# 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 DATA SCIENCE

# B.Sc., DATA SCIENCE

# SYLLABUS

## (CHOICE BASED CREDIT SYSTEM)

### Under

# LEARNING OUTCOMES-BASED CURRICULUM

# FRAMEWORK (LOCF)

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

# PREFACE

Data Science is a vast field comprising many topics of Statistics, Mathematics, and IT. A Data Science course syllabus for beginners covers basic and advanced concepts of data analytics, Machine learning, Statistics, and programming languages like Python or R. It also teaches students how to interpret large datasets and identify patterns to create predictive models. Data Science has come a long way. Data Scientists were once referred to as business problem solvers" who knew how to make sense of incoherent data clusters. Fast-forward to the present, Data Scientists are the most important resources for any business looking to thrive in this mad rush. They are now the wizards of all problem solvers".

The course is enabled to include several interdisciplinary areas like: programming languages, algorithms, operating systems, databases, machine learning, data mining, business intelligence, big data, probability and statistics, data optimization, statistical simulation and data analysis, management decision analysis, decision models and predictive analysis. Data Science has gained paramount importance in the computer science domain. The need for scientists who understand data in all its aspects will continue to grow strongly. Students graduating from the program will have significantly more depth and breadth in the broad area of Data Science and receive all the information they need to work with various kinds of data and statistical data. The program is designed so that students have in-depth knowledge of the many approaches, aptitudes, methodologies, and instruments needed to deal with corporate data. Students receive instruction in the abilities needed to find the needed solutions and assist in making significant judgments.

This is the primary reason the syllabus of Data Science courses includes concepts that touch base on cloud computing, big data, natural language processing, and data sentiment analysis. The future of Data Science is estimated to bring opportunities in various areas of banking, finance, insurance, entertainment, telecommunication, automobile, etc. A data scientist will help grow an organization by assisting them in making better decisions. Data science has become important due to recent technology disruptions. Most fundamental is Moore's Law which has driven an exponential growth in computing, storage, and communications per rupee over the past 50 years. This rate of growth shows no signs of abating. Consequently, today we have the Internet of Things: a plethora of sensors costing 10s of rupees or less, a global Internet with almost limitless bandwidth, and enormous storage in global clouds. The present era is full of

technological advances in almost all spectrum of life and we are flooded with enormous amount of data. There is an increasing demand of capturing, analyzing, and synthesizing this large amount of data sets in a number of application domains to better understand various phenomena and to convert the information available in the data into actionable strategies such as new scientific discoveries, business applications, policy making, and healthcare etc.

Data science is the area where applications of various tools and techniques from the disciplines of applied statistics, mathematics and computer science are used to get greater insight and to make better and informed decisions for various purposes by analyzing a large amount of data. Consequently, the study of data science as a discipline as become essential to cater the growing need for professionals and researchers to deal with the future challenges.

The purpose of the outcome-based education is meant to provide an exposure to the fundamental aspects in different branches of Computer Science and its applications, keeping in mind the growing needs for higher education, employability, entrepreneurship and social responsibility. The periodical restructuring of the syllabi is carried out to fulfill the requirements of graduate attributes, qualification descriptors, programme learning outcomes and course outcomes. The outcome-based education enriches the curriculum to deliver the basic principles, synthetic strategies, mechanisms and application-oriented learning for the benefit of students. It also includes self-learning module, minor projects and industrial internship to enable students to get equipped for higher studies and employment. The non-major elective courses offer chances to learn and augment interest in other related fields. The outcome-based curriculum is intended to enrich the learning pedagogy to global standards. ICT enabled teaching-learning platforms are provided to students along with the interaction of international scientists. The seminars periodically delivered by industrialists, subject experts and former professors would certainly help the students to update with latest technology/trends in different fields of chemistry. 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 breathe. The college has grown into a full-fledged educational hub offering 12 under graduate programmes, 8 post graduate programmes, 5 M.Phil research programmes and 4 Ph.D programmes. The college has been accredited with 'A' grade by NAAC in 2nd cycle and recognized under section 2(f) & 12(B) of the UGC act 1956. The College is permanently affiliated to Thiruvalluvar University. The College is also acquired the status of Autonomous from the academic year 2024-2025. The College is an associate member of ICT Academy and registered member of NPTEL and Spoken Tutorials of IIT Bombay. The college is also a member of INFLIBNET and NDL.

**VISION OF THE COLLEGE**

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

**MISSION OF THE COLLEGE**

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

**QUALITY POLICY OF THE COLLEGE**

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

**ABOUT THE DEPARTMENT**

Department of Data Science (DS) has been established in the year 2023 with a goal of training students for data–centric world and human values. The students will have an opportunity to learn principles, tools and techniques to model various real-world problems, analyze them, and discover useful information. The primary focus of this programme is to equip students with statistical skills, Learning algorithms, knowledge discovery and visualization skills.

**VISION OF THE DEPARTMENT**

The vision of the Department of Data Science is to create the next generation of students as data scientists who will solve these grand challenges and innovate through world-class research to take advantage of these opportunities.

**MISSION OF THE DEPARTMENT**

➢ To develop the skills and knowledge to analyze data in many forms and communicate insights.

➢ To impart quality and value based education and contribute towards the innovation of computing, expert system, Data Science to raise satisfaction level of all stakeholders.

➢ Our effort is to apply new advancements in high performance computing hardware and software.

**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., Data Science, the students will be able to:

| PSOs | Statements |
|---|---|
| PSO1 | Able to apply data analytical skills that rely on mathematical and statistical methods to solve problems in a data-driven world. |
| PSO2 | Able to understand the nuances of data analytical skills to evolve innovative ideas and communicate the social relevance and impact of their analytical findings. |
| PSO3 | Becoming analytical experts and data entrepreneurs with exemplary behavior safeguarding the public interest. |

**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 | 3 | 2 | 3 | 2 | 3 | 2 | - | - | 3 |
| **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., Data Science
### (Effective for the Batch of Students Admitted from 2024-2025)

| Semester | Part | Category | Course Code | Course Title | Ins.Hrs/ Week | Credit | 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 | AUCDS11 | Python Programming | 5 | 5 | 25 | 75 | 100 |
| | | Core 2 | AUCPDS12 | Practical -Python Lab | 5 | 5 | 25 | 75 | 100 |
| | | Elective Course I (Choose any One) | AUEMA13A | Mathematical Statistics – I | 4 | 3 | 25 | 75 | 100 |
| | | | AUEMA13B | Numerical Methods I | | | | | |
| | IV | Skill Enhancement | AUSDS14 | Fundamentals of Information Technology | 2 | 2 | 25 | 75 | 100 |
| | | Skill Enhancement (Foundation Course) | AUFDS15 | 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 | AUCDS21 | Data Structures and Algorithms | 5 | 5 | 25 | 75 | 100 |
| | | Core – 4 | AUCPDS22 | Practical II - Data Structures using Python Lab | 5 | 5 | 25 | 75 | 100 |
| | | Elective-II (Choose any One) | AUEMA23A | Mathematical Statistics – II | 4 | 3 | 25 | 75 | 100 |
| | | | AUEMA23B | Numerical Methods II | | | | | |
| | IV | Skill Enhancement | AUSDS24 | Introduction to HTML | 2 | 2 | 25 | 75 | 100 |
| | IV | Skill Enhancement | AUSDS25 | 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 | AUCDS31 | Fundamentals of Data Science | 5 | 5 | 25 | 75 | 100 |
| | | Core – 6 | AUCPDS32 | Data Science Lab | 5 | 5 | 25 | 75 | 100 |
| | | Elective-III (Choose any One) | AUEMA33A | Discrete Mathematics–I | 3 | 3 | 25 | 75 | 100 |
| | | | AUEDS33B | Computer Networks | | | | | |
| | IV | Skill Enhancement | AUSDS34 | E-Commerce | 1 | 1 | 25 | 75 | 100 |
| | | Skill Enhancement | AUSDS35 | Big Data Analytics | 2 | 2 | 25 | 75 | 100 |
| | | Compulsory Paper | AUES30 | Environmental Science | 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 | AUCDS41 | Relational Database Management System | 5 | 5 | 25 | 75 | 100 |
| | | Core – 8 | AUCPDS42 | RDBMS Lab Using Oracle | 5 | 5 | 25 | 75 | 100 |
| | | Elective-IV (Choose any One) | AUEMA43A | Discrete Mathematics–II | 4 | 3 | 25 | 75 | 100 |
| | | | AUEDS43B | Network Security | | | | | |
| | IV | Skill Enhancement Course | AUSDS44 | Data Mining and Warehousing | 2 | 2 | 25 | 75 | 100 |
| | | Skill Enhancement | AUSDS45 | Open Source Software Technologies | 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 | AUCDS51 | Machine Learning | 5 | 4 | 25 | 75 | 100 |
| | | Core – 10 | AUCPDS52 | Machine Learning Lab | 5 | 4 | 25 | 75 | 100 |
| | | Core – 11 | AUCDS53 | Software Engineering | 5 | 4 | 25 | 75 | 100 |
| | | Core – 12 | AUPDS54 | Core/Project with Viva-voce | 5 | 4 | 25 | 75 | 100 |
| | | Elective-V (Choose any One) | AUEDS55A | Information Security | 4 | 3 | 25 | 75 | 100 |
| | | | AUEDS55B | Financial Analytics | | | | | |
| | | | AUEDS55C | Cryptography | | | | | |
| | | Elective-VI (Choose any One) | AUEDS56A | Operating System | 4 | 3 | 25 | 75 | 100 |
| | | | AUEDS56B | Simulation and Modeling | | | | | |
| | | | AUEDS56C | Quantitative Aptitude | | | | | |
| | IV | Compulsory Paper | AUVE50 | Value Education | 2 | 2 | 25 | 75 | 100 |
| | | | AUIDS57 | Internship/Industrial Training (Carried out in II-Year Summer vacation) (30hours) | - | 2 | 100 | - | 100 |
| | | | | **Semester Total** | **30** | **26** | | | |
| **SEMESTER - VI** | III | Core – 13 | AUCDS61 | IoT and Cloud Technologies | 6 | 4 | 25 | 75 | 100 |
| | | Core – 14 | AUCPDS62 | IoT and Cloud Technologies Lab | 6 | 4 | 25 | 75 | 100 |
| | | Core – 15 | AUCDS63 | Artificial Intelligence | 6 | 4 | 25 | 75 | 100 |
| | | Elective-VII (Choose any One) | AUEDS64A | Introduction to Linear Algebra | 5 | 3 | 25 | 75 | 100 |
| | | | AUEDS64B | Artificial Neural Networks | | | | | |
| | | | AUEDS64C | Analytics for Service Industry | | | | | |
| | | Elective-VIII (Choose any One) | AUEDS65A | Computing Intelligence | 5 | 3 | 25 | 75 | 100 |
| | | | AUEDS65B | Data Analytics using R Programming | | | | | |
| | | | AUEDS65C | Natural Language Processing | | | | | |
| | IV | Skill Enhancement | AUSDS66 | Cyber Forensics | 2 | 2 | 25 | 75 | 100 |
| | | Compulsory | AUEA60 | Extension Activity | - | 1 | 100 | - | 100 |
| | | | | **Semester Total** | **30** | **21** | | | |

**Consolidated Semester wise and Component wise Credit distribution**

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

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

## COURSE DESCRIPTORS

| Title of the Course | **PYTHON PROGRAMMING** | Hours/Week | 05 |
|---|---|---|---|
| Course Code | AUCDS 11 | Credits | 05 |
| Category | Core-1 | Year & Semester | I & I |
| Prerequisites | Basics of Programming Language | Regulation | 2024 |

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

| UNITS | Contents | COs | Cognitive Levels |
|---|---|---|---|
| UNIT-I | **Basics of Python Programming:** History of Python-Features of Python – Literal – Constants - Variables - Identifiers–Keywords-Built-in Data Types-Output Statements – Input Statements-Comments – Indentation-Operators-Expressions-Type conversions. **Python Arrays:** Defining and Processing Arrays – Array methods. | CO1 CO3 | K1 K2 K3 |
| UNIT-II | **Control Statements:** Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. **Jump Statements:** break, continue and pass statements**.** | CO1 CO2 CO3 | K1 K2 K3 K4 |
| 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 CO4 | K1 K2 K3 K5 |

| | | | |
|---|---|---|---|
| **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.. | CO2 CO3 CO4 | K1 K2 K3 K5 |
| **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. Python Dictionaries-Numpy, Pandas, Matplotlib, Scipy. | CO2 CO3 CO4 CO5 | K1 K2 K3 K5 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", First Edition, 2017, Dream tech Publishers.

**Reference Books**

1. Vamsi Kurama, "Python Programming: A Modern Approach", Pearson Education.

2. Mark Lutz, "Learning Python", O rielly.

3. Adam Stewarts, "Python Programming", Online.

4. Fabio Nelli, "Python Data Analytics", A Press.

5. Kenneth A. Lambert, "Fundamentals of Python – First Programs", CENGAGE Publication.

**Website and e-learning source**

1) *https://onlinecourses.nptel.ac.in*

2) *http://www.mikeblaber.org/oldwine/chm1045/notes_m.htm*

3) *http://www.ias.ac.in/initiat/sci_ed/resources/chemistry/Inorganic.html*

4) *https://swayam.gov.in/course/64-atomic-structure-and-chemical-bonding*

5) *https://www.chemtube3d.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 | Examine Python syntax and semantics and write simple programs on python | K1,K2 |
| CO2 | Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements. | K1,K2,K4 |
| CO3 | Compare function, function arguments and Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules. | K1,K2,K3 |
| CO4 | Identify and differentiate List, tuples and dictionary, Write program using list, tuples and dictionary. | K1,K2,K5 |
| CO5 | Demonstrate proficiency in handling Strings and File Systems and Python Libraries. | K1,K2,K6 |

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

## COURSE DESCRIPTORS

| Title of the Course | Fundamentals of Information Technology | Hours/Week | 02 |
|---|---|---|---|
| Course Code | AUSDS14 | Credits | 02 |
| Category | Skill Enhancement Course SEC – 1 | Year & Semester | I & I |
| Prerequisites | Basic knowledge of Computers | Regulation | 2024 |

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

| UNITS | Contents | COs | Cognitive Levels |
|---|---|---|---|
| UNIT-I | **Introduction to Computers:** Introduction, Definition, .Characteristics of computer, Evolution of Computer, Block Diagram Of a computer, Generations of Computer, Classification Of Computers, Applications of Computer, Capabilities and limitations of computer | CO1 CO3 | K1 K2 K3 |
| UNIT-II | **Basic Computer Organization:** Role of I/O devices in a computer system. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, Output Units: Monitors and its types. Printers: Impact Printers and its types. Non Impact Printers and its types, Plotters, types of plotters, Soundcards, Speakers. | CO1 CO2 CO3 | K1 K2 K3 K4 |
| UNIT-III | **Storage Fundamentals:** Primary Vs Secondary Storage: Data storage & retrieval methods. Primary Storage, Secondary Storage and Cloud Storage. | CO3 CO4 | K1 K2 K3 |

| | | | | |
|---|---|---|---|---|
| **UNIT-IV** | **Software:**<br>Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Application S/W and its types: Word Processing, Spread Sheets Presentation, Graphics, DBMSs/w | CO2<br>CO3<br>CO4 | K1<br>K2<br>K3<br>K5 | |
| **UNIT-V** | **Operating System:**<br>Functions, Measuring System Performance, Assemblers, Compilers and Interpreters. Batch Processing, Multiprogramming, Multi Tasking, Multiprocessing, Time Sharing, DOS, Windows, Unix/Linux. | CO2<br>CO3<br>CO4<br>CO5 | K1<br>K2<br>K3 | |

**Recommended Text Books**

Anoop Mathew, S. Kavitha Murugeshan(2009),"Fundamental of Information Technology", Majestic Books.

AlexisLeon,MathewsLeon,"FundamentalofInformationTechnology",2ndEdition.

P . Rizwan Ahmed, "Introduction to Information Technology". Margham Publications, 2010

"Cloud Computing" Antony T. Velte, McGrawhill.

**Reference Books**

Bhardwaj Sushil Puneet Kumar, "Fundamental of Information Technology"

GGWILKINSON,"FundamentalsofInformationTechnology",Wiley-Blackwell

A Ravichandran , "Fundamentals of Information Technology", Khanna Book Publishing

**Website and e-learning source**

https://testbook.com/learn/computer-fundamentals

https://www.tutorialsmate.com/2020/04/computer-fundamentals-tutorial.html

https://www.javatpoint.com/computer-fundamentals-tutorial

https://www.tutorialspoint.com/computer_fundamentals/index.htm

https://www.nios.ac.in/media/documents/sec229new/Lesson1.pdf

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

| COs | CO Description | Cognitive Level |
|---|---|---|
| CO1 | Construct the structure of the required things in computer, learn how to use it. | K1,K3 |
| CO2 | Explain organizational structure using for the devices present currently under input or output unit. | K1,K2,K4 |
| CO3 | Describe the concept of storing data in computer. | K1,K2,K3 |
| CO4 | Classify and Work with different software. Write program in the software and applications of software. | K1,K2,K5 |
| CO5 | Read the usage of Operating system in information technology which really acts as a interpreter between software and hardware Files. Develop programs using files. | K1,K2,K6 |

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

## COURSE DESCRIPTORS

| Title of the Course | Problem Solving Technique | Hours/Week | 02 |
|---|---|---|---|
| Course Code | AUFDS15 | Credits | 02 |
| Category | Skill Enhancement (Foundation Course) | Year & Semester | I & I |
| Prerequisites | Basics Idea about problem solving | Regulation | 2024 |

**Objectives of the course:**
➢ Familiarize with writing of algorithms, fundamentals of C and philosophy of problem solving.
➢ Implement different programming constructs and decomposition of problems into functions
➢ Use data flow diagram, Pseudocode 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 | **Programming Languages:** Machine language, Assembly language, High- level language,4 GL and 5GL-Features of good programming language. Translators: Interpreters and Compilers. **Data:** Data types, Input, Processing of data, Arithmetic Operators, Hierarchy of operations and Output. Different phases in Program Development Cycle (PDC). | CO1 CO3 | K1 K2 K3 |
| UNIT-II | **Structured Programming: Algorithm:** Features of good algorithm, Benefits and drawbacks of algorithm. **Flowcharts:** Advantages and limitations of flowcharts, when to use flowcharts, flowchart symbols and types of flowcharts. **Pseudocode:** Writing a pseudocode. Coding, documenting and testing a program: Comment lines and types of errors. **Program design:** Modular Programming. | CO1 CO2 CO3 | K1 K2 K3 K4 |
| UNIT-III | **Selection Structures:** Relational and Logical Operators - Selecting from Several Alternatives – Applications of Selection Structures. **Repetition Structures:** Counter Controlled Loops –Nested Loops– Applications of Repetition Structures. | CO3 CO4 | K1 K2 K3 K5 |

| | | | |
|---|---|---|---|
| **UNIT-IV** | **Data Type:** Numeric Data and Character Based Data. **Arrays:**One Dimensional Array - Two Dimensional Arrays – Strings as Arrays of Characters. **Data Flow Diagrams:** Definition, DFD symbols and types of DFDs.**Program Modules:** Subprograms-Value and Reference parameters- Scope of a variable - Functions– Recursion. | CO2 CO3 CO4 | K1,K2, K3,K5 |
| **UNIT-V** | **Files:** File Basics-Creating and reading a Sequential file-Modifying Sequential Files. **Problem solving approaches:** Greedy Algorithm, Search and Sorting, Dynamic Programming, Branch and Bound. | CO2 CO3 CO4 | K1,K2, K3,K5 |

**Recommended Text Books**

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

Ellis Horowitz and Sartaj sahni(2010), "Fundamentals of Computer Algorithms", Galgotia Publications Pvt. Ltd.

**Website and e-learning source**

https://www.codesansar.com/computer-basics/problem-solving-using-computer.htm

http://www.nptel.iitm.ac.in/video.php?subjectId=106102067

http://utubersity.com/?page_id=876

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

| COs | CO Description | Cognitive Level |
|---|---|---|
| CO1 | Analyze the programming languages and Study the data types and arithmetic operations. | K1,K4 |
| CO2 | Know about the algorithms. Develop program using flow chart and pseudocode. | K1,K2,K4 |
| CO3 | Determine the various operators.Explain about the structures. Illustrate the concept of Loops | K1,K2,K3 |
| CO4 | Illustrate the DFD and program modules | K1,K2,K5 |
| CO5 | Creating and reading Files and discuss Problem solving approaches | K1,K2,K4 |

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

## COURSE DESCRIPTORS

| Title of the Course | Practical -Python Lab | Hours/Week | 05 |
|---|---|---|---|
| Course Code | AUCPDS12 | Credits | 05 |
| Category | Core Course CC-II | Year & Semester | I & I |
| Prerequisites | Knowledge of Computers | Regulation | 2024 |

**Objectives of the course:**

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

| UNITS | Contents | COs | Cognitive Levels |
|---|---|---|---|
| LABEXERCISES | 1. Program Using variables, constants, I/O statements in Python. <br><br> 2. Program using Operators in Python. <br><br> 3. Program using Conditional Statements. <br><br> 4. Program using Loops. <br><br> 5. Program using Jump Statements. <br><br> 6. Program using Functions. <br><br> 7. Program using Recursion. <br><br> 8. Program using Arrays. <br><br> 9. Program using Strings. <br><br> 10. Program using Modules. <br><br> 11. Program using Lists. <br><br> 12. Program using Tuples. <br><br> 13. Program using Dictionaries. <br><br> 14. Program for File Handling. | CO1 CO3 | K1 K2 K3 |

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

| COs | CO Description | Cognitive Level |
|-----|----------------|-----------------|
| CO1 | Demonstrate the understanding of syntax and semantics of Python programming | K1,K3 |
| CO2 | Identify the problem and solve using PYTHON programming techniques. | K1,K2,K4 |
| CO3 | Identify suitable programming constructs for problem solving. | K1,K2,K3 |
| CO4 | Analyze various concepts of PYTHON language to solve the problem in an efficient way. | K1,K2,K5 |
| CO5 | Develop a PYTHON program for a given problem and test for its correctness. | K1,K2,K6 |

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

## COURSE DESCRIPTORS

| Title of the Course | **MATHEMATICAL STATISTICS-I** | Hours/Week | 04 |
|---|---|---|---|
| Course Code | AUEMA13A | Credits | 03 |
| Category | ELECTIVE COURSE -I | Year & Semester | I & I |
| Prerequisites | 12thStandard Mathematics | Regulation | 2024 |

**Objectives of the course:**

➢ Understand basic concepts of Statistical Methods
➢ Have a basic understanding of measures of location
➢ Have a basic understanding of measures of dispersion
➢ Understand about Measures of Skewness
➢ Understand 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

**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 | 3 | 2 | 1 |
| CO2 | 2 | 1 | 3 | 1 | 2 | - | 1 | - | - | 1 | 3 | 2 | 1 |
| CO3 | 3 | 1 | 3 | 1 | 2 | 1 | 1 | - | - | 1 | 3 | 2 | 1 |
| CO4 | 3 | 1 | 3 | 2 | 2 | - | 1 | - | - | 1 | 3 | 2 | 1 |
| CO5 | 3 | 1 | 3 | 2 | 2 | 1 | 1 | - | - | 1 | 3 | 2 | 1 |

## 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 | 12th Standard 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** <br> 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 <br> K2 <br> K3 |
| UNIT-II | **The solution of numerical algebraic and transcendental Equations:** <br> Bisection method – Iteration Method – Regula Falsi Method – Newton– Raphson method | CO2 | K1 <br> K2 <br> K3 |
| UNIT-III | **Solution of simultaneous linear algebraic equations:** <br> Gauss elimination method – Gauss Jordan method – Method of Triangularization – Gauss Jacobi method – Gauss Seidel method. | CO3 | K1 <br> K2 <br> K3 |
| UNIT-IV | **Finite differences** <br> Operators $\Delta$, $\nabla$ and E - relation between them — factorial polynomials. <br> **Interpolation with equal intervals:** Gregory-Newton forward and backward- interpolation formulas. | CO4 | K1 <br> K2 <br> K3 |
| UNIT-V | **Central differences formulae** <br> Operators $\mu$, $\delta$ and relation with the other operators,Gauss forward and backward formulae, Stirling's formula and Bessel's formula. | CO5 | K1 <br> K2 <br> 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 like Bisection method, Iteration method, Regula Falsi method and Newton – Raphson method | K1,K2,K3 |
| CO3 | Estimate the solution of simultaneous linear equations using different numerical methods | K1,K2,K3 |
| CO4 | Define basic concept of operators $\Delta$, $\nabla$ and E, Solving interpolation with equal intervals problems using Gregory Newton's forward formula and Newton's backward formula | K1,K2,K3 |
| CO5 | Estimate the solution of central difference formula using the methods Gauss's forward, backward formula, Stirling's formula and Bessel,s 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 | 3 | 2 | 1 |
| CO2 | 3 | 3 | 2 | 3 | 3 | 3 | 1 | - | - | 1 | 3 | 1 | 1 |
| CO3 | 3 | 2 | 2 | 3 | 2 | 3 | 1 | - | - | 1 | 3 | 1 | 1 |
| CO4 | 3 | 3 | 3 | 2 | 2 | 3 | 1 | - | - | 1 | 3 | 2 | 1 |
| CO5 | 3 | 2 | 3 | 2 | 3 | 2 | 1 | - | - | 1 | 3 | 1 | 1 |

# COURSEDESCRIPTORS

| Title of the Course | DATA STRUCTUREAND ALGORITHMS | Hours/Week | 5 |
|---|---|---|---|
| Course Code | AUCDS21 | Credits | 5 |
| Category | CORE -3 | Year & Semester | I & II |
| Prerequisites | Knowledge of Python Programming | Regulation | 2024 |

**Objectives of the course:**
- ➢ To Understand the meaning asymptotic time complexity analysis and various data structures
- ➢ To Enhancing the problem solving skills and thinking skills
- ➢ To write efficient algorithms and Programs
- ➢ To Understanding how linear and non-linear data structures works.
- ➢ To Understanding how searching and sorting is performed in Python

| UNITS | Contents | COs | Cognitive Levels |
|---|---|---|---|
| UNIT-I | **Arrays and ordered Lists: Algorithm - Data Structure- Types -** Abstract data types – asymptotic notations – complexity analysis-Arrays and its Operations – List. Linked lists: Singly linked list – doubly linked lists - Circular linked list, General lists- stacks – Queues – Circular Queues – Evaluation of expressions | CO1 | K1,K2,K3 |
| UNIT-II | **Trees and Graphs** Trees – Binary Trees – Binary Tree Traversal – Binary Tree Representations – Binary Search Trees - threaded Binary Trees - Application of trees (Sets). Representation of Graphs – Graph implementation – graph Traversals - Minimum Cost Spanning Trees – Shortest Path Problems-Application of graphs | CO2 | K1,K2 |
| UNIT-III | **Searching and Sorting** – Bubble Sort, Insertion Sort, Selection Sort. Searching – Linear search, Divide and Conquer Technique: Binary search, Merge Sort, Quick Sort. | CO3 | K2,K3,K4 |

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|---|---|---|---|
| **UNIT-IV** | **Greedy Method and Dynamic programming** Greedy Method: Knapsack problem– Job Sequencing with deadlines – Optimal storage on tapes. General method – Multistage Graph Forward Method– All pairs shortest path – Single source shortest path – Search Techniques for Graphs – DFS – Connected Components – Bi-Connected Components | CO4 | K2,K3,K4 |
| **UNIT-V** | **Backtracking** General Method – 8-Queen"s – Sum Of Subsets – Graph Coloring – Hamiltonian Cycles – Branch And Bound: General Method – Travelling Sales Person Problem | CO5 | K3,K5 |

**Recommended Text Books**

1. *Seymour Lipshutz(2011),Schaum"s Outlines - Data Structures with C, Tata McGraw Hill, publications.*
2. *Ellis Horowitz and SartajSahni, Sanguthevar Raja sekaran (2010) ,Fundamentals of*
3. *Computer Algorithms, Galgotia Publications Pvt.Ltd.*
4. *P.Rizwan Ahmed, C++ and Data Structure, Margham Publications, 2012*
5. *Revathy.P &Poonkuzhali, " Data Structures" , Charulatha Publications.*

**ReferenceBooks**

1. Gregory L.Heileman(1996), Data Structures, Algorithms and Object-Oriented Programming, McGraw Hill International Edition, Singapore.

2. A.V.Aho, J.D. Ullman, J.E.Hopcraft(2000). Data Structures and Algorithms, Addison Wesley Publication.

3. DATA STRUCTURES USING PYTHON by Dr Shriram K. Vasudevan (Author), Mr Abhishek S. Nagarajan (Author),

**Websiteande-learningsource**
https://www.tutorialspoint.com/data_structures_algorithms/index.htm
https://www.programiz.com/dsa
https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/

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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 | Design an algorithm for a computational task and calculate the time/space complexities of the algorithm | K1,k2,K3 |
| CO2 | Understand the Concepts of Trees and Graphs Perform traversal operations on Trees and Graphs. | K1,K2 |
| CO3 | Demonstrate knowledge of sorting and searching algorithms and their run-time complexity. | K2,K3,K4 |
| CO4 | Apply and analyze the complexity of Greedy and Dynamic Programming. | K2,K3,K4 |
| CO5 | Apply Backtracking and Branch and Bound techniques to solve the real time problems | K3,K5 |

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

# COURSEDESCRIPTORS

| Title of the Course | DATASTRUCTUREUSING PYTHON LAB | Hours/Week | 5 |
|---|---|---|---|
| Course Code | AUCPDS22 | Credits | 5 |
| Category | CORE - 4 | Year &Semester | I/II SEM |
| Prerequisites | Knowledge of Python Programming | Regulation | 2024 |

**Objectives of the course:**

- To predict the performance of different algorithms in order to guide design decisions, provide theoretical estimation for the required resources of an algorithm to solve a specific computational problem

| UNITS | Contents | COs | Cognitive Levels |
|---|---|---|---|
| LAB EXERCISE | 1. Perform stack operations using arrays.<br>2. Perform queue operations using arrays.<br>3. Perform tree traversal operations<br>4. Search an element in an array using linear search.<br>5. Search an element in an array using binary search<br>6. Sort the given set of elements using Merge Sort.<br>7. Sort the given set of elements using Quick sort.<br>8. Search the Kth smallest element using Selection Sort<br>9. Find the Optimal solution for the given Knapsack Problem using Greedy Method.<br>10. Find all pairs shortest path for the given Graph using Dynamic Programming method<br>11. Find the Single source shortest path for the given Travelling Salesman problem using Dynamic Programming method<br>12. Find all possible solution for an N Queen problem using backtracking method<br>13. Find all possible Hamiltonian Cycle for the given graph using backtracking method | CO1<br><br>CO2<br><br>CO3<br><br>CO4<br><br>CO5 | K1,<br><br>K2,K3,<br><br>K4,K6 |

**Course Learning Outcomes(for Mapping with Pos and PSOs)**

On completion of the course the students should be able to

| COs | CO Description | Cognitive Level |
|------|----------------|-----------------|
| CO1 | Understand the concepts of Linked List, Stack and Queue. | K1,K2 |
| CO2 | Execute traversal functions on graphs, trees and their applications. | K1,K2,K3 |
| CO3 | Apply searching and sorting techniques using python program | K3,K4 |
| CO4 | Determine the concepts of Greedy Method to apply searching techniques. | K3,K5 |
| CO5 | Apply the backtracking method and dynamic programming concepts to find optimal solution using python programming | K1,K2,K5 |

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

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## COURSEDESCRIPTORS

| Title of the Course | INTRODUCTION TO HTML | Hours/Week | 2 |
|---|---|---|---|
| Course Code | AUSDS24 | Credits | 2 |
| Category | SKILL ENHANCEMENT | Year & Semester | I & II |
| Prerequisites | Knowledge of Computer | Regulation | 2024 |

**Objectives of the course:**
- ➢ Create a web page. Insert a graph 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 using CSS.

| UNITS | Contents | COs | Cognitive Levels |
|---|---|---|---|
| UNIT-I | Introduction: Web Basics: What is Internet–Web browsers–What is Webpage –HTML Basics: Understanding tags. | CO1 | K2,K3 |
| UNIT-II | Tags for Document structure (HTML, Head, Body Tag).Block level text elements :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.<br> CSS: What is CSS- CSS syntax – External CSS –Internal CSS – Inline CSS – Basic styling properties: Color, backgrounds, borders, margins, padding, height/width, text, font. | CO3 | K1,K2,K4 |
| UNIT-IV | Tables: Creating basic Table, Table elements, Caption–Table and cell Alignment – Row span, Col span–Cell padding. | CO4 | K1,K2,K3 |
| UNIT-V | Frames: Frameset–Targeted Links–No frame–Forms: Input, Text area, Select, Option. | CO5 | K1,K2,K5,K6 |

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**Recommended Text Books**

1. "Mastering HTML5 and CSS3 Made Easy", TeachUComp Inc., 2014.
2. Thomas Michaud, "Foundations of Web Design: Introduction to HTML & CSS"
3. P. Rizwan Ahmed, Open Source Programming , Margham Publications, Chennai, 2017
4. Aurna  "Hyper Text Markup Language",  Margham Publications, Chennai, 2017
5. Shahina begam, " Web Technology",  Selvam Publications"
6. Thomas A Powel, " HTML&XHTML", TMH publications

**Reference Books**

https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf

https://www.w3schools.com/html/default.asp

**Website and e-learning source**

https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf
https://www.w3schools.com/html/default.asp

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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 | Learn about internet technology, network models and how to create online pages with HTML tags. | K2, K3 |
| CO2 | Use Text-level formatting to present content on web page. | K1, K2 |
| CO3 | create a web page based on list and link with other documents by applying CSS concepts | K1,K2,K4 |
| CO4 | Apply the concept of row span, column span and cell padding using tables in a web page | K1,K2,K3 |
| CO5 | Display several document on a same webpage and create user interface controls and features of users. | K1,K2,K5,K6 |

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

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# COURSEDESCRIPTORS

| Title of the Course | PHP Programming | Hours/Week | 2 |
|---|---|---|---|
| Course Code | AUSDS25 | Credits | 2 |
| Category | SKILL ENHANCEMENT | Year & Semester | I & II |
| Prerequisites | Knowledge of Internet | Regulation | 2024 |

**Objectives of the course:**

➢ To introduce the importance of PHP in web page design.
➢ To understand the features like functions, forms in PHP.
➢ To understand Files, OOPs concepts, Cookies, Sessions and Data base.

| 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,K2,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 | K2,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,K4 |
| UNIT-IV | PHP Advanced Concepts -Reading and Writing Files -Reading Data from a File -Managing Sessions and Using Session Variables | CO4 | K1,K2,K3 |
| UNIT-V | OOPS Using PHP -OOPS Concept-Class, Object, Abstractions, Encapsulation, Inheritance, Polymorphism -Creating Classes and Object in PHP-Cookies and Session Management | CO5 | K3,K4,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

3. Larry, "PHP and MYSQL for dynamic websites", Pearson Publisher

**Reference Books**

The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL- Alan Forbes

**Website and e-learning source**

https://www.w3schools.com/php/
https://www.coursera.org/learn/web-applications-php
https://www.classcentral.com/course/freecodecamp-php-programming-language-tutorial-full-course-105107
https://www.udemy.com/course/php-for-complete-beginners-includes-msql-object-oriented/?couponCode=24T4MT92724A
https://www.tutorialspoint.com/php/index.htm
https://phptherightway.com/

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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 | Understanding the basic concepts of PHP in website creation with XAMPP and WAMP installation. | K1,K2,K6 |
| CO2 | Develop program using control statements. | K2, K3 |
| CO3 | Implement functions and browser handling power of PHP Utilizing the basic concept of statements and arrays | K2,K4 |
| CO4 | Imparting Database applications, File handling, Cookies in the webpage. | K1,K2,K3 |
| CO5 | Develop programs by applying various object oriented concepts and implementing Cookies and Session Management concepts in developing web pages | K3,K4,K5 |

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

**COURSEDESCRIPTORS**

| Title of the Course | FUNDAMENTALS OF DATA SCIENCE | Hours/Week | 05 |
|---|---|---|---|
| Course Code | AUCDS31 | Credits | 05 |
| Category | Core-5 | Year & Semester | II & III |
| Prerequisites | Programming knowledge in Python | Regulation | 2024 |

**Objectives of the course:**
- ➤ To understand the basic concepts of Data Science
- ➤ To acquire a solid foundation in pandas
- ➤ To understand the principles of Data Loading, Storage, and File Formats
- ➤ To acquire a solid foundation in Data Wrangling
- ➤ To visualize data using plots in python

| UNITS | Contents | COs | Cognitive Levels |
|---|---|---|---|
| UNIT-I | **Data Science**: definition, Datafication, Exploratory Data Analysis, The Data science process, A data scientist role in this process. NumPy Basics: The NumPyndarray: A Multidimensional Array Object, Creating ndarrays ,Data Types for ndarrays, Operations between Arrays and Scalars, Basic Indexing and Slicing, Boolean Indexing, Fancy Indexing, Data Processing Using Arrays, Expressing Conditional Logic as Array Operations, Methods for Boolean Arrays , Sorting , Unique. | CO1 | K1, K2, K3, K4 |
| UNIT-II | **Getting Started with pandas**: Introduction to pandas, Library Architecture, Features, Applications, Data Structures, Series, Data Frame, Index Objects, Essential Functionality Reindexing, Dropping entries from an axis, Indexing, selection, and filtering),Sorting and ranking, Summarizing and Computing Descriptive Statistics, Unique Values, Value Counts, Handling Missing Data, filtering out missing data. | CO2 | K1, K2, K3 |
| UNIT-III | **Data Loading, Storage, and File Formats** : Reading and Writing Data in Text Format, Reading Text Files in Pieces, Writing Data Out to Text Format, Manually Working with Delimited Formats, JSON Data, XML and HTML: Web Scraping, Binary Data Formats, Using HDF5 Format, Reading Microsoft Excel Files, Interacting with Databases, Storing and Loading Data in MongoDB | CO2, CO3 | K1, K2, K3, K4 |

| | | | |
|---|---|---|---|
| **UNIT-IV** | Data Wrangling:  Combining and Merging Data Sets, Database style Data Frame Merges, Merging on Index, Concatenating Along 2nAxis,Combining Data with Overlap, Reshaping and Pivoting, Reshaping with Hierarchical Indexing, Data Transformation, Removing Duplicates, Replacing Values. | CO4 | K3, K4, K5 |
| **UNIT-V** | **Plotting and Visualization**: A Brief matplotlib API Primer, Figures and Subplots, Colors, Markers, and Line Styles, Ticks, Labels, and Legends, Annotations and Drawing on a Subplot, Saving Plots to File, Plotting Functions in pandas, Line Plots, Bar Plots, Histograms and Density Plots, Scatter Plots. | CO5 | K3, K4, K5, K6 |

**Text Books:**
1. WesMcKinney,"PythonforDataAnalysis",O'REILLY,ISBN:978-1-449-31979-3,1st edition,October2012
2. Rachel Schutt & O'neil, "DoingDataScience",O'REILLY,ISBN:978-1-449-35865-5,1st edition, October 2013.

**Reference Books:**
1. JoelGrus,"DataSciencefromScratch:FirstPrincipleswithPython",O'ReillyMedia,2015
2. MattHarrison,"LearningthePandasLibrary:PythonToolsforDataMunging,Analysis,andVisualization,O'Reilly,2016.

**Website and e-learning source**

**https://www.w3schools.com/datascience/**

**https://www.geeksforgeeks.org/data-science-fundamentals/**

**https://www.programiz.com/python-programming**

**https://www.tutorialspoint.com/numpy/numpy_introduction.htm**

https://www.guru99.com/python-tutorials.html

**Course Learning Outcomes (for Mapping with POs and PSOs)**

On completion of the course the students should be able to

| COs | CO Description | Cognitive Level |
|---|---|---|
| CO1 | Describe the significance of data science and Data Science process | K1, K2, K3 |
| CO2 | Apply principles of NumPy and Pandas to the analysis of data. | K1, K2, K3 |
| CO3 | Build and prepare data for use with a variety of statistical methods and models | K1, K2, K3,K4 |
| CO4 | Apply the need and importance of pre-processing techniques. | K3,K4,K5 |
| CO5 | Analyze Data using various Visualization techniques. | K3,K4,K5 |

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

**COURSEDESCRIPTORS**

| Title of the Course | DATASCIENCELAB | Hours/Week | 05 |
|---|---|---|---|
| Course Code | AUCPDS32 | Credits | 05 |
| Category | Core- 6 | Year & Semester | II & III |
| Prerequisites | Programming knowledge in Python | Regulation | 2024 |

**Objectives of the course:**

➢ The main objective of the course is to inculcate the basic understanding of Data Science and it's practical implementation using Python.

| Units | Contents | COs | Cognitive Levels |
|---|---|---|---|
| **LAB EXERCISE** | 1. Creating a NumPyArray<br>a. Basic ndarray<br>b. Array of zeros<br>c. Array of ones<br> d. Random numbers in ndarray<br>e. An array of your choice<br>f. Imatrix in NumPy<br> g. Evenlys paced ndarray<br><br>2. The Shape and Reshaping of NumPyArray<br>a. Dimensions of NumPyarray<br>b. Shape of NumPyarray<br>c. SizeofNumPyarray<br>d. Reshaping a NumPyarray<br>e. Flattening a NumPyarray<br> f. Transpose of a NumPyarray<br><br>3. Expanding and Squeezing a NumPyArray<br>a. Expanding a NumPyarray<br> b. Squeezing a NumPyarray<br> c. Sorting in NumPyArrays<br><br>4.Indexing and Slicing of NumPyArray<br>a. Slicing1-DNumPyarrays<br>b. Slicing2-DNumPyarrays<br>c. Slicing3-DNumPyarrays<br> d. Negative slicing of NumPyarrays<br><br>5.Stacking and Concatenating NumpyArrays | CO1<br>CO2<br>CO3<br>CO4<br>CO5 | K2,K3,<br>K4,K6 |

| | | |
|---|---|---|
| a. Stacking ndarrays<br>b. Concatenating ndarrays<br> c. Broadcasting in NumpyArrays<br><br>6. Perform following operations using pandas<br> a. Creating dataframe<br>b. concat()<br>c. Setting conditions<br><br><br>d. Adding a new column<br><br>7.Perform following operations using pandas<br> a. Filling NaN with string<br>  b. Sorting based on column values<br>  c. groupby()<br><br>8. Read the following file formats using pandas<br>a. Text files<br>b. CSV files<br>c. Excel files<br> d. JSON files<br><br>9. Perform following preprocessing techniques on<br>   loan prediction dataset<br>a. Feature Scaling<br> b. Feature Standardization<br> c. Label Encoding<br>  d. OneHotEncoding<br><br>10. Perform following visualizations using matplotlib<br> a. Bar Graph<br> b. Pie Chart<br> b. Box Plot<br> c. Histogram<br> d. Line Chart and Subplots<br>  e. Scatter Plot | | |

**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 Numpy array | K1, K2, K3 |
| CO2 | Apply principles of NumPy and Pandas to solve using Python Programming Techniques. | K1, K2, K3 |
| CO3 | Identify suitable programming constructs for problem solving. | K1, K2, K3,K4 |
| CO4 | Apply the need and importance of pre-processing techniques. | K3,K4,K5 |
| CO5 | Analyze Data using various Visualization techniques. | K3,K4,K5 |

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

**COURSEDESCRIPTORS**

| Title of the Course | COMPUTERNETWORKS | Hours/Week | 03 |
|---|---|---|---|
| Course Code | AUEDS33B | Credits | 03 |
| Category | Elective III | Year & Semester | II & III |
| Prerequisites | Fundamentals of Computers | Regulation | 2024 |

**Objectives of the course:**

➤ To make students understand the concepts of Network hardware and Network Software.

➤ To analyze different network models

➤ To impart knowledge on Design Issues of Data Link Layer

➤ To impart knowledge on IP Addresses and Routing algorithm

➤ To make the students understand the establishment of Network connection

| UNITS | Contents | COs | Cognitive Levels |
|---|---|---|---|
| UNIT-I | Introduction–Uses of Computer Networks–Network Hardware – Network Software- Types of Network Topologies – OSI Reference Model – TCP/IP Reference Model. | CO1 | K1, K2, K3, K4 |
| UNIT-II | Physical Layer – Guided Transmission media –Wireless Transmission- Transmission Modes: Simple, Half duplex, Full duplex– Public Switched Telephone Network–Local Loop– Trunks – Multiplexing- Switching: Circuit and Packet Switching. | CO2 | K1, K2, K3 |
| UNIT-III | Data Link Layer –Design Issues-Error Detection and Correction- Flow Control and congestion control - Simplex Stop and Wait Protocol-Sliding Window Protocol. | CO2, CO3 | K1,K2, K3, K4 |
| UNIT-IV | Network Layer–Design Issues–Routing Algorithm-IP Protocol – IPV4-IP Addresses-Internet Control Protocols. | CO4 | K3, K4, K5 |
| UNIT-V | Transport Layer: Addressing- Connection Establishment-Connection Release. Internet Transport Protocol: UDP-TCP. Application Layer: DNS- Electronic Mail-World Wide Web. | CO5 | K3,K4, K5, K6 |

**Recommended Text Books**
1. A.S.Tanenbaum,"ComputerNetworks",Prentice-HallofIndia2008,4thEdition.
2. Behrouz Forouzan, "Data Communication and Networking", McGraw Hill
3. William Stallings, "Data and Computer Communication", Pearson. 4. Kurose and Ross, "Computer Networking- A Top-Down Approach", Pearson

**Reference Books**
1. Stallings, "Data and Computer Communications", PearsonEducation2012,7thEdition
2. B.A.Forouzan,"DataCommunicationsandNetworking",TataMcGrawHill2007,4thEdition.
3. F.Halsall,"DataCommunications,ComputerNetworksandOpenSystems",PearsonEducation2008.
4. D.BertsekasandR.Gallagher,"DataNetworks",PHI2008,2ndEdition.
5. Lamarca,"CommunicationNetworks",TataMcGrawHill2002.

**Website and e-learning source**

https://www.geeksforgeeks.org/basics-computer-networking/

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

https://www.tutorialspoint.com/computer_fundamentals/computer_networking.htm

https://www.javatpoint.com/computer-network-tutorial

http://ceit.aut.ac.ir/~91131079/SE2/SE2%20Website/Lecture%20Slides.html

Course Learning Outcomes (for Mapping with POs and PSOs)

On completion of the course the students should be able to

| COs | CO Description | Cognitive Level |
|-----|----------------|-----------------|
| CO1 | Understand the significance and concepts of computer networks. | K1, K2, |
| CO2 | Analyses physical layer and the technologies involved in transmitting data across networks. | K1, K2, K3 |
| CO3 | Apply channel allocation, framing, error and flow control techniques. | K2,k3 |
| CO4 | Describe the functions of Network Layer i.e. Logical addressing, subnetting& Routing Mechanism | K2,k3 |
| CO5 | Illustrate different Transport Layer functions. | K3,K4,K5 |

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

## COURSEDESCRIPTORS

| Title of the Course | E-COMMERCE | Hours/Week | 01 |
|---|---|---|---|
| Course Code | AUSDS34 | Credits | 01 |
| Category | Skill Enhancement | Year & Semester | II & III |
| Prerequisites | Knowledge of Internet | Regulation | 2024 |

**Objectives of the course:**

➢ Understanding of the foundations and importance of E-commerce

➢ Understanding of retailing in E-commerce by in terms of branding and pricing strategies determining the effectiveness of market research.

➢ Assess the Internet trading relationships including Business to Consumer, Business-to- Business, Intra-organizational.

➢ Knowing key features of Internet, Intranets and Extranets and how they relate to each other.

➢ Understanding legal issues and privacy in E-Commerce.

| UNITS | Contents | COs | Cognitive Levels |
|---|---|---|---|
| UNIT-I | **E-Commerce:** E-Commerce Framework – E-Commerce and Media Convergence– The anatomy of E-commerce applications - E-Commerce Consumer Applications - E- Commerce Organization Applications. | CO1 | K1, K2, K3, K4 |
| UNIT-II | **Internet:** The Internet Terminology – NSFNET – Architecture and Components– National Research and Education Network – Internet Governance – An overview of Internet Applications. | CO2 | K1, K2, K3 |
| UNIT III | **E-Commerce and the World Wide Web:** Architectural Frame work for E- commerce–WWW as the architecture–Technology behind the web–Security and the web. | CO2, CO3 | K1, K2, K3, K4 |
| UNIT IV | **Electronic Payment Systems:** Types of Electronic Payment Systems –Digital token Electronic Payment Systems–Credit Card Based Electronic Payment Systems – Risk and Electronic Payment Systems. | CO4 | K3, K4, K5 |
| UNIT V | **Advertising and Marketing on the Internet:** E-Commerce Catalogs – Information Filtering – Consumer Data Interface – Emerging tools. Software Agents: Characteristics and Properties of Software Agents | CO5 | K3, K4, K5, K6 |

**Recommended Text Books**
1. Ravi Kalakota & Andrew Whinston, "*Frontiers of Electronic-Commerce*", Addison Wesley.
2. P. Rizwan Ahmed, E-Commerce and E-Business, Margham Publications,Chennai2012

**Reference Books**
1. Efraim Turvan J. Lee, David Kugand Chung, "Electronic Commerce", Pearson Education, Asia.
2. Manlyn Greenstein and Miklos, "Electronic Commerce", TMH.

**Website and e-learning source**

1. https://www.the-reference.com/en/expertise/creation-and.../e-commerce
2. https://en.wikipedia.org/wiki/E-commerce
3. https://www.tutorialspoint.com/e_commerce/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 | Demonstrate E-Commerce Frame works and their applications. | K1, K2, K3, K4 |
| CO2 | Analyze the E-Commerce Networks Internet Commercialization | K1, K2, K3 |
| CO3 | Evaluate how E-Commerce incorporate the Internet and Web Security | K1, K2, K3,K4 |
| CO4 | Distinguish the different payment systems. | K3,K4,K5 |
| CO5 | Understanding the Advertising and Marketing on the Internet and Software Agents | K3,K4,K5 |

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

<div align="center">

**COURSEDESCRIPTORS**

</div>

| Title of the Course | BIG DATA ANALYTICS | Hours/Week | 02 |
|---|---|---|---|
| Course Code | AUSDS35 | Credits | 02 |
| Category | Skill Enhancement | Year & Semester | II & III |
| Prerequisites | Basic Programming Knowledge | Regulation | 2024 |

**Objectives of the course:**

➢ To know the fundamental concepts of big data and analytics.
➢ To explore tools and practices for working with Big data.
➢ To learn about stream computing.
➢ To know about the research that requires the integration of large amounts of data.
➢ To analyze data by utilizing clustering and classification algorithms.

| UNITS | Contents | COs | Cognitive Levels |
|---|---|---|---|
| UNIT-I | **Big data Introduction:** Big Data introduction-definition and taxonomy- Big data value for the enterprise - The Hadoop ecosystem - Introduction to Distributed computing- Hadoop ecosystem – Hadoop Distributed File System (HDFS)Architecture-HDFS commands for loading/getting data-Accessing HDFS through Java program. | CO1 | K1, K2, K3, K4 |
| UNIT-II | **Map reduce :** Introduction to Map Reduce frame work - Basic Map Reduce Programming: - Advanced Map Reduce programming: Basic template of the Map Reduce program, Word count problem- Streaming in Hadoop- Improving the performance using combiners-Chaining Map Reduce jobs – Joining data from different sources. | CO2 | K1, K2, K3 |
| UNIT III | **Pig and Hive:** Applications on Big Data Using Pig and Hive–Data processing operators in Pig–Hive services–Hive QL–Querying Data in Hive – Fundamentals of HBase and Zoo Keeper. | CO2, CO3 | K1, K2, K3, K4 |
| UNIT IV | **Mongo DB :** No SQL databases: Mongo DB: Introduction – Features - Data types - Mongo DB Query language - CRUD operations – Arrays - Functions: Count–Sort–Limit–Skip–Aggregate-Map Reduce. Cursors–Indexes- Mongo Import–Mongo Export. | CO4 | K3, K4, K5 |
| UNIT V | **Cassandra:** Introduction–Features-Data types–CQLSH-Keyspaces-CRUD operations–Collections–Counter–TTL-Alter commands-Import And Export-Querying System tables | CO5 | K3, K4, K5, K6 |

**Recommended Text Books**

1. JSeemaAcharya,SubhashiniChellappan,"BigDataandAnalytics",WileyPublication, 2015
2. RameshSharda,DursunDelen,EfraimTurban(2018),BusinessIntelligence,Pearson Education Services Pvt Ltd.

**Reference Books**

1. Judith Hurwitz, Alan Nugent, Dr. Fern Halper, Marcia Kaufman, "Big Data for Dummies", John Wiley & Sons, Inc., 2013.
2. Tom White, "Hadoop: The Definitive Guide", O" Reilly Publications,2011.
3. KyleBanker,"MongoDBinAction",ManningPublicationsCompany,2012.
4. RussellBradberry,EricBlow,"PracticalCassandraAdevelopersApproach",PearsonEducation,

**Website and e-learning source**

1. https://www.techtarget.com/searchbusinessanalytics/definition/big-data-analytics
2. https://www.coursera.org/articles/big-data-analytics

**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 Big Data and its analytics in the real world | K1, K2, K3, K4 |
| CO2 | Design of Algorithms to solve Data Intensive Problems using Map Reduce Paradigm. | K1, K2, K3 |
| CO3 | Analyze the Big Data framework like Hadoop and NOSQL to efficiently store and process Big Data to generate analytics. | K1, K2, K3,K4 |
| CO4 | Design and Implementation of Big Data Analytics using pig and spark to solve data intensive problems and to generate analytics. | K3,K4,K5 |
| CO5 | Implement Big Data Activities using Hive. | K3,K4,K5 |

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