a python program to remove punctuations from the given string.	CO2	K2
Write a python program to sort the sentence in alphabetical order.	CO3	K3
Write a program to implement Hangman game using python.	CO3	K3
Write a program to implement Tic – Tac – Toe game using python.	CO3	K3
Write a python program to remove stop words for a given passage from a text file using NLTK?	CO4	K2
Write a python program to implement stemming for a given sentence using NLTK.	CO4	K2
Write a python program to POS (Parts of Speech) tagging for the give sentence using NLTK?	CO5	K4
Write a python program to implement Lemmatization using NLTK?	CO4	K2
Write a python program for Text Classification for the give sentence using NLTK.	CO5	K4

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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	Use of python to understand the concept of AI.	K2
CO2	Demonstrate various concepts in python.	K2
CO3	Apply various AI techniques in practical Life.	K3
CO4	Understanding of Natural Language Tool Kit.	K2
CO5	Analyze Natural Language Tool Kit for various Practical Application.	K4

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

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COURSEDESCRIPTORS

Title of the Course	IOT and its Applications	Hours/Week	03
Course Code	AUEAI32A	Credits	03
Category	Elective – 3	Year & Semester	II & III
Prerequisites	Basics of networking	Regulation	2024

Objectives of the course:

➢ To use of Devices, Gateways and Data Management in IoT.

➢ To Design IoT applications in different domain and be able to analyze their performance.

➢ To implement basic IoT applications on embedded platform.

➢ To gain knowledge on Industry Internet of Things.

➢ To learn about the privacy and Security issues in IoT.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	IoT & Web Technology, The Internet of Things Today, Time for Convergence, Towards the IoT Universe, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy &Trust, Device Level Energy Issues, IoT Related Standardization.	CO1	K1, K4
UNIT-II	M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, M2M to IoT-An Architectural Overview–Building an architecture, Main design Principles and needed capabilities, Sensors – types, characteristics.	CO2	K2
UNIT-III	IoT Architecture –State of the Art – Introduction, State of the art, Architecture. Reference Model- Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture-Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.	CO3	K4
UNIT-IV	IoT Applications - Smart Light, smart agriculture, smart vehicle, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management	CO4	K5

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UNIT-V	Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smarty Approach. Data Aggregation for the IoT in Smart Cities, Security		K1, K3, K6

Recommended Text Books

Vijay Madisetti and Arshdeep Bahga,"Internet of Things:(A Hands-on Approach)",

Universities Press(INDIA) Private Limited 2014, 1stEdition.

Reference Books

Michael Miller," The Internet of Things: How Smart TVs, Smart Cars, Smart Homes,and

Smart Cities Are Chang ng the World",kindle version.

Francisda Costa,"Re thinking the Internet of Things: A Scalable Approach to Connecting

Everything", A press Publications 2013,1st Edition,.

Website and e-learning source

https://www.geeksforgeeks.org/introduction-to-internet-of-things-iot-set-1/

https://www.javatpoint.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	Identify and Assess the infrastructure, networks, and communication protocols essential for IoT implementations.	K1, K4
CO2	Describe the new industrial structures that are emerging due to the proliferation of IoT technologies..	K2
CO3	Analyze the functional view and the information view of IoT architecture, highlighting their roles and contributions.	K4
CO4	Evaluate the impact of IoT technologies on the industries sector, focusing on efficiency, safety, and value addition.	K5
CO5	Identify and describe initial steps necessary to develop a secure IoT platform, including threat modeling and risk assessment.	K1, K3, K6

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

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COURSEDESCRIPTORS

Title of the Course	Introduction to Data Science	Hours/Week	03
Course Code	AUEAI32B	Credits	03
Category	Elective - 3	Year & Semester	II & III
Prerequisites	Understanding data	Regulation	2024

Objectives of the course:

➢ To learn about basics of Data Science and Big data.

➢ To learn about over view and building process of Data Science.

➢ To learn about various Algorithms in Data Science.

➢ To learn about Hadoop Framework.

➢ To learn about case study about Data Science.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	**Introduction:** Introduction to Data Science - history, advantages., Benefits and uses – Data - Facts of data – Types of Data – big data analytics and its types – Data science process – Big data ecosystem and data science.	CO1	K2
UNIT-II	**The Data science process**: Overview – research goals – retrieving data – transformation – Exploratory Data Analysis – Model building.	CO2	K3
UNIT-III	**Algorithms**: need for machine learning - Machine learning algorithms – Modeling process – Types – Supervised – Unsupervised - Semi-supervised – reinforcement. Machine learning process – machine learning challenges.	CO3	K4
UNIT-IV	**Introduction to Hadoop**: Hadoop framework – Spark – replacing Map Reduce – No SQL – ACID – CAP – BASE –types.	CO4	K1,K2
UNIT-V	**Case Study**: Prediction of Disease - Setting research goals - Data retrieval – preparation - exploration - Disease profiling - presentation and automation	CO5	K3,K4

Recommended Text Books

1. Davy Cielen, Arno D.B.Meysman, Mohamed Ali, "Introducing Data Science",Manning publications 2016

2. Dr S.Sridhar & Dr M.Vijayalakshmi, "Machine Learning" Oxford University Press India; 1st edition 2021.

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Reference Books
Roger Peng,“ The Art of Data Science”, lulu.com 2016.

Website and e-learning source
https://www.w3schools.com/datascience/
https://en.wikipedia.org/wiki/Data_science
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.	K2
CO2	Demonstrate the over view and model building process in Data Science.	K3
CO3	Understand and analyze various Algorithms in Data Science.	K4
CO4	List and Explain the core components of Hadoop Frame work in Data Science.	K1,K2
CO5	The student will able to apply and analyze these skills in real-world scenarios	K3,K4

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

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COURSEDESCRIPTORS

Title of the Course	Software Engineering	Hours/Week	01
Course Code	AUSAI33	Credits	01
Category	Skill Enhancement - 4	Year & Semester	II & III
Prerequisites	Problem Solving Ability	Regulation	2024

Objectives of the course:

➢ To Gain basic knowledge of software engineering.
➢ To apply software engineering principles and techniques.
➢ To Model a reliable and cost-effective software system.
➢ To Perform Testing at various levels and produce an efficient system.
➢ To learn about software maintenance process.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	**Introduction:** The software engineering discipline, programs vs software products, why study software engineering, Notable changes in software development practices, computer systems engineering.	CO1	K2
UNIT-II	**Requirements Analysis and Specification:** Requirements gathering and analysis, Software requirements specification (SRS). **Software Design**: Good software design, cohesion and coupling.	CO2	K1
UNIT-III	**Function-Oriented Software Design:** Overview of SA/SD methodology, Structured analysis, data flow diagrams (DFD's).	CO3	K6
UNIT-IV	**Coding and Testing: Coding;** code review; testing; testing in the large vs testing in the small; unit testing; black-box testing; white-box testing.	CO4	K3, K5
UNIT-V	**Software Maintenance:** Characteristic of software maintenance; software reverse engineering; software maintenance process models; estimation of maintenance cost.	CO5	K4

Recommended Text Books

    Rajib Mall, Fundamentals of Software Engineering, Fifth Edition, Prentice-Hall of India, 2018

Reference Books

1. Richard Fairley, Software Engineering Concepts,Tata McGraw-Hill publishing company Ltd, Edition 1997.
2. Roger S.Pressman, Software Engineering, Seventh Edition, McGraw-Hill.

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Website and e-learning source	
	https://www.geeksforgeeks.org/software-engineering/
	https://www.tpointtech.com/software-engineering

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	Describe and evaluate significant changes in software development methodologies and practices over the years	K2
CO2	Define the processes involved in requirements gathering and analysis, including various techniques and stakeholder engagement strategies.	K1
CO3	Develop Data Flow Diagrams (DFDs) for a given system to represent the flow of data	K6
CO4	Apply testing techniques to evaluate software functionality to ensure it meets requirements.	K3, K5
CO5	Analyze common challenges and risks associated with software maintenance.	K4

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

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COURSEDESCRIPTORS

Title of the Course	Operating System Design	Hours/Week	02
Course Code	AUSAI34	Credits	02
Category	Skill Enhancement - 5	Year & Semester	II & III
Prerequisites	Basics of Computer Science	Regulation	2024

Objectives of the course:

➢ To understand the fundamental concepts and role of Operating System.

➢ To learn the Process Management and Scheduling Algorithms.

➢ To understand the Memory Management policies.

➢ To gain insight on and File management techniques.

➢ To Analyze resource management techniques

UNITS	Contents	COs	Cognitive Levels
UNIT-I	**Introduction**-views and goals–Operating System Services-User and Operating System interface - System Call- Types of System Calls – Operating System Structure, Types of OS.	CO1	K1, K2
UNIT-II	**Process Scheduling**: Basic Concepts-Scheduling Criteria Scheduling Algorithm Multiple Processor Scheduling CPU Scheduling. **Synchronization**: The Critical- Section Problem. .	CO2	K4
UNIT-III	**Deadlocks:** Deadlock Characterization-Methods for Handling Deadlocks-Deadlock Prevention-Deadlock Avoidance – Deadlock Detection – Recovery from Deadlock.	CO3	K3
UNIT-IV	**Memory**-Management Strategies: Swapping - Contiguous Memory Allocation, Segmentation- Paging - Structure of the Page Table. **Virtual- Memory Management**: Demand Paging-Page Replacement – Allocation of Frames	CO4	K4
UNIT-V	.. **Storage Management:** File System- File Concept - Access Methods - Directory and Disk Structure. Allocation Methods – Free - Space Management.	CO5	K5

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Recommended Text Books
A.Silberschatz P.B.Galvin, Gange."Operating System Concepts", Ninth Edition,2013, Addison Wesley Publishing Co.
Reference Books
Anderw S Tanenbaum, Albert S.Woodhull," Operating System Design and Implementation", prentice-Hall India Publication. William Stallings," Operating Systems Internals and Design Principles",Pearson,2018,9thEdition.
Website and e-learning source
https://www.guru99.com/operating-system-tutorial.html https://www.geeksforgeeks.org/what-is-an-operating-system/ http://www.cs.kent.edu/~farrell/osf03/oldnotes/2.th-edition.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	Define and Describe the main functions, services and goals of an operating system	K1, K2
CO2	Analyze and compare various CPU scheduling algorithms.	K4
CO3	Implement and demonstrate deadlock detection algorithms and explain their mechanisms	K3
CO4	Analyze the structure and function of the page table.	K4
CO5	Assess various free space management techniques to evaluate their effectiveness in managing disk space.	K5

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

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COURSEDESCRIPTORS

Title of the Course	R PROGRAMMING	Total Hours	05
Course Code	AUCAI41	Credits	05
Category	Core - 7	Year & Semester	II & IV
Prerequisites	Basics of Programming Languages	Regulation	2024

Objectives of the course:

➢ To Understanding and being able to use basic programming concepts in R.

➢ To automate data Analyze using control structures and data structures in R.

➢ To understanding and working with list and data frames in R.

➢ To Knowing and use factors, table and build in functions in R.

➢ To Understanding and implement the concept of object oriented programming using R.

UNITS	Contents	COs	Cognitive Levels
UNIT – I	Introduction: Overview of R, R data types and objects, reading and writing data, sub setting R Objects, Essentials of the R Language, Installing R, Running R, Packages in R, Calculations, Complex numbers in R, Rounding, Arithmetic, Modulo and integer quotients, Variable names and assignment, Operators, Integers, Factors, Logical operations.	CO1	K1, K2, K3, K4
UNIT- II	Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes Vectors: Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operations	CO2	K3, K4, K5
UNIT-III	Lists: Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, DATA FRAMES, Creating Data Frames, Accessing Data Frames, Other Matrix-Like Operations	CO3	K3, K4
UNIT-IV	FACTORS AND TABLES, Factors and Levels, Common Functions Used with Factors, Working with Tables, Matrix/Array-Like Operations on Tables ,Extracting a Sub table, Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions	CO4	K4, K5

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UNIT-V		OBJECT-ORIENTED PROGRAMMING: S Classes, S Generic Functions, Writing S Classes, Using Inheritance, S Classes, Writing S Classes, Implementing a Generic Function on an S Class, visualization, Simulation, code profiling, Statistical Analyze with R, data manipulation.	CO5	K3, K4

Recommended Text Books
R Programming for Data Science by Roger D.Peng
The Art of R Programming by Prashanth singh, Vivek Mourya, Cengage Learning India.

Reference Books
Tilman M. Davies, The Book of R: A First Course in Programming and Statistics, 1st edition, 2019.

Website and e-learning source
https://www.w3schools.com/r/
https://www.javatpoint.com/r-tutorial
https://www.tutorialspoint.com/r/index.htm

Course Learning Outcomes (for Mapping with POs and PSOs)

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Implement of basic R programming framework and data structures.	K1, K2, K3, K4
CO2	Make use of critical R programming language concepts such as control structures and recursion.	K3, K4, K5
CO3	Analyze the mathematical and statistical operations data in R.	K3, K4
CO4	Examine data-sets to create testable hypotheses and identify appropriate statistical tests.	K4, K5
CO5	Make use of appropriate statistical tests using R and Create and edit visualizations with regression models.	K3, K4

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

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COURSEDESCRIPTORS

Title of the Course	R PROGRAMMING LAB	Total Hours	05
Course Code	AUCPAI45	Credits	05
Category	Core – 8	Year & Semester	II & IV
Prerequisites	Basics of Programming Languages	Regulation	2024

Objectives of the course:

➢ To understanding and use basic concepts in R.

➢ To acquire programming skills in R.

➢ To understanding and implement the data structures in R.

➢ To use mathematical and statistical functions in R.

➢ To understand and use object oriented concepts in R.

List of Practical	COs	Cognitive Levels
Write a R-Program to demonstrate working with operators (Arithmetic, Relational, Logical, Assignment operators).	CO1	K2
Write a R Program to Check if a Number is Odd or Even.	CO2	K4, K6
Write a R Program to check if the given Number is a Prime Number.	CO2	K4, K6
Write a R Program to Find the Factorial of a Number.	CO2	K4, K6
Write a R Program to Find the Fibonacci sequence Using Recursive Function	CO2	K4, K6
Write a R Program to Make a Simple Calculator.	CO2	K4, K6
Write a R Program to Find L.C.M of two numbers.	CO2	K4, K6
Write a R Program to Find the elements of a vector that are not in another	CO3	K3, K4
Write a R Program to sort the elements of an array.	CO3	K3, K4
Write a R Program to Find columns and rows with NA in R Data Frame	CO3	K3, K4
Write a R Program to Find the row and column index of maximum and minimum value in a matrix in R	CO3	K3, K4
Write a R Program to Concatenate two given factors in a single factor in R	CO3	K3, K4
Write a R Program to create a table and find the second largest cell.	CO3	K3, K4
Write a R Program to implement mathematical function in R.	CO4	K3, K4
Write a R Program to implement statistical function in R.	CO4	K3, K4
Write a R Program to create a S3 Class and S3Objects.	CO5	K2, K3
Write a R Program to write a own generic function in S3 Class.	CO5	K2, K6
Write a R Program to create a S4 Class and S4 Objects.	CO5	K2, K3
Write a R Program to write a own generic function in S4 Class.	CO5	K2, K6
Write a R Program to create Reference Class and modify its Methods	CO5	K2, K3

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Website and e-learning source

https://www.programiz.com/r

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 various basic concepts in R	K2
CO2	Analyze various concepts of R to solve the problem in an efficient way.	K4, K6
CO3	Applying various data structures supported by R.	K3, K4
CO4	Make use of mathematical and statistical function in R	K3, K4
CO5	Understand and implement the concept of OOP using R.	K2, K3, K6

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

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COURSEDESCRIPTORS

Title of the Course	Data Mining	Total Hours	04
Course Code	AUEAI42A	Credits	03
Category	Elective-IV	Year & Semester	II & IV
Prerequisites	Basics of data base system	Regulation	2024

Objectives of the course:

➢ To provide the knowledge on Data Mining and Warehousing concepts and techniques.

➢ To know the concepts of Data mining system architectures.

➢ To understanding association rule.

➢ To study the concepts of classification and prediction.

➢ To study a set of typical clustering methodologies.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction: Data mining – Functionalities – Classification – Introduction to Data Warehousing – Data Preprocessing: Preprocessing the Data–Data cleaning–Data Integration and Transformation–Data Reduction	CO1	K1, K2
UNIT-II	Data Mining, Primitives, Languages and System Architecture: Data Mining – Primitives – Data Mining Query Language, Architecture of Data mining Systems. Concept Description, Characterization and Comparison: Concept Description, Data Generalization and Summarization.	CO2	K2, K3
UNIT-III	Mining Association Rules: Basic Concepts –Single Dimensional Boolean Association Rules From Transaction Databases, Multilevel Association Rules From Transaction Databases.	CO3	K4
UNIT-IV	Classification and Prediction: Introduction – Issues – Decision Tree Induction – Bayesian Classification – Classification of Back Propagation.	CO4	K2, K4
UNIT-V	Cluster Analysis: Introduction – Types of Data in Cluster Analysis, Petitioning Methods – Hierarchical Methods - Density Based Methods	CO5	K2, K4

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Recommended Text Books
Hanand M. Kamber, "Data Mining Concepts and Techniques", 2001, Harcourt India Pvt. Ltd, New Delhi.
P.Rizwan Ahmed, Data Mining, Margham Publications, Chennai,2012.
Reference Books
K.P.Soman, Shyam Diwakar, V.Ajay "Insight into Data Mining Theory and Practice", Prentice Hall of India Pvt. Ltd, New Delhi.
Website and e-learning source
https://www.geeksforgeeks.org/data-science/data-mining
https://www.tutorialspoint.com/data_mining/index.htm

Course Learning Outcomes (for Mapping with POs and PSOs)

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Understand the basic concepts and the functionality of the various data mining and data warehousing component.	K1, K2
CO2	Explain the concepts of Data mining system architectures.	K2, K3
CO3	Analyze the principles of association rules.	K4
CO4	Analyze concepts of classification and prediction.	K2, K4
CO5	Analyze and differentiate classification and clustering.	K2, K4

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

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COURSEDESCRIPTORS

Title of the Course	Cloud Computing	Total Hours	04
Course Code	AUEAI42B	Credits	03
Category	Elective-IV	Year & Semester	II & IV
Prerequisites	Basics of Operating System	Regulation	2024

Objectives of the course:

➢ To learn fundamental concepts and Technologies of Cloud Computing.

➢ To learn various cloud service types and their uses and pitfalls.

➢ To learn about Cloud Architecture and Application design.

➢ To know the various aspects of application design, benchmarking and security on the Cloud.

➢ To learn the various Case Studies in Cloud Computing.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction to Cloud Computing: Definition of Cloud Computing – Characteristics of Cloud Computing – Cloud Models – Cloud Service Examples – Cloud-based Services and Applications. Cloud Concepts and Technologies: Virtualization – Load balancing– Scalability and Elasticity–Deployment–Replication–Monitoring.	CO1	K1, K2
UNIT-II	Cloud Services: Compute Services - Amazon Elastic Computer Cloud - Google Compute Engine - Windows Azure Virtual Machines Storage Services: Amazon Simple Storage Service - Google Cloud Storage - Windows Azure Storage Database Services: Amazon Relational Data Store - Amazon Dynamo DB - Google Cloud SQL - Google Cloud Data Store - Windows Azure SQL Database - Windows Azure Table Service	CO2	K2, K4
UNIT-III	Cloud Application Design: Introduction – Design Consideration for Cloud Applications – Scalability – Reliability and Availability– Security – Maintenance and Upgradation – Performance – Reference Architectures for Cloud Applications – Cloud Application Design Methodologies: Service Oriented Architecture(SOA), Cloud Component Model, IaaS, PaaS and SaaS Services for Cloud Applications, Model View Controller (MVC), RESTful Web Services	CO3	K2, K3
UNIT-IV	Cloud Application Benchmarking and Tuning: Introduction to Benchmarking – Steps in Benchmarking – Workload Characteristics – Application Performance Metrics–Design Consideration for Bench marking Methodology – Bench marking Tools and Types of Tests – Deployment Prototyping.	CO4	K2

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UNIT-V	Case Studies: Cloud Computing for Healthcare – Cloud Computing for Energy Systems - Cloud Computing for Transportation Systems - Cloud Computing for Manufacturing Industry - Cloud Computing for Education.	CO5	K4

Recommended Text Books

Arshdeep Bahga, Vijay Madisetti, Cloud Computing – A Hands On Approach, Universities Press (India) Pvt. Ltd., 2018.

Reference Books

Anthony T Velte, Toby J Velte, Robert Elsenpeter, Cloud Computing: A Practical Approach, Tata McGraw-Hill, 2013

Website and e-learning source

https://en.wikipedia.org/wiki/Cloud_computing

https://www.geeksforgeeks.org/cloud-computing/cloud-computing-tutorial/

CDW-Cloud-Computing-Reference-Guide.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	Understand the fundamental concepts and Technologies in Cloud Computing.	K1, K2
CO2	Analyze the various cloud service types and their uses.	K2, K4
CO3	Understand Cloud Architecture and Application design.	K2, K3
CO4	Understand the various aspects of application design, benchmarking and security in the Cloud.	K2
CO5	Analyze various case studies in cloud computing	K4

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

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COURSEDESCRIPTORS

Title of the Course	Software Project Management	Total Hours	02
Course Code	AUSAI43	Credits	02
Category	Skill Enhancement - 6	Year &Semester	II & IV
Prerequisites	Software Engineering	Regulation	2024

Objectives of the course:

➢ To learn and highlight importance of software project management.

➢ To study about software management metrics & strategy in managing projects

➢ To familiarizes in Software Project planning

➢ To study about various resource management.

➢ To study about building quality software.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Introduction to Competencies - Product Development Techniques - Management Skills - Product Development Life Cycle - Software Development Process and models – The SEI CMM - International Organization for Standardization.	CO1	K1, K2
UNIT-II	Managing Domain Processes - Project Selection Models - Project Portfolio Management - Financial Processes - Selecting a Project Team - Goal and Scope of the Software Project – Project Planning-Creating the Work. Breakdown Structure - Approaches to Building a WBS - Project Milestones - Work Packages - Building a WBS for Software.	CO2	K1, K2
UNIT-III	Tasks and Activities – Software Size and Reuse Estimating-The SEI CMM - Problems and Risks – Cost Estimation – Effort Measures - COCOMO: A Regression Model – COCOMO II -SLIM: A Mathematical Model – Organizational Planning –Project Roles and Skills Needed.	CO3	K2, K3, K4
UNIT-IV	Project Management Resource Activities-Organizational Form and Structure - Software Development Dependencies - Brainstorming - Scheduling Fundamentals - PERT and CPM - Leveling Resource Assignments - Map the Schedule to a Real Calendar - Critical Chain Scheduling.	CO4	K2, K3, K4
UNIT-V	Quality: Requirements – The SEI CMM - Guidelines - Challenges - Quality Function Deployment - Building the Software Quality Assurance - Plan – Software Configuration Management: Principles – Requirements – Planning and Organizing – Tools – Benefits – Legal Issues in Software – Case Study	CO5	K2, K4

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Recommended Text Books
Robert T. Futrell, Donald F. Shafer, Linda I. Safer, "Quality Software Project Management", Pearson Education Asia 2002.
Reference Books
Hughes, "Software Project Management", TataMc Graw Hill 2004, 3rd Edition.
Website and e-learning source
Software Project Management e-resources from Digital libraries
https://www.tutorialspoint.com/cmmi/cmmi-overview.htm
www.smartworld.com/notes/software-project-management

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 principles and concepts of software project management	K1, K2
CO2	Know about the metrics & strategy in managing projects	K1, K2
CO3	Apply various software project tasks and activities.	K2, K3, K4
CO4	Utilize various resources required to develop the software.	K2, K3, K4
CO5	Understand the various factors to develop quality software and analyze the case study.	K2, K4

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

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COURSEDESCRIPTORS

Title of the Course	Data Communication and Networking	Total Hours	02
Course Code	AUSAI44	Credits	02
Category	Skill Enhancement - 7	Year & Semester	II & IV
Prerequisites	Basics of networking	Regulation	2024

Objectives of the course:

➢ To introduce the fundamental network architecture concepts.

➢ To learn about various error handling mechanisms.

➢ To understand the functionalities of network and transport layer.

➢ To know the various services of application layer.

➢ To learn the basics of wireless communication.

UNITS	Contents	COs	Cognitive Levels
UNIT-I	Data Communications: Introduction – Networks – The Internet – Protocols and Standards – Network Models: OSI model –TCP/IP protocol suite–Transmission Media: Guided media – Unguided Media.	CO1	K1, k2
UNIT-II	Data Link Layer: Error Detection and Correction: Introduction- Block coding– Linear block codes – Cyclic Codes – Checksum. Framing – Flow and Error Control: Protocols –Noiseless Channels: Stop-and–Wait – Noisy Channel: Stop-and-Wait. Automatic Repeat Request - Go-Back–N.	CO2	K4
UNIT-III	Medium Access and Network Layer: Multiple Accesses: Random Access – Controlled access - Channelization. Network Layer Logical addressing: IPv4 addresses – IPv6 addresses. Transport Layer: Process to Process delivery: UDP – TCP. Congestion Control – Quality of Service	CO3	K2, k4
UNIT-IV	Application Layer: Domain Naming System: Name Space-Domain Name Space – Distribution of Name Space – DNS in the INTERNET – Resolution – Remote logging – E-mail – FTP.	CO4	K2
UNIT-V	Wireless Networks: Wireless Communications –Principles and Fundamentals. WLANs – WPAN – Satellite Networks - Ad-hoc Networks	CO5	K2

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Recommended Text Books
Forouzan, A. Behrouz. (2006), Data Communications & Networking, Fourth Edition, Tata McGraw Hill Education
Reference Books
Fred Halsall(1996), Data Communications Computer Networks and Open Systems, Fourth Edition, Addison Wesley.
Website and e-learning source
https://www.tutorialspoint.com/data_communication_computer_network/index.htm https://www.geeksforgeeks.org/data-communication-definition-components-types-channels/

Course Learning Outcomes (for Mapping with POs and PSOs)

On completion of the course the students should be able to

COs	CO Description	Cognitive Level
CO1	Understand the basics of data communication, networking, internet and their importance.	K1, k2
CO2	Analyze the services and protocols of data link layer.	K4
CO3	Analyze the services and protocols of network and differentiate the protocols of transport layer.	K2, k4
CO4	Understand the functionalities of application layer.	K2
CO5	Understand the basics principles and fundamentals of wireless and ad-hoc network	K2

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