



IARE
INSTITUTE OF
AERONAUTICAL ENGINEERING
(Autonomous)

NAAC/A++
ACCREDITED

NBA
NATIONAL BOARD OF
ACCREDITATION



TOP 100
ENGINEERING
INSTITUTES

16th
STATE PRIVATE
ENGINEERING COLLEGES

26
YEARS
OF EXCELLENCE

B.TECH

**COMPUTER SCIENCE
AND ENGINEERING**

**DATA
SCIENCE**

Unlocking the Potential:
The Vital Role of
Data Science in Engineering

ACADEMIC YEAR 2026-27



INDUSTRY
RELEVANT
CURRICULUM



EXPERT
FACULTY



INNOVATION
& RESEARCH
FOCUS



SHAPING
FUTURE-READY
DATA SCIENTISTS

www.iare.ac.in



VISION AND MISSION OF THE INSTITUTE

VISION

To bring forth students, professionally competent and socially progressive, capable of working across cultures meeting the global standards ethically.

MISSION

To provide students with an extensive and exceptional education that prepares them to excel in their profession, guided by dynamic intellectual community and be able to face the technically complex world with creative leadership qualities.

Further, be instrumental in emanating new knowledge through innovative research that emboldens entrepreneurship and economic development for the benefit of wide spread community.

VISION AND MISSION OF THE DEPARTMENT

VISION

To empower students with leading-edge skills and knowledge in data science, fostering innovation and research capabilities to develop impactful solutions across technology, business, and society.

MISSION

The mission of the data science program is to produce graduates who are creative and have the mathematical, data analytics, programming, critical thinking, leadership, and decision-making skills, whilst being aware of the social and ethical aspects of their work.

B. Tech

Program Educational Objectives (PEOs)

PEOs are a promise by the department to the aspiring students about what they will achieve once they join the program.

PEO-I

Students will establish themselves as effective professionals by solving problems through programming, leadership qualities, team work, effective communication skills, critical thinking to solve business solutions.

PEO-II

Students will develop data science applications in advanced areas and employability in IT industry.

PEO-III

Students will understand the significance of Data Science tools and methodologies in global industry demands.

PEO-III

Students will be provided with strong foundation in Data Science applications for their career paths.

Knowledge and Attitude Profile

WK1

A systematic, theory based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2

Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3

A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4

Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5

Knowledge, including emcient resource use, environmental impacts, whole-life cost, reuse of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6

Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK7

Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK8

Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9

Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

B. Tech Program Outcomes (POs)

PO-1 Engineering Knowledge

Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO-2 Problem Analysis

Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO-3 Design/Development of Solutions

Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO-4 Conduct Investigations of Complex Problems

Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO-5 Engineering Tool Usage

Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO-6 The Engineer and The World

Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

PO-7 Ethics

Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO-8 Individual and Collaborative Team work

Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO-9 Communication

Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO-10 Project Management & Finance

Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multi-disciplinary environments.

PO-11 Life-Long Learning

Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

B. Tech Program Specific Outcomes (PSOs)

PSO-I

Build suitable statistical models, tools and techniques to analyze large data sets for visualization and interpretation.

PSO-II

Focus on improving software reliability, network security or information retrieval systems.

PSO-III

Make use of computing theory, mathematics, statistical methods and the principles of optimization techniques in data analytics for providing solutions.



ABOUT Data Science

Data Science is pivotal for innovation, enabling organizations and engineers to extract meaningful insights from large and complex data streams for intelligent decision-making. It enhances system design, automation, prediction, and optimization across various domains, improving efficiency, accuracy, and sustainability. With applications in healthcare, finance, manufacturing, cyber security, and smart technologies, Data Science plays a vital role in driving digital transformation and future-ready solutions.

WHY STUDY HERE DS@IARE?

- One of the most sought-after and future-driven B. Tech programs aligned with Industry 4.0 and global technology trends.
- Experienced faculty and researchers specializing in Artificial Intelligence, Machine Learning, Data Analytics, Big Data, Cloud Computing, Cyber Security, and Internet of Things (IoT).
- State-of-the-art laboratories and advanced research centers that provide hands-on learning in Data Science and emerging technologies.
- Strong industry collaborations supporting professional certifications, internships, research & development activities, innovation projects, and industry-oriented learning.
- International exposure through student mobility programs, academic collaborations, global certifications, and exchange opportunities.
- Industry-focused curriculum designed to build analytical thinking, problem-solving ability, innovation, and research aptitude.
- Practical exposure to modern tools and technologies including Python, TensorFlow, Hadoop, Spark, MongoDB, Google Colab, and Cloud Platforms.
- Data Science applications driving innovation in:
 - ✚ Healthcare through predictive diagnosis and personalized treatment systems
 - ✚ Finance through fraud detection, risk analytics, and intelligent financial services
 - ✚ E-Commerce through recommendation systems, customer analytics, and supply chain optimization
 - ✚ Smart Governance through urban planning, policy analytics, and public service optimization
 - ✚ Manufacturing through intelligent automation, predictive maintenance, and process optimization
- A dynamic learning ecosystem that empowers students to become globally competent data scientists, AI engineers, innovators, and technology leaders.

DATA SCIENCE FRAMEWORK

The Data Science Framework is a structured process used to transform raw data into meaningful insights for decision-making and problem solving. It involves key stages such as problem identification, data collection, data preprocessing, exploratory analysis, and model development using statistical and Machine Learning techniques.

The framework also includes model evaluation, visualization, deployment, and continuous improvement to ensure accuracy and reliability. By following a systematic approach, Data Science helps organizations optimize operations, predict outcomes, and develop intelligent, data-driven solutions across various industries.

The Data Science Framework is a structured and systematic methodology used to collect, process, analyze, and interpret data for generating meaningful insights and intelligent decision-making. It combines statistical analysis, data engineering, Machine Learning, Artificial Intelligence, and visualization techniques to transform raw data into valuable knowledge and predictive solutions. The framework helps organizations and researchers solve complex real-world problems efficiently while ensuring scalability, reliability, and continuous improvement in data-driven systems.

► **Problem Identification** – Define the business objective, research problem, project scope, constraints, and expected outcomes to establish a clear analytical direction.

► **Data Collection** – Gather relevant structured, semi-structured, and unstructured data from databases, sensors, cloud platforms, IoT devices, APIs, websites, and enterprise systems.

► **Data Preprocessing & Cleaning** – Improve data quality by handling missing values, duplicate records, inconsistencies, outliers, and noise through cleaning, transformation, normalization, and feature engineering techniques.

► **Exploratory Data Analysis (EDA)** – Analyze patterns, trends, correlations, and anomalies using statistical methods and visualization tools to understand data behavior and support informed decision-making.

► **Data Integration & Storage** – Organize, integrate, and manage data using databases, data warehouses, cloud storage, and Big Data platforms to ensure accessibility, scalability, and security.

► **Model Development** – Develop analytical and predictive models using Machine Learning, Deep Learning, Artificial Intelligence, and statistical algorithms for classification, regression, clustering, forecasting, and optimization tasks.

► **Model Training & Testing** – Train models using historical datasets and evaluate their performance using testing techniques and validation methods to improve reliability and generalization capability.

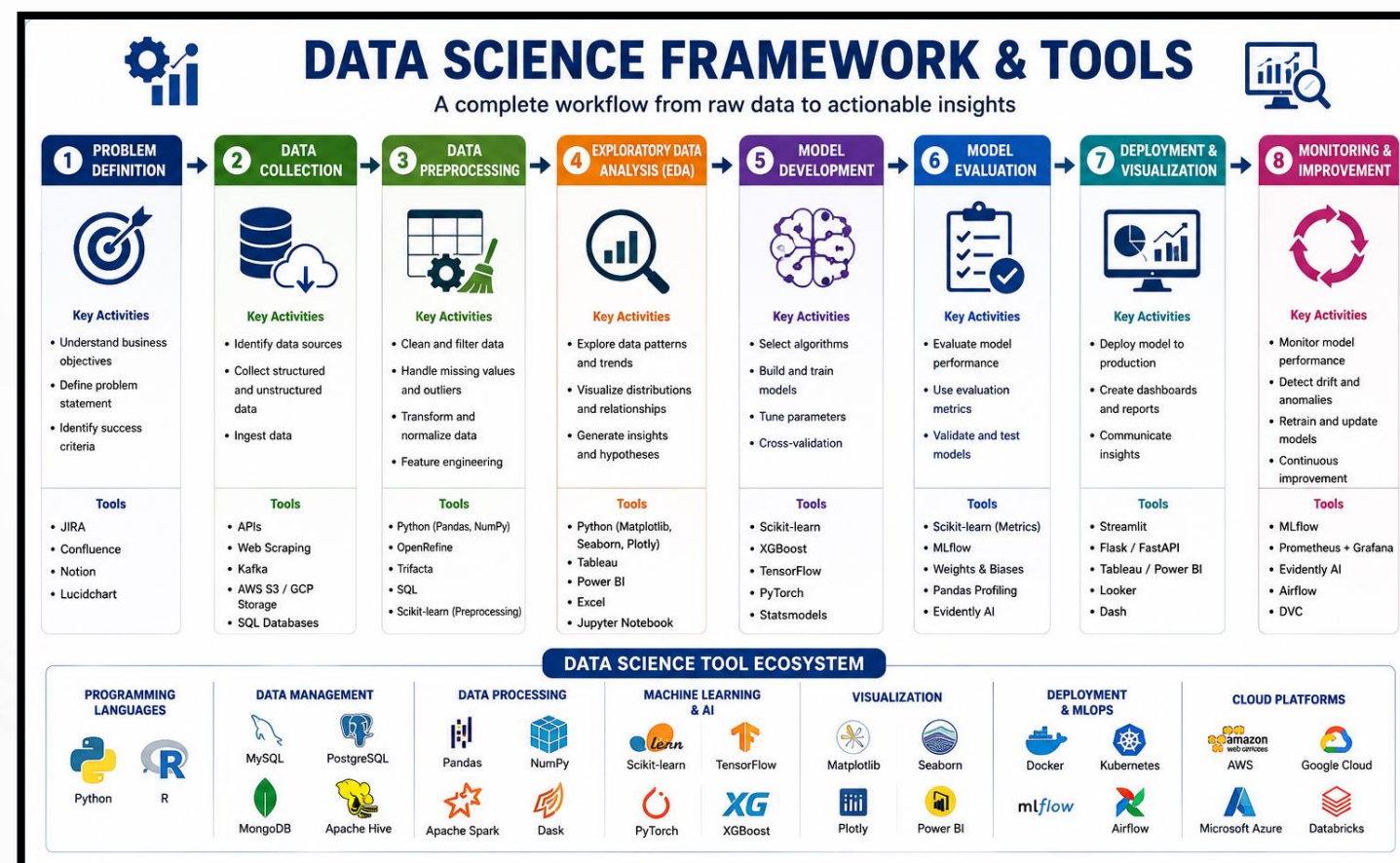
► **Model Evaluation** – Measure model accuracy and efficiency using evaluation metrics such as Precision, Recall, F1-Score, RMSE, MAE, and Confusion Matrix to ensure optimal performance.

► **Deployment & Visualization** – Deploy trained models into real-time systems, applications, dashboards, and cloud environments while presenting insights through reports, visual analytics, and interactive data visualizations.

► **Decision-Making & Business Intelligence** – Utilize analytical insights to support strategic planning, operational optimization, automation, and intelligent decision-making across industries and organizations.

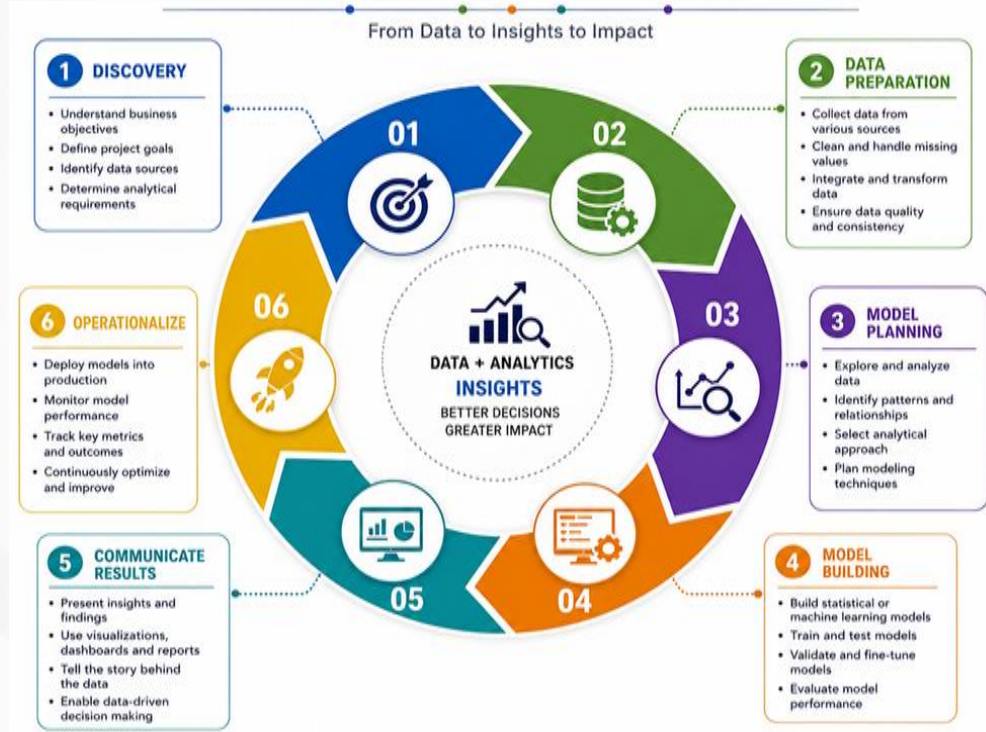
► **Monitoring & Continuous Improvement** – Continuously monitor model performance, update datasets, retrain models, and optimize algorithms to maintain accuracy, adaptability, and long-term efficiency in dynamic environments.

► **Security, Ethics & Governance** – Ensure data privacy, ethical AI practices, governance policies, transparency, fairness, and secure handling of sensitive information throughout the Data Science lifecycle.

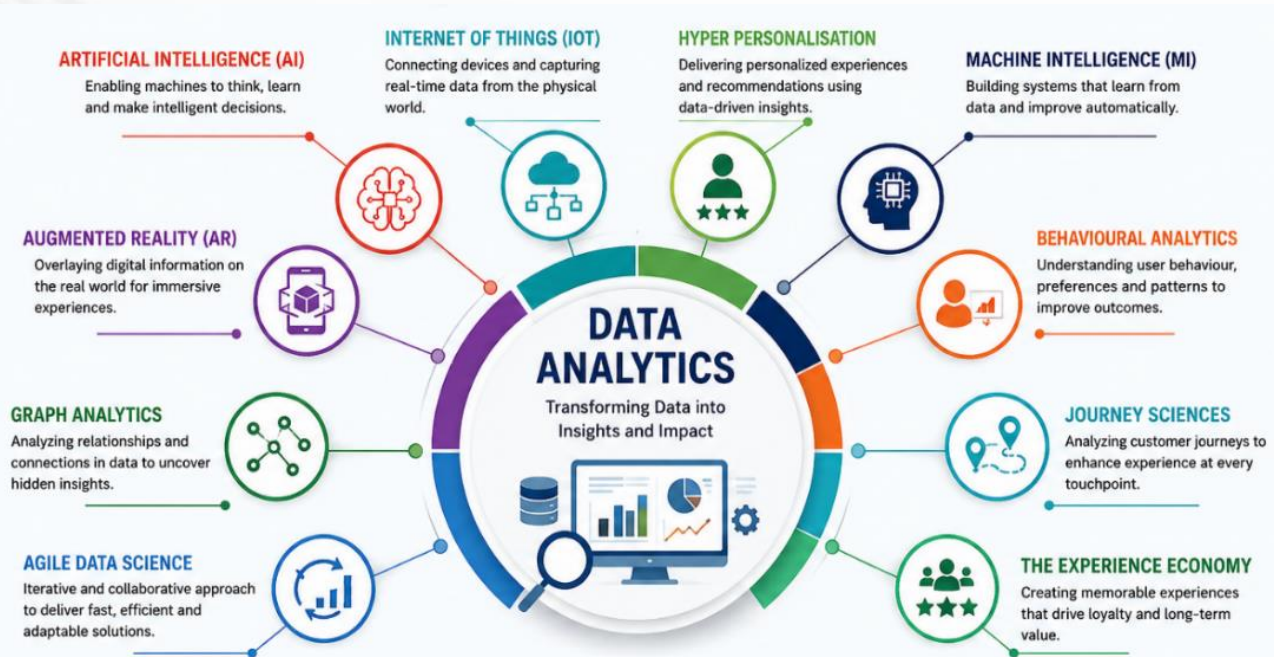


Data Analytics Lifecycle

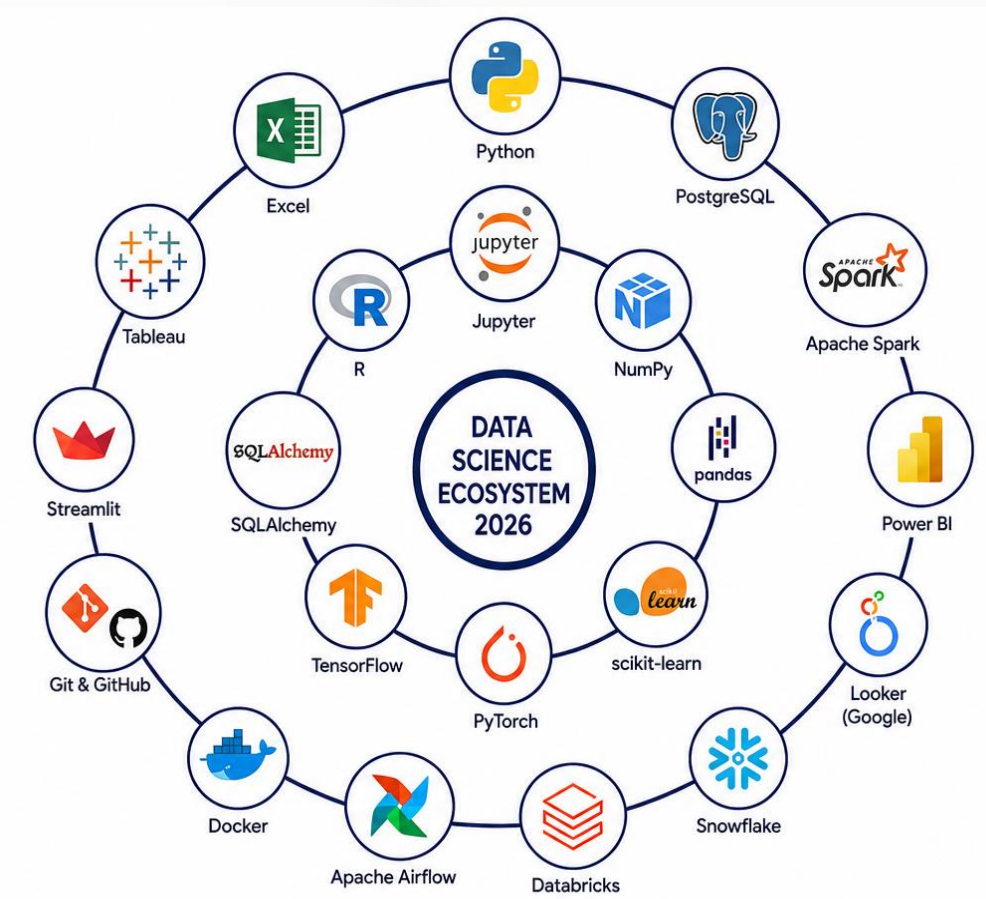
The Data Analytics Lifecycle is a structured process used to collect, process, analyze, and interpret data for effective decision-making and problem solving. It includes stages such as business understanding, data collection, data preparation, data analysis, model building, visualization, and deployment to generate meaningful insights from data. The lifecycle also involves continuous monitoring and improvement to ensure accuracy, efficiency, and reliability of analytical models. It helps organizations optimize operations, predict outcomes, identify trends, and support data-driven innovation across various domains.



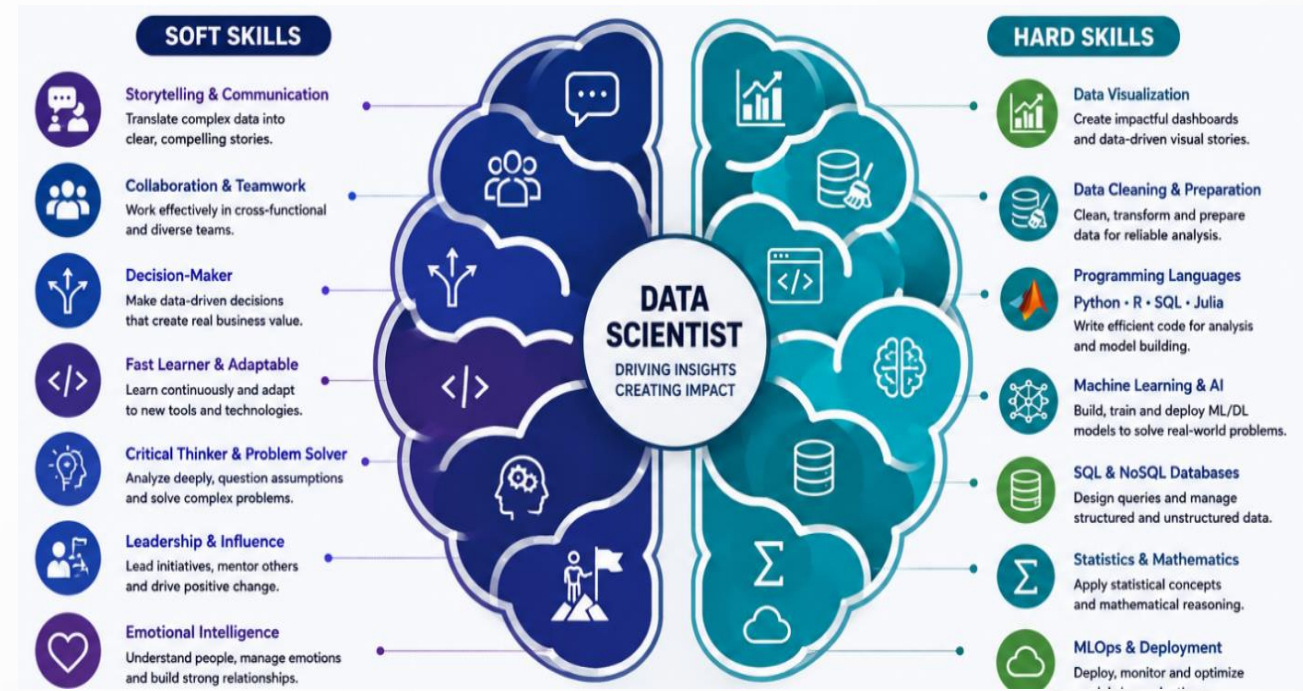
Emerging Areas of Data Analytics



Data Science Tools



Essential Skill for Data Scientist



Specialized Laboratories

Cloud Application Development Centre:

IARE has a MoU with Manjra Soft Solution Pty Ltd. to establish an industry support Cloud Application Development Centre. The centre is focused on the creation of innovative software technologies for simplifying the development and deployment of applications on private or public Clouds. Aneka platform plays the role of Application Platform as a Service for Cloud Computing. Aneka supports various programming models involving Task Programming, Thread Programming and MapReduce Programming and tools for rapid creation of applications and their seamless deployment on private or public Clouds to distribute applications.

Aneka technology primarily consists of two key components:

- ✚ SDK (Software Development Kit) containing application programming interfaces (APIs) and tools essential for rapid development of applications. Aneka APIs supports three popular Cloud programming models: Task, Thread, and MapReduce.
- ✚ A Runtime Engine and Platform for managing deployment and execution of applications on private or public Clouds.

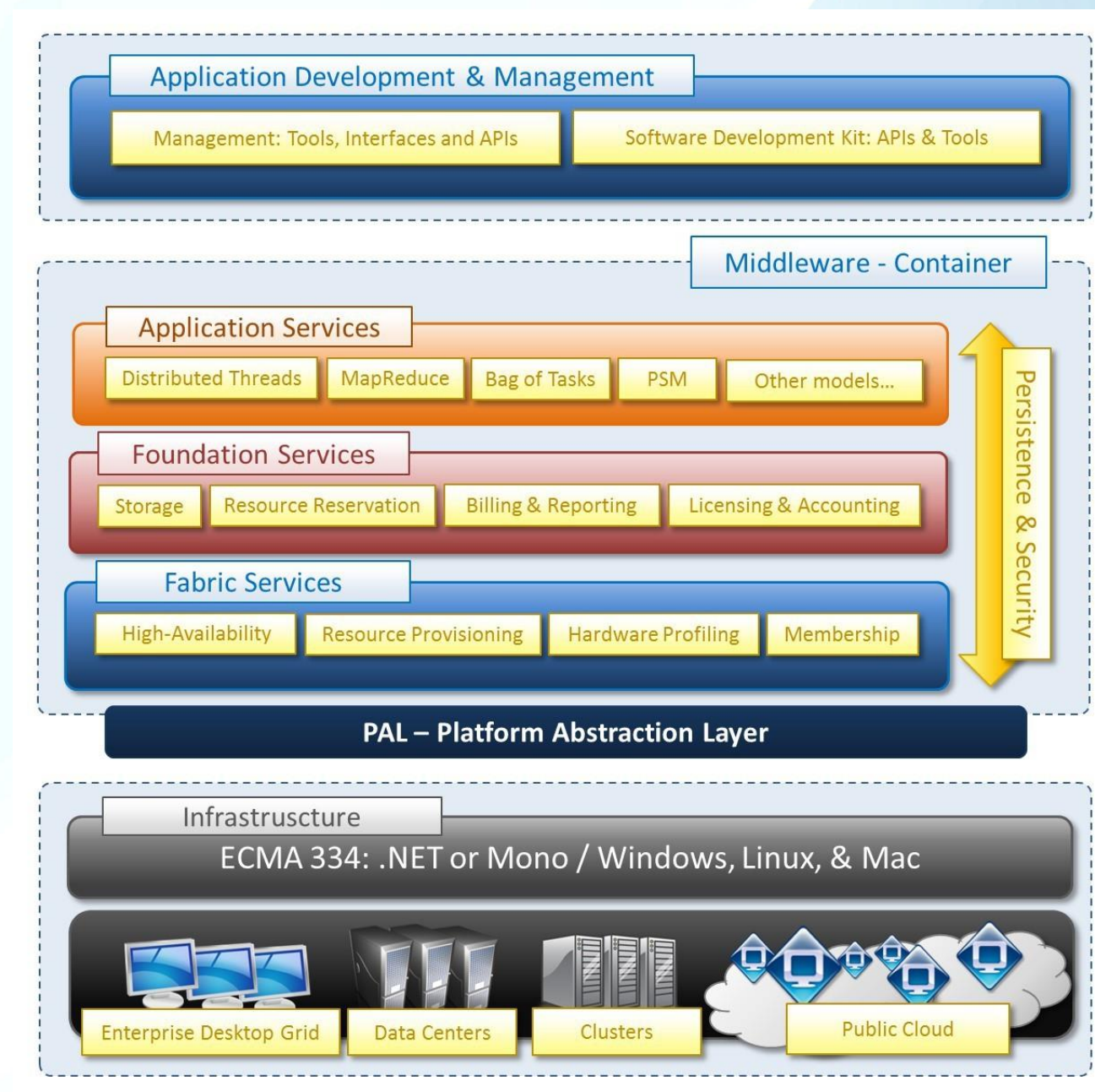
IARE has Augment Reality/Virtual Reality center which provides students with hands-on experience in using cutting-edge technologies to visualize complex concepts, conduct experiments, and develop solutions to real-world problems. AR & VR labs can also foster creativity, collaboration, and critical thinking skills, which are essential for success in their careers. The center will engage in research, teaching and services for developing advanced methods and algorithms for near-real 3D user interfaces and exploratory data analysis in virtual environments.

Highlights of Aneka Center:

- ✚ Support of multiple programming and application environments Simultaneous support of multiple run-time environments
- ✚ Rapid deployment tools and framework
- ✚ Simplicity in developing applications on Cloud
 - Dynamic Scalability
- ✚ Ability to harness multiple virtual and/or physical machines for accelerating application result
- ✚ Provisioning based on QoS/SLA

Aneka Architecture:

Aneka is a platform and a framework for developing distributed applications on the Cloud. Aneka provides developers with a rich set of APIs for transparently exploiting such resources and expressing the business logic of applications by using the preferred programming abstractions. The Aneka based computing cloud is a collection of physical and virtualized resources connected through a network, which are either the Internet or a private intranet



Data Science Center

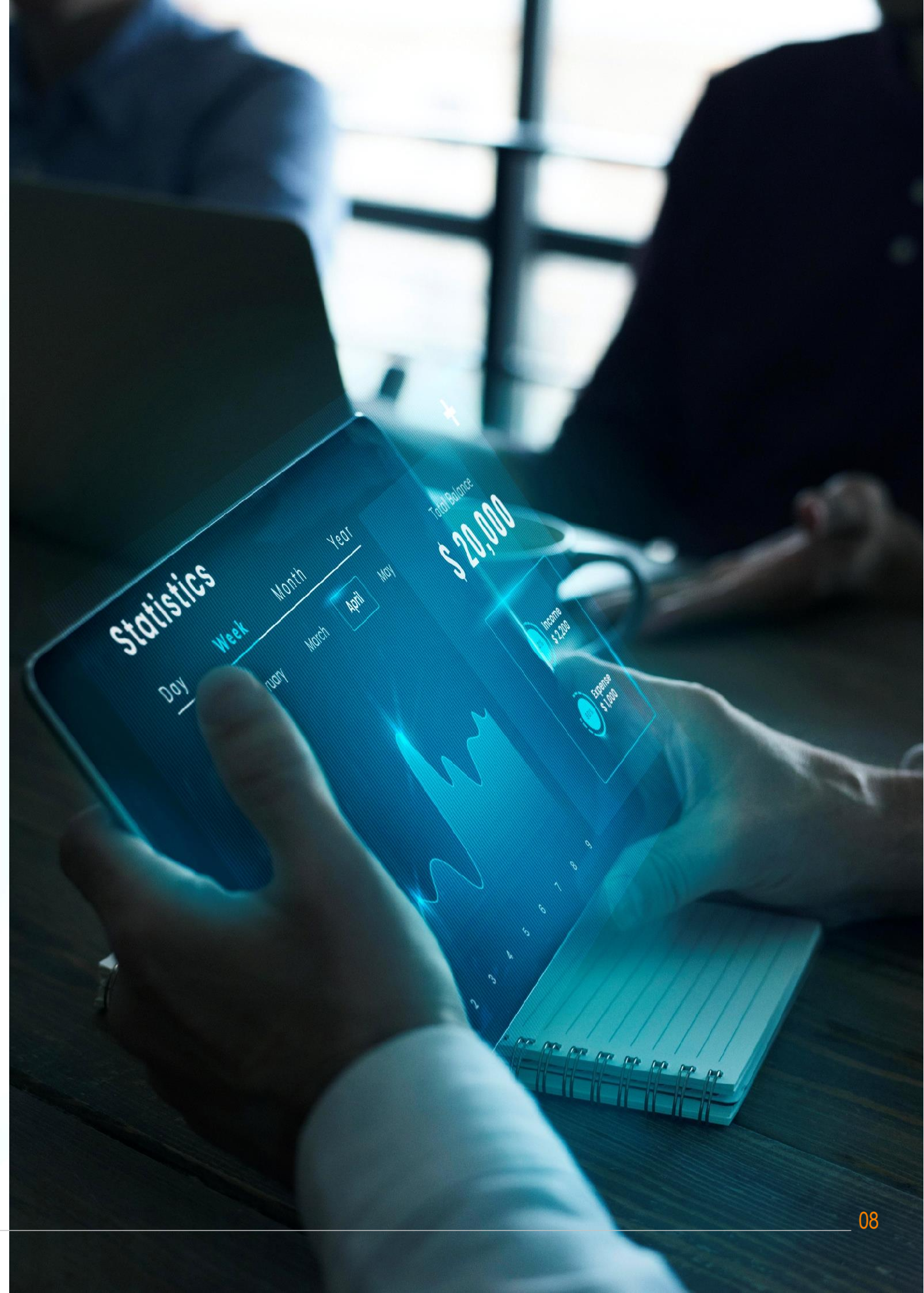
The Data Science Center is an advanced research and innovation facility established to provide students, researchers, and faculty members with practical exposure to modern Data Science technologies and applications. The center is designed to support learning in core programming languages such as C, C++, Python, and Java, while also enabling hands-on experience in emerging domains including Machine Learning, Artificial Intelligence, Deep Learning, Data Mining, Computer Vision, and Big Data Analytics. The center facilitates database design and management through industry-relevant platforms such as Oracle, MySQL, and other advanced computing frameworks.

The center provides a collaborative computing environment equipped with modern software tools, cloud-enabled platforms, and analytical technologies including Python, R, OpenCV, TensorFlow, and related AI frameworks. Each laboratory session is structured to bridge the gap between theoretical concepts and real-world implementation through practical programming, algorithm development, and data-driven problem solving. The Data Science Center welcomes students, researchers, interns, and faculty members from multidisciplinary backgrounds who are interested in transforming large and complex datasets into meaningful knowledge and intelligent solutions.

The center focuses on developing innovative and scalable solutions for real-world challenges in areas such as data analytics, machine learning, information retrieval, network analysis, and computer vision. It encourages research and innovation through project-based learning, industry collaboration, research publications, internships, hackathons, and technology-driven societal applications.

Objectives:

- ✚ To develop advanced algorithms and software tools for data management, analytics, and intelligent decision-making.
- ✚ To provide practical exposure in Machine Learning, Artificial Intelligence, Deep Learning, Data Mining, and Big Data technologies.
- ✚ To apply data-driven approaches and network analysis techniques to solve real-world industrial and societal problems.
- ✚ To explore scalable statistical and computational methods for data mining, optimization, predictive analytics, and complex data modelling.
- ✚ To promote interdisciplinary research, innovation, and skill development in emerging technologies and intelligent systems.
- ✚ To support students and researchers in developing industry-ready skills through practical implementation, research activities, and collaborative learning environments.



Laboratory Details

1 Statistical Programming Laboratory

Statistical Programming Laboratory provides a fundamental concept in statistics for data science. Students will learn statistical inference including estimation, hypothesis testing and nonparametric tests. Further, students will be introduced to Bayesian inference, linear regression and classification. R will be used to apply these statistical methods. At the end of the course, students should be able to apply the statistical methods to real large data sets.

Major Equipment

Computer Systems – 36 Nos

Make: Acer

Model: Veriton M200

Configuration: 1Intel core-i5-H510, Processor, 16GB DDR4, 512 HDD, Bluetooth, Wi-Fi,22" Monitor, Keyboard, Mouse

Software: R-Studio

2 Data Structures Laboratory

The Data Structure lab intends to provide the students a practical knowledge of data structures so that the abstractions discussed in lecture classes are made concrete. The lab demonstrates familiarity with major algorithms and data structures and analyzes performance of algorithms. It is used to choose the appropriate data structure and algorithm design method for a specified application and determine which algorithm or data structure to use in different scenarios.

Major Equipment

Computer Systems – 36 Nos

Make: Acer

Model: Veriton M200

Configuration: 1Intel core-i5-H510, Processor, 16GB DDR4, 512 HDD, Bluetooth, Wi-Fi,22" Monitor, Keyboard, Mouse

Software: Python, Google Colab and Spyder.

3 Data Handling and Visualizations Laboratory

Data handling is the process of collecting, organizing, and presenting the data in a way to analyze, make predictions, draw conclusions, and make decisions. Data visualization is a part of exploratory data analysis, a prior step before a full-pledged data analysis. This laboratory course is intended to offer practical knowledge and skills in both data handling and visualization. In this laboratory python packages such as NumPy, SciPy and Pandas for computations, and the visualization packages such as seaborn and matplotlib. Hands-on exercises are designed to explore the basic data importing, exploration, visualization, preliminary data analysis and data exporting techniques using core python and its packages.

Major Equipment

Computer Systems – 36 Nos

Make: Acer

Model: Veriton M200

Configuration: 1Intel core-i5-H510, Processor, 16GB DDR4, 512 HDD, Bluetooth, Wi-Fi,22" Monitor, Keyboard, Mouse

Software: Python, Google Colab and Spyder.

4 Database Management Systems Laboratory

A database management system (DBMS) is a collection of programs that enables users to create and maintain databases and control all access to them. Database Management Systems Laboratory provides working on existing database systems, designing of database, creating relational database, analysis of table design. The lab course also provides practical knowledge to understand advanced database concepts such as Datamining and Big Data Analysis.

Major Equipment

Desktop Computer Systems – 36 Nos

Make: Acer

Model: Veriton M200

Configuration: 1Intel core-i5-H510, Processor, 16GB DDR4, 512 HDD, Bluetooth, Wi-Fi,22" Monitor, Keyboard, Mouse

Software: MySQL and Oracle

5 Data Mining and Warehousing Laboratory

The Data Mining and Warehousing Laboratory is a dynamic research facility focused on exploring and implementing advanced techniques for extracting valuable insights from large datasets. Utilizing cutting-edge tools and methodologies, students investigate patterns, trends, and correlations within data to inform decision-making processes. Additionally, the laboratory specializes in designing efficient data storage and retrieval systems to support the needs of various industries and applications.

Major Equipment

Desktop Computer Systems – 36 Nos

Make: Acer

Model: Veriton M200

Configuration: 1Intel core-i5-H510, Processor, 16GB DDR4, 512 HDD, Bluetooth, Wi-Fi,22" Monitor, Keyboard, Mouse

Software: Weka, RapidMiner, Orange.

6 Machine Learning Algorithms Laboratory

Machine Learning Algorithms Laboratory provides the application aspects of machine learning in the domains of artificial intelligence, machine learning, deep learning, numerical optimization, and natural language processing. Also, to develop applications in the area of computational biology, object detection in images, video segmentation and summarization, detection of rare topics in text documents and statistical modelling of computer systems.

Major Equipment

Desktop Computer Systems – 36 Nos

Make: Acer **Model:** Veriton M200

Configuration: 1Intel core-i5-H510, Processor, 16GB DDR4, 512 HDD, Bluetooth, Wi-Fi,22" Monitor, Keyboard, Mouse

Software: Jupiter Notebook, Pycham, Google Colab, Spyder and Pytorch

7 Big Data Management Laboratory

The Big Data Management laboratory equip students with hands-on experience in handling large datasets, employing technologies like Hadoop, Spark, and NoSQL databases. Through practical exercises, students learn data ingestion, storage, processing, and analysis techniques, crucial for modern data-driven enterprises.

Major Equipment

Desktop Computer Systems – 36 Nos

Make: Acer

Model: Veriton M200

Configuration: 1Intel core-i5-H510, Processor, 16GB DDR4, 512 HDD, Bluetooth, Wi-Fi,22" Monitor, Keyboard, Mouse

Software: Apache Hadoop, Spark, MongoDB

8 Computer Networks Laboratory

The Computer Networks Laboratory offers students practical experience in configuring, analyzing, and troubleshooting network setups. Through hands-on exercises, students learn about protocols, network architectures, security mechanisms, and data transmission techniques essential for understanding and working with distributed systems, a key aspect of modern data science.

Major Equipment

Desktop Computer Systems – 36 Nos

Make: Acer

Model: Veriton M200

Configuration: 1Intel core-i5-H510, Processor, 16GB DDR4, 512 HDD, Bluetooth, Wi-Fi,22" Monitor, Keyboard, Mouse

Software: Python, Wireshark.

9 Mobile and Web Application Development Laboratory

Web application development design allows web-based projects to behave and perform like mobile apps. Web applications engage users by focusing on responsive interactions, while accessed over the internet. Web apps come in a variety of shapes and sizes. Web application development provides the process of designing, building, testing and deploying web-based applications that will be installed on remote servers and delivered to users or customers via the internet.

Major Equipment

Desktop Computer Systems – 36 Nos

Make: Acer

Model: Veriton M200

Configuration: 1Intel core-i5-H510, Processor, 16GB DDR4, 512 HDD, Bluetooth, Wi-Fi,22" Monitor, Keyboard, Mouse

Software: XAMPP Server and WAMP.

10 Distributed Systems Security Laboratory

The Distributed Systems Security Laboratory offers B. Tech data science students practical training in securing distributed computing environments. Through hands-on exercises, students explore authentication, encryption, access control mechanisms, and threat detection techniques. They gain insights into safeguarding data integrity, confidentiality, and availability, crucial for modern data-centric applications.

Major Equipment

Desktop Computer Systems – 36 Nos

Make: Acer

Model: Veriton M200

Configuration: 1Intel core-i5-H510, Processor, 16GB DDR4, 512 HDD, Bluetooth, Wi-Fi,22" Monitor, Keyboard, Mouse

Software: Sun RPC, Java RMI

FACULTY INFORMATION



Sajja Suneel

Associate Professor & Head

Ph. D (2023),
Veer Bahadur Singh Purvanchal University,
A State University, Jaunpur, UP, India.

Postgraduate Degree (2010),
Hindustan University, Chennai, TamilNadu, India.

Undergraduate Degree
(2008), Vignan Engineering College (JNTU), Guntur,
Andhra Pradesh, India.

AREA OF SPECIALIZATION

Artificial Intelligence,
Data Mining,
Deep Learning,
Image Processing,
Internet of Things (IoT),
Machine Learning and
Quantum Computing,



Dr. G Ganapathi Rao

Associate Professor & Deputy Head

Ph. D (2017), Andhra University,
Visakhapatnam, AP

M.Tech (2011), JNTU,
Hyderabad, TS

B. Tech (2003), Acharya Nagarjuna
University, Guntur, AP

AREA OF SPECIALIZATION

Machine Learning,
Deep Learning and Computer
Vision



Dr. R Obulakonda Reddy

Professor

Ph. D (2017), JNTU, AP

M.Tech (2009), JNTU,
Hyderabad, TS

B. Tech (2005), Sri
Krishnadevaraya
University, Anantapur, AP

AREA OF SPECIALIZATION

Machine Learning,
Deep Learning and
Computer Vision



Dr. Mohammad Rafi D

Associate Professor

Ph. D (2020), Veltch
University Chennai,
Tamil Nadu

M.Tech (2008), JNTU,
Hyderabad, TS

B. Tech (2005), JNTU,
Hyderabad, TS

AREA OF SPECIALIZATION

Data Mining



Dr. D Sreenivasulu

Associate Professor

Ph. D (2023), Doctoral Degree
Rayalaseema University, Pasupula

M.Tech (2006), JNTUH, Hyderabad

B. Tech (1994), Koneru Lakshmaiah
College of Engineering, Guntur

AREA OF SPECIALIZATION

Machine Learning



Dr. S Sreekanth

Associate Professor

Ph. D (2020), Sri Venkateswara
University, Tirupathi, AP

M.Tech (2009), Satyabama
University, Chennai, Tamilnadu

B. Tech (1988), SV
University, Tirupathi, AP

AREA OF SPECIALIZATION

Machine Learning, Computer
Vision



Dr. Ranjith Kumar Gatla

Associate Professor

Ph. D (2019), Wuhan
University of Technology,
China

M.Tech (2011), SRM
(Deemed to be University),
Chennai, Tamil Nadu

B. Tech (2008), JNTU,
Hyderabad, TS

AREA OF SPECIALIZATION

Machine Learning,
Computer Vision



Dr. B. Navothna

Associate Professor

Ph. D (2025), Gitam (Deemed to
be University), Vishakapatnam

M.Tech (2016), JNTU,
Hyderabad, TS

B. Tech (2014), JNTU,
Hyderabad, TS

AREA OF SPECIALIZATION

Data Science in Grid-connected
PV Plants, and AI applications in
Power Systems.

Assistant Professors

Mr. Y Mallikarjun

Mr. Chitte Anil

Mr. B.Ramesh

Mr. V Koti Reddy

Mr. D.V.S. Sagar Naidu

Ms. N Lakshmi Deepthi

Ms. P Aswani

Ms. R Tejaswini

Ms. J Sirisha

Ms. K Praveena

Ms. C Vanitha Reddy

I Year I Semester

Course Code	Course Name	Credits	Prerequisites
THEORY			
AHSE01	Matrices and Calculus	4	Mathematics
AHSE02	Engineering Physics	3	Physics
AHSE04	English for Skill Enhancement	3	English Fundamentals
ACSE02	Essentials of Problem Solving	3	--
ACSE01	Object Oriented Programming	3	Programming Basics
PRACTICALS			
AHSE07	English Language and Communication Skills Laboratory	1	English for Skill Enhancement
ACSE03	Object Oriented Programming Laboratory	1	Object Oriented Programming
AHSE05	Engineering Physics Laboratory	1	Engineering Physics
ACSE04	Front-End Web Development Laboratory	1	--
EXPERIENTIAL ENGINEERING EDUCATION (E₃EED)			
--	Induction Program	--	--
Total Credits		20	
Cumulative Credits		20	

I Year II Semester

Course Code	Course Name	Credits	Prerequisites
THEORY			
AHSE03	Engineering Chemistry	3	Chemistry
AHSE08	Ordinary Differential Equations and Vector Calculus	3	Mathematics
ACSE06	AI Foundations	3	Programming Fundamentals
ACSE05	Data Structures	3	Problem Solving
AEEE01	Basic Electrical and Electronics Engineering	3	Physics
PRACTICALS			
AHSE06	Engineering Chemistry Laboratory	1	Engineering Chemistry
ACSE07	Programming for Problem Solving Laboratory	1	Problem Solving
ACSE08	Data Structures Laboratory	1	Data Structures
AMEE03	Computer Aided Engineering Graphics	2	Engineering Graphics Basics
ACSE09	Knowledge Representation and Reasoning Laboratory	1	AI Foundations
Total Credits		21	
Cumulative Credits		41	

II Year I Semester

AITE01	Computer System and Architecture	3	Digital Fundamentals
ACSE10	Design and Analysis of Algorithms	3	Data Structures
AITE02	Database Management Systems	3	Programming Fundamentals
ACDE01	Data Handling and Visualization Techniques	3	Programming Fundamentals
PRACTICALS			
ACSE12	Design and Analysis of Algorithms Laboratory	1	Design and Analysis of Algorithms
AITE03	Database Management Systems Laboratory	1	Database Management Systems
ACDE02	Data Handling and Visualization Techniques Laboratory	1	Data Handling and Visualization Techniques
ACSE14	Mobile Applications Development Laboratory	1	Object Oriented Programming
SKILL ENHANCEMENT PROJECT			
AITE04	Programming with Objects	1	Object Oriented Programming
MANDATORY COURSE			
AMCE01	Environment and Sustainable Development	1	--
Total Credits		21	
Cumulative Credits		62	

II Year II Semester

Course Code	Course Name	Credits	Prerequisites
THEORY			
AITE06	Software Engineering	3	Programming Fundamentals
ACSE11	Operating System	3	Computer Architecture
AITE05	Computer Networks	3	Computer Fundamentals
ACSE15	Internet Programming	3	Web Technologies
ACSE16	Knowledge Discovery and Data Mining	2	Database Management Systems
PRACTICALS			
AITE07	Software Engineering and Computer Networks Laboratory	1	Software Engineering & Computer Networks
ACSE18	Internet Programming Laboratory	1	Internet Programming
ACSE19	Knowledge Discovery and Data Mining Laboratory	1	Knowledge Discovery and Data Mining
ACSE20	Java Full Stack Development	1	Object Oriented Programming
EXPERIENTIAL ENGINEERING EDUCATION (E₃EED)			
ASDE01	Prototype and Design Building	1	--
SKILL ENHANCEMENT PROJECT			
ASDE02	Engineering Entrepreneurship and Skill Development	1	--
Total Credits		20	
Cumulative Credits		82	

III Year I Semester

Course Code	Course Name	Credits	Prerequisites
THEORY			
ACSE17	Applied Artificial Intelligence	3	AI Foundations
AHSE10	Business Economics and Financial Analysis	3	--
ACAE04	Big Data and Advanced Data Mining	3	Data Mining
Professional Elective-I	Professional Elective-I	3	Depends on Elective
Open Elective-I	Open Elective-I	2	--
PRACTICALS			
ACDE08	Applied Artificial Intelligence Laboratory	1	Applied Artificial Intelligence
ACDE09	Big Data and Advanced Data Mining Laboratory	1	Big Data and Advanced Data Mining
ACAE10	Creative Coding Laboratory	1	Programming Skills
EXPERIENTIAL ENGINEERING EDUCATION (E₃EED)			
ASDE03	Engineering Design Project	2	--
SKILL ENHANCEMENT PROJECT			
ACSE28	DevOps Engineering	2	Software Engineering
MANDATORY COURSE			
AMCE02	Indian Knowledge System	1	--
Total Credits		21	
Cumulative Credits		103	

III Year II Semester

Course Code	Course Name	Credits	Prerequisites
THEORY			
AITE08	Theory of Computation	3	Discrete Mathematics
ACDE10	Machine Learning Algorithms	3	Probability & Statistics
ACDE11	Cloud Computing	3	Computer Networks
Professional Elective-II	Professional Elective-II	3	Depends on Elective
Open Elective-II	Open Elective-II	2	--
PRACTICALS			
AHSE11	Professional Studies and Skill Development Laboratory	1	--
ACDE15	Machine Learning Algorithms Laboratory	2	Machine Learning Algorithms
ACDE16	Cloud Computing Laboratory	1	Cloud Computing
EXPERIENTIAL ENGINEERING EDUCATION (E₃EED)			
ASDE04	Engineering Development Project	1	Engineering Design Project
MANDATORY COURSE			
AMCE03	Gender Sensitization	1	--
Total Credits		20	
Cumulative Credits		123	

IV Year I Semester

Course Code	Course Name	Credits	Prerequisites
THEORY			
AHSE12	Management Science and Psychology	3	--
ACDE17	Entrepreneur Thinking and Digital Models	3	Entrepreneurship Basics
Professional Elective-III	Professional Elective-III	3	Depends on Elective
Professional Elective-IV	Professional Elective-IV	3	Depends on Elective
Open Elective-III	Open Elective-III	2	--
PRACTICALS			
ACDE27	Data Stream Mining Lab	1	Data Mining
ACDE28	Web and Social Media Analytics Lab	1	Web Technologies
ACAE31	Generative AI Laboratory	1	Artificial Intelligence
SKILL ENHANCEMENT PROJECT			
ASDE05	Student Learning Model – Projects / Products	2	--
Total Credits		21	
Cumulative Credits		144	

IV Year II Semester

Course Code	Course Name	Credits	Prerequisites
THEORY			
Professional Elective-V	Professional Elective-V	3	Depends on Elective
Professional Elective-VI	Professional Elective-VI	3	Depends on Elective
PROJECT WORK			
ACDE33	Capstone Project Work	14	Completion of Core Courses
Total Credits		20	
Cumulative Credits		164	



Curriculum Designed Based on Professional Modules from Leading It Industries Professional modules from Alibaba, Huawei and Microsoft in several subjects so that students have opportunity to obtain professional certificates from these companies upon graduation.

ELECTIVE COURSES

PROGRAM ELECTIVES COURSES (PEC)

The below listed courses are Professional electives and the student has to study six courses as professional electives.

Elective Group	Course Code	Course Name	Prerequisites	Preferred Semester	Credits
Professional Elective-I	ACDE03	Natural Language Processing	Python Programming, Introduction to Machine Learning	V	3
	AITE28	Adhoc and Sensor Networks	Data Communication, Basic Wireless Communication Concepts	V	3
	ACAE06	Software Testing Methodologies	Software Engineering	V	3
	ACDE04	Computer Vision	Digital Image Processing	V	4
	ACDE05	Ethics and Privacy in Data Science	Fundamentals of Data Science	V	3
Professional Elective-II	ACDE12	Intelligent Systems	Artificial Intelligence Fundamentals	VI	3
	ACAE13	Blockchain Technology	Cryptography Basics	VI	3
	AITE18	Software Project Management	Software Engineering	VI	3
	ACAE14	Mining Massive Datasets	Database Management Systems	VI	3
	ACDE13	Distributed Systems	Operating Systems, Database Management Systems	VI	3
Professional Elective-III	ACAE24	Agile Methodology	Software Engineering, Software Project Management	VII	3
	ACDE18	Cryptography and Network Security	Computer Networks	VII	3
	ACDE19	Penetration Testing and Incident Response	Ethical Hacking Basics	VII	3
	ACDE20	Information Retrieval Systems	Database Management Systems	VII	3
	ACDE21	Data-Driven Analytics for Software Development	Software Engineering, Data Analytics	VII	3
Professional Elective-IV	ACDE22	Augmented and Virtual Reality	Computer Graphics, Fundamentals of Computer Vision	VII	3
	ACDE23	Data Science in Bioinformatics	Fundamentals of Data Science	VII	3
	ACAE26	Quantum Computing	Fundamentals of Algorithms	VII	3
	ACAE27	Robotic Process Automation	Workflow Automation Basics	VII	3
	ACDE24	Cyber Forensics	Cyber Security Fundamentals	VII	3
Professional Elective-V	ACSE43	Human Computer Interaction (UI & UX)	Basics of Web Technologies	VIII	3
	AITE13	Internet of Things	Sensors & Actuators Basics	VIII	3
	ACDE29	Data Streaming Mining	Fundamentals of Data Mining	VIII	3
	ACAE35	Knowledge Representation and Reasoning	Artificial Intelligence	VIII	3
	ACDE30	Reinforcement and Robot Learning	Machine Learning	VIII	3
Professional Elective-VI	ACAE37	High Performance Computing	Computer Architecture	VIII	3
	ACAE38	Edge Computing	Distributed Systems	VIII	3
	ACDE31	Pattern Recognition	Fundamentals of Machine Learning	VIII	3
	ACDE32	Optimization Techniques	Linear Algebra, Probability Theory	VIII	3
	ACAE40	Classical Automation Techniques	Embedded Systems	VIII	3

OPEN ELECTIVE COURSES (OEC)

The courses listed below are offered by the Department of CSE (AI&ML) for students of other departments.

Open Elective Group	Course Code	Course Name	Credits
Open Elective-I	ACDE06	Data Science Tools and Techniques	2
	ACDE07	Data Analytics using Python	2
Open Elective-II	ACDE14	Soft Computing	2
	ACAE28	Cluster Computing	2
Open Elective-III	ACDE25	Android Application Development	2
	ACDE26	Graph Theory	2

Value Added Courses

Objective:

Value added courses are provided to equip the students with knowledge and skills outside of the curriculum or to meet any specific requirements of the industry. The following are the Value-Added Courses provided to students by various departments in our institution.

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- Data Scalability and Distribution (Amazon Web Services, Microsoft Azure, Google Cloud Platform etc.)
- Software Developer (Restful webservices / Microservices, Rust programming, MEAN, MERN, MEVN)
- Data Science (Data visualization, Data wrangling, Bigdata Technologies, Business Intelligence etc.)
- Operating Systems (IBM I, Mac OS, Linux, Haiku etc.)
- Debugging
- Testing (Selenium, TestNG)
- Cyber Security (Network Security, Threat Intelligence and Analysis / Risk Assessment and Management)
- Software Architect
- Blockchain Technology

COURSE SYNOPSIS

CORE COURSES

Probability and Statistics

The Probability and Statistics course explores fundamental concepts in probability theory and statistical analysis. Topics include probability distributions, hypothesis testing, confidence intervals, regression analysis, and Bayesian inference. Students learn to analyze data, make predictions, and draw conclusions using statistical methods. Through lectures, problem-solving sessions, and hands-on projects, students develop critical thinking skills and gain proficiency in statistical software.

Computer Architecture and Operating Systems

This course is designed to explore the fundamental principles underlying the design and function of modern computer systems. The course delves into topics such as processor architecture, memory hierarchy, input/output systems, and parallel computing. Students analyze the relationship between hardware and software, studying how operating systems manage system resources, scheduling processes, and ensuring security. Ultimately, the course equips students with a comprehensive understanding of the intricate interplay between computer architecture and operating systems, preparing them for advanced studies or careers in the field.

Discrete Mathematical Structures

This course explores foundational concepts crucial in computer science and mathematics. Topics include set theory, logic, proof techniques, relations, functions, combinatorics, and graph theory. Through rigorous analysis, students develop problem-solving skills applicable in algorithm design, cryptography, and database management. Emphasizing abstraction and precision, the course delves into fundamental principles underlying computational processes, enabling students to analyze complex systems with clarity. By learning these discrete structures, students gain a robust framework for tackling real-world challenges in computing and beyond, fostering critical thinking and mathematical maturity essential for success in various fields.

Data Structures

This course explores fundamental concepts and techniques for organizing, storing, and accessing data efficiently. It covers topics such as arrays, linked lists, stacks, queues, trees, graphs, and hash tables, delving into their implementations, operations, and algorithms. Through practical exercises and projects, students learn to analyze problems, select appropriate data structures, and design algorithms for optimal performance. Emphasis is placed on understanding time and space complexities, enabling students to make informed choices when solving real-world problems. Additionally, the course often includes discussions on abstract data types, recursion, sorting, searching, and dynamic programming, preparing students for advanced data manipulation and algorithm design challenges.

Web Systems Engineering

This course delves into the design, development, and maintenance of robust web-based systems. It covers fundamental concepts of web architecture, including client-server communication, database integration, and scalability. Students explore technologies such as HTML, CSS, JavaScript, and frameworks like React or Angular. They learn to build dynamic web applications using server-side scripting languages such as PHP, Python, or Node.js. Emphasis is placed on security practices, performance optimization, and usability principles. Through hands-on projects, students gain practical experience in deploying, monitoring, and troubleshooting web systems, preparing them for roles in web development and IT infrastructure management.

Design and Analysis of Algorithms

This course delves into foundational principles and techniques for creating and evaluating efficient algorithms. Covering topics like algorithm design paradigms (such as greedy, divide and conquer, dynamic programming), complexity analysis (big O notation, worst-case analysis), and data structures, it equips students with the tools to solve computational problems effectively. Through theoretical study and practical implementation exercises, learners develop skills in algorithmic problem-solving, optimization, and understanding computational complexity. Emphasis is placed on algorithmic correctness, efficiency, and scalability, preparing students for real-world applications in fields like computer science, engineering, and data analysis.

Applied Artificial Intelligence

This course delves into fundamental concepts and practical applications within AI. Topics include search techniques such as breadth-first and depth-first search, reasoning systems including propositional and first-order logic, game playing strategies like minimax and alpha-beta pruning, and various AI applications such as natural language processing and computer vision. Additionally, students explore the principles of intelligent agents, covering topics like Robot Hardware, Robotic Perception, Planning to Move, Planning Uncertain Movements, Moving Software Architectures, navigation and motion planning in application domains. Through this subject students gain a comprehensive understanding of how AI techniques are implemented and utilized across different domains.

Data Handling and Visualizations

This course equips students with essential skills for managing and analyzing data effectively. Topics include data cleaning, manipulation, and visualization techniques using popular tools like Python, and R. Students learn to extract valuable insights from datasets, employing descriptive statistics and exploratory data analysis. They delve into various visualization methods to present findings compellingly, including charts, graphs, and interactive dashboards. Practical exercises and projects reinforce comprehension, fostering proficiency in handling real-world data scenarios. By course end, participants emerge equipped to tackle data-driven challenges, adept at transforming raw information into meaningful narratives through visualization and analysis.

Database Management Systems

This course provides a comprehensive overview of key concepts and practices. Beginning with conceptual modeling, students delve into the relational approach, understanding the fundamentals of database design. They learn SQL-query basics, enabling them to interact with databases Efficiently. RDBMS normalization principles are explored to ensure data integrity and emciency. Transaction management techniques are studied to maintain database consistency and reliability. Finally, students examine data storage strategies and query processing methods to optimize database performance. Through theoretical learning and practical exercises, students gain a strong foundation in database management essential for modern information systems.

Software Engineering

This course offers a structured approach to developing high-quality software systems. The course covers various stages of the software development lifecycle, including requirements analysis, design, implementation, testing, and maintenance. Students learn software development methodologies such as Agile, Waterfall, and DevOps, emphasizing the importance of teamwork, communication, and project management. Topics include software architecture, coding standards, version control, and quality assurance techniques. Through case studies and hands-on projects, students gain practical experience in designing scalable, maintainable, and reliable software solutions. The course equips them with the skills and knowledge needed to thrive in the dynamic field of software engineering.

Theory of Computation

This course delves into the fundamental principles governing computation. Beginning with automata theory, students explore abstract machines such as finite automata and pushdown automata, analyzing their capabilities and limitations in solving computational problems. Formal language theory examines the properties of languages and grammars, establishing connections between automata and languages through the Chomsky hierarchy. Complexity theory delves into the classification of computational problems based on their inherent difficulty, introducing concepts like time and space complexity. Through rigorous mathematical analysis and problem-solving exercises, students develop a deep understanding of computation's theoretical underpinnings, essential for designing emcient algorithms and solving complex computational problems.

Optimization Techniques

This course explores strategies to enhance emciency and effectiveness across various domains. Students delve into mathematical models and algorithms aimed at maximizing or minimizing objective functions while adhering to constraints. Techniques include linear programming, dynamic programming, and metaheuristic algorithms like genetic algorithms and simulated annealing. Through case studies and practical applications, students learn to analyze complex problems, formulate optimization models, and implement algorithms to find optimal solutions. The course equips students with invaluable skills to tackle real-world challenges in diverse fields such as engineering, operations research, finance, and logistics, fostering a deeper understanding of optimization principles and their practical implications.

Machine Learning

This course offers a comprehensive exploration of algorithms and techniques that enable computers to learn from data and make predictions or decisions. Students delve into supervised learning methods such as regression and classification, unsupervised learning techniques like clustering and dimensionality reduction, and reinforcement learning principles for sequential decision-making. Emphasis is placed on understanding model evaluation, feature engineering, and hyperparameter tuning to ensure effective model performance. Practical implementation using popular libraries like scikit-learn and TensorFlow is integrated with theoretical concepts. By the course's conclusion, students acquire a solid understanding of machine learning fundamentals and the ability to apply them to real-world problems.

Computer Networks

This course offers a thorough exploration of networking principles and technologies. Beginning with foundational concepts, students learn about network architectures, protocols, and communication models. They delve into the intricacies of data transmission, including packet-switching and routing algorithms. The course covers various network types, such as LANs, WANs, and wireless networks, along with their respective technologies and topologies. Students also examine network security, addressing issues like encryption, authentication, and intrusion detection. Through theoretical study and practical exercises, students develop a comprehensive understanding of computer networks, preparing them to design, manage, and troubleshoot modern network infrastructures.

Distributed Systems and Security

This course explores the intricacies of networked computing environments. Students delve into the design and implementation of distributed systems, studying concepts such as distributed algorithms, communication protocols, and fault tolerance mechanisms. Security aspects are emphasized throughout the course, covering authentication, encryption, access control, and threat mitigation strategies specific to distributed systems. Topics also include distributed storage systems, consensus algorithms, and scalability challenges. Through theoretical discussions and hands-on exercises, students develop a deep understanding of both the theoretical principles and practical considerations essential for building secure and robust distributed systems in today's interconnected world.

Big Data Management

This course offers an in-depth exploration of handling large volumes of diverse data. It covers foundational concepts such as the 3Vs (Volume, Variety, Velocity) and scalability challenges. Students learn various big data processing frameworks like Hadoop and Spark, mastering techniques for distributed computing and parallel processing. The course addresses data ingestion, storage, and processing techniques tailored for big data environments. Advanced topics include data governance, security, and real-time analytics. Through hands-on projects and case studies, students develop skills in managing, analyzing, and deriving insights from massive datasets, preparing them for roles in industries reliant on big data technologies.

Image Processing

This course offers a thorough exploration of techniques and principles fundamental to manipulating digital images. Beginning with an introduction to image representation, students delve into essential topics such as image enhancement, restoration, and segmentation. Advanced topics include image filtering, edge detection, and feature extraction, providing students with a comprehensive understanding of image analysis. Through hands-on projects and theoretical study, students gain proficiency in using tools like MATLAB or Python libraries for image processing tasks. By the end of the course, students are equipped with the skills necessary to address real-world challenges in fields such as medical imaging, remote sensing, and computer vision.

Mobile Computing

This course delves into the intricate realm of mobile computing, offering a comprehensive overview of its principles, applications, and evolving trends. Students explore the fusion of data science methodologies with mobile technology, unraveling the potential of smartphones, wearables, and IoT devices. From understanding mobile platforms and architectures to harnessing data-driven insights for app development and optimization, this course equips learners with the skills to navigate the dynamic landscape of mobile computing. Through hands-on projects and real-world case studies, students embark on a transformative journey, mastering the fusion of data science and mobile innovation to shape the future of technology.

Parallel and Distributed Algorithms

This course delves into the intricate realm of Parallel and Distributed Algorithms, a cornerstone of B. Tech Data Science curriculum. Through this course students unravel the complexities of designing algorithms capable of executing tasks concurrently across multiple computing nodes. From understanding fundamental parallel computing concepts to exploring cutting-edge distributed systems, learners embark on a journey of innovation and efficiency. They acquire proficiency in optimizing algorithm performance for large-scale data processing, essential in today's data-driven world. By mastering this course, students unlock the power to engineer scalable solutions that propel industries forward, shaping tomorrow's technological landscape.

Cloud Computing

This course on Cloud Computing offers a comprehensive overview of the intersection between cloud technology and data science. Students delve into the fundamentals of cloud infrastructure, exploring concepts such as virtualization, scalability, and elasticity. Through projects and case studies, they master the deployment and management of data-intensive applications in cloud environments. Moreover, this course equips students with the skills to leverage cloud-based tools and platforms for data storage, processing, and analysis, enabling them to tackle real-world challenges with agility and eminency. Join us on a journey where innovation meets scalability, shaping the future of data science in the cloud.

Advanced Social, Text, and Media Analytics

This course offers a comprehensive exploration into Advanced Social, Text, and Media Analytics within the Data Science program. Through a blend of theory and practical application, students delve into cutting-edge methodologies for extracting valuable insights from diverse data sources. From sentiment analysis to natural language processing and multimedia data mining, learners uncover the intricacies of understanding human behavior and interactions in the digital sphere. With hands-on projects and real-world case studies, this course equips students with the skills to tackle complex societal challenges, drive innovation, and revolutionize industries through the power of data-driven decision-making.

Augmented Reality and Virtual Reality

This course delves into the captivating realms of Augmented Reality (AR) and Virtual Reality (VR), pioneering the fusion of data science principles with immersive technologies. Through a dynamic blend of theory and hands-on practice, students harness the power of data analytics to revolutionize AR/VR experiences. From creating lifelike simulations to enhancing user interactions, this course equips future engineers with the skills to innovate across industries. Dive into cutting-edge coursework that explores data-driven design, spatial computing, and interactive storytelling, unlocking a world where imagination meets data science to redefine the boundaries of reality. Embark on an exhilarating journey where innovation knows no bounds.

NOSQL Databases

The NoSQL Databases course provides an in-depth understanding of non-relational database systems, covering key concepts such as document, key-value, column-family, and graph databases. Students learn to design, implement, and manage NoSQL databases to handle large volumes of unstructured or semi-structured data effectively. Topics include data modeling, querying, scalability, fault tolerance, and consistency models. Through hands-on projects and case studies, students gain practical skills to address modern data storage and retrieval challenges in diverse application domains.

Natural Language Processing

Natural Language Processing equips students with skills in computational linguistics, machine learning, and data science to analyze and understand human language. Core subjects include linguistics, algorithms, statistics, and programming languages. Students learn to develop applications like chatbots, sentiment analysis tools, and machine translation systems. Practical training in NLP techniques and projects often form a significant part of the curriculum, preparing graduates for careers in AI, data science, and software engineering.

Parallel Computing

Parallel Computing explores foundational concepts, algorithms, and architectures for concurrent computation. Students delve into parallel programming paradigms, such as shared memory and distributed systems, and gain expertise in designing efficient parallel algorithms. Topics cover parallel hardware architectures, synchronization, and scalability. Practical applications include high-performance computing, data analytics, and machine learning. Hands-on projects and labs foster skills in parallel programming and system optimization.

Software Project Management

Software Project Management covers fundamental principles of project planning, execution, and monitoring within software development contexts. Topics include project lifecycle, scheduling, budgeting, risk management, and team coordination. Students learn tools and methodologies like Agile and Waterfall, as well as software engineering practices to ensure successful project delivery. Emphasis is placed on practical application through case studies and hands-on projects to prepare graduates for real-world project management roles.

Principles of IoT

Internet of Things (IoT) is the networking of physical objects that contain electronics embedded within their architecture in order to communicate and sense interactions amongst each other or with respect to the external environment. In the upcoming years, IoT-based technology will offer advanced levels of services and practically change the way people lead their daily lives. Advancements in medicine, power, gene therapies, agriculture, smart cities, and smart homes are just a few of the categorical examples where IoT is strongly established.

Information Security

Information Security typically covers topics such as cryptography, network security, ethical hacking, and secure software development. Students learn to analyze and mitigate security risks, protect information systems from cyber threats, and develop secure computing solutions. The curriculum combines theoretical knowledge with hands-on experience in areas like threat detection, intrusion prevention, and incident response. Graduates are equipped for roles in cybersecurity consulting, digital forensics, and security analysis across various industries.

Information Retrieval Systems

Information Retrieval Systems typically covers fundamental concepts of data retrieval, indexing techniques, search algorithms, and information organization. Students learn about database systems, natural language processing, and machine learning algorithms for efficient data retrieval. Practical aspects involve designing and implementing search engines, query optimization, and evaluating retrieval effectiveness. The curriculum emphasizes both theoretical understanding and practical skills necessary for developing effective information retrieval systems.

Predictive Data Analytics

Predictive Data Analytics equips students with skills in statistical analysis, machine learning, and data mining techniques to extract insights from large datasets. Courses cover programming languages like Python and R, database management, predictive modeling, and data visualization. Students learn to apply these techniques in various domains such as finance, healthcare, and marketing to make data-driven decisions. Emphasis is placed on practical applications through projects and internships.

Fuzzy Logic Systems

Fuzzy Logic Systems, students learn the fundamentals of fuzzy set theory and its applications in decision-making and control systems. Topics include fuzzy set operations, fuzzy inference systems, fuzzy clustering, and fuzzy control algorithms. Students gain practical experience through projects involving fuzzy logic-based modeling and control in various engineering domains. Emphasis is placed on understanding uncertainty and imprecision in real-world data and developing solutions using fuzzy logic principles.

Machine Learning for Engineering Applications

Machine Learning for Engineering Applications provides students with a comprehensive understanding of machine learning techniques and their applications in engineering domains such as robotics, automation, and optimization. Core subjects include linear algebra, statistics, programming languages, and algorithm design. Specialized topics cover neural networks, deep learning, reinforcement learning, and their implementation in engineering solutions. Practical projects and internships ensure hands-on experience in real-world applications.

Reinforcement Learning

Reinforcement Learning is about learning the optimal behavior in an environment to obtain maximum reward. This optimal behavior is learned through interactions with the environment and observations of how it responds, similar to children exploring the world around them and learning the actions that help them achieve a goal. Reinforcement learning is an area of Machine Learning. It is about taking suitable action to maximize reward in a particular situation. It is employed by various software and machines to find the best possible behavior or path it should take in a specific situation. Reinforcement learning differs from supervised learning in a way that in supervised learning the training data has the answer key with it so the model is trained with the correct answer itself whereas in reinforcement learning, there is no answer but the reinforcement agent decides what to do to perform the given task. In the absence of a training dataset, it is bound to learn from its experience.

Applied Natural Language Processing

Natural Language Processing (NLP) is an important area of Artificial Intelligence concerned with the processing and understanding (NLU) of a human language. The goal of NLP and NLU is to process and harness information from a large corpus of text with very little manual intervention. Natural language processing is a field of computer science and linguistics that deals with the interaction between computers and human languages. NLP enables computers to understand human language and respond in a way that is natural for humans. The ultimate goal of NLP is to help computers understand language as well as we do. It is the driving force behind things like virtual assistants, speech recognition, sentiment analysis, automatic text summarization, machine translation and much more.

Computer Vision

Computer vision means the extraction of information from images, text, videos, etc. Sometimes computer vision tries to mimic human vision. It's a subset of computer-based intelligence or Artificial intelligence which collects information from digital images or videos and analyze them to define the attributes. Computer vision is closely related to artificial intelligence (AI) and often uses AI techniques such as machine learning to analyze and understand visual data. Machine learning algorithms are used to "train" a computer to recognize patterns and features in visual data, such as edges, shapes and colors.

Agile Development and Scrum Practices

Agile Development and Scrum Practices offers a comprehensive understanding of iterative software development methodologies. It covers the principles of Agile and Scrum frameworks, emphasizing teamwork, adaptability, and continuous improvement. Students learn to manage projects Efficiently through sprints, backlog grooming, and daily stand-up meetings. Hands-on exercises and case studies provide practical insights into implementing Agile practices in real-world scenarios, preparing students for dynamic industry demands.

Deep Learning Techniques

deep learning typically covers fundamentals of neural networks, convolutional neural networks (CNNs), recurrent neural networks (RNNs), and advanced topics like generative adversarial networks (GANs) and reinforcement learning. Students learn programming languages like Python, TensorFlow, and PyTorch, alongside mathematical foundations such as linear algebra and calculus. Practical applications in computer vision, natural language processing, and autonomous systems are emphasized for real-world implementation.

Advanced Data Mining

The Advanced Data Mining course delves into complex data analysis techniques, including machine learning algorithms, neural networks, and deep learning models. Students learn to extract valuable insights from vast datasets, mastering advanced statistical methods and data visualization tools. The curriculum covers topics such as pattern recognition, clustering, and predictive modeling. Practical applications in various fields, like finance, healthcare, and marketing, are emphasized to prepare students for real-world challenges in data-driven decision-making.

Cryptography and Network Security

Cryptography and Network Security covers fundamental principles of secure communication, cryptographic algorithms, network security protocols, and threat analysis. Students delve into topics such as encryption, digital signatures, secure key exchange, and network defense strategies. Practical aspects include hands-on experience with security tools, simulation of attacks, and designing secure systems. The curriculum emphasizes understanding threats, implementing countermeasures, and ensuring the integrity and confidentiality of digital information.

Human Computer Interaction (UI & UX)

Human-Computer Interaction (HCI) focuses on designing intuitive user interfaces (UI) and optimizing user experiences (UX) in digital systems. It covers principles of interaction design, usability testing, user research, and interface prototyping. Students learn to blend technology with psychology and design to create user-friendly products. Practical projects and internships enhance skills in UI/UX development for web, mobile, and other digital platforms.

GPU Computing

GPU Computing offers comprehensive training in parallel processing using Graphics Processing Units (GPUs). Students delve into GPU architecture, parallel programming models like CUDA and OpenCL, and applications in fields like deep learning, scientific simulations, and computer graphics. The curriculum integrates theory with hands-on projects to equip graduates with skills in harnessing GPU power for accelerating computations across various domains.

Blockchain Technologies

Blockchain Technologies provides a comprehensive understanding of blockchain fundamentals, decentralized systems, smart contracts, and cryptographic techniques. Students learn to develop blockchain-based applications, explore consensus mechanisms, and address security challenges. The curriculum includes courses on distributed ledger technologies, cryptography, and decentralized finance (DeFi). Practical projects and internships offer hands-on experience, preparing graduates for careers in blockchain development, cybersecurity, fintech, and more.

Digital Visualizations

Digital Visualizations blends art and technology, focusing on creating compelling visual experiences across digital platforms. Students learn design principles, digital imaging, animation, and interactive media development. Core courses cover graphics programming, user interface design, and visual storytelling techniques. Advanced topics include virtual reality, augmented reality, and game design. Graduates are equipped for careers in animation studios, game development companies, advertising agencies, and digital media production houses.

Edge Computing

Edge Computing typically covers fundamentals of cloud computing, networking, and IoT systems, emphasizing on processing data closer to its source for reduced latency and enhanced emciency. Topics include edge device architecture, distributed systems, security, and real-time analytics. Hands-on experience with edge computing platforms and projects are integral, preparing students for careers in industries requiring agile, low-latency data processing solutions.

Foundations of Cyber Physical Systems

Foundations of Cyber Physical Systems provides a comprehensive understanding of the integration between computer systems and physical processes. Students delve into areas like embedded systems, control theory, networking, and cybersecurity. The curriculum emphasizes hands-on experience through practical projects and explores topics such as real-time computing, sensor networks, and system optimization. Graduates are equipped to design and manage complex interconnected systems across various industries, from healthcare to transportation.



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