B.TECH

COMPUTER SCIENCE AND ENGINEERING

DEFINING TOMORROW

MASTER THE MOST IN-DEMAND
SKILLS FOR CODING THE BRIGHT FUTURE

ACADEMIC YEAR 2024-25

IARE
INSTITUTE OF
AERONAUTICAL ENGINEERING

NAAC ACCREDITATION A++ GRADE
NBA NATIONAL BOARD OF ACCREDITATION
nirf INDIA RANKINGS 2023 TOP 200 ENGINEERING RANK 151-200 TOP 100 INNOVATION RANK 51-100
24 YEARS OF Excellence

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 produce competent graduates suitable for industries and organizations at a global level including research and development with social responsibility.

MISSION

To provide an open environment to foster professional and personal growth with a strong theoretical and practical background having an emphasis on hardware and software development making the graduates industry ready with social ethics.

Further, the department is to provide training and to partner with global entities in education and research.

B.Tech

Program Educational Objectives (PEOs)

PEO-I

Students will establish themselves as effective professionals by solving real problems using computer science knowledge and with attention to teamwork, effective communication, critical thinking, and problem-solving skills

PEO-II

Students will develop professional skills that prepare them for immediate employment and life-long learning in advanced areas of computer science and related fields.

PEO-III

Students will demonstrate their ability to adapt to a rapidly changing environment by having learned and applied new skills and new technologies

PEO-IV

Students will be provided with an educational foundation that prepares them for excellence, and leadership roles along diverse career paths with encouragement to professional ethics and active participation needed for a successful career.

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 efficient 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

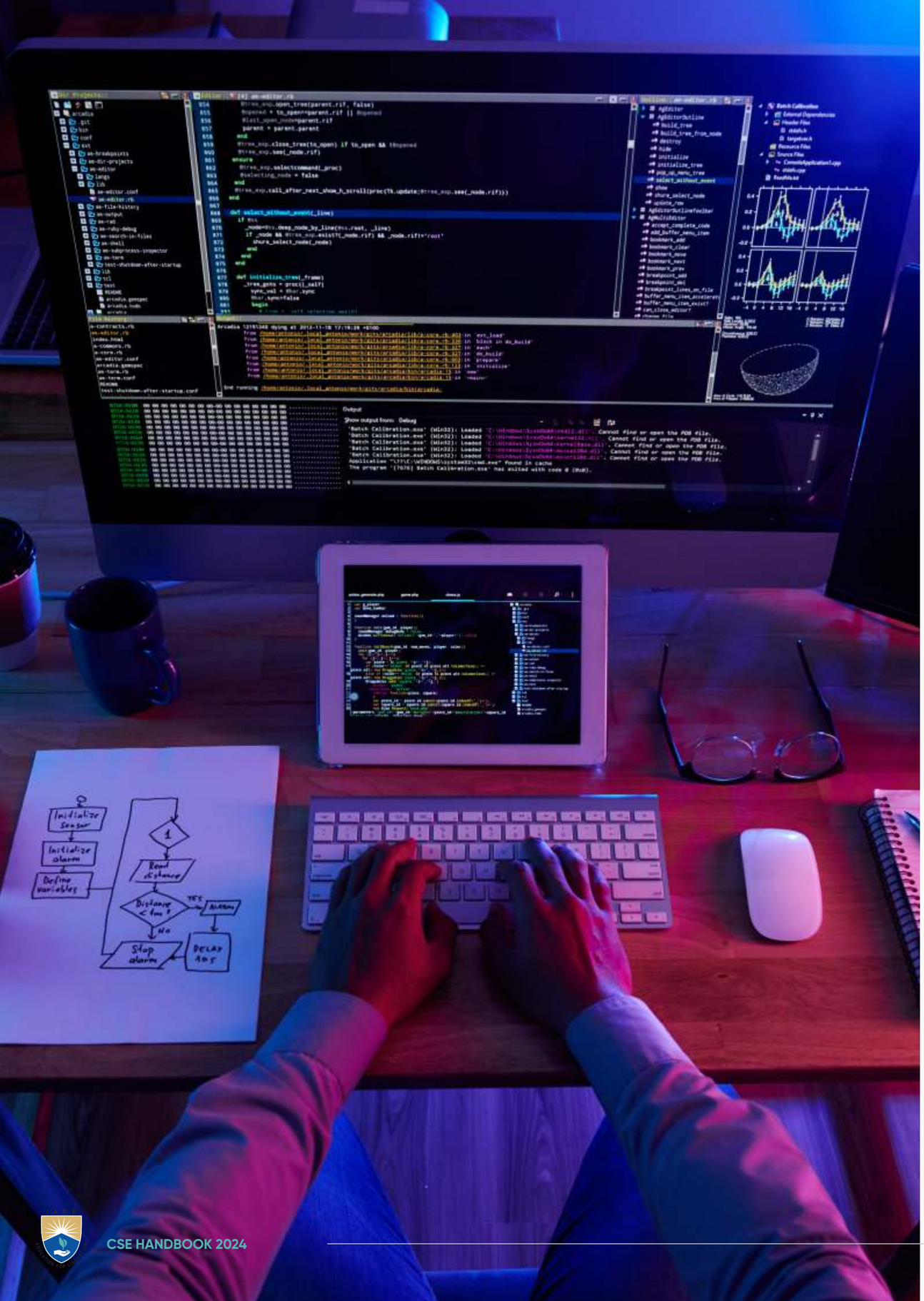
Understand, design, and analyze computer programs in the areas related to Algorithms, System Software, Web design, Big data, Artificial Intelligence, Machine Learning, and Networking.

PSO-II

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

PSO-III

Make use of modern computer tools to create innovative career paths, to be an entrepreneur, and to desire higher studies.



ABOUT **Computer Science and Engineering**

Computer Science and Engineering (CSE) is a field that encompasses the study of computers and computational systems. It involves the theory, design, development, and application of software and hardware technologies. CSE covers a wide range of topics, including programming languages, algorithms, data structures, computer architecture, operating systems, databases, and artificial intelligence.

Artificial Intelligence is changing the course of the future and the way of building new products and services. AI is the future. The impact of AI on computer science and engineering has been profound and multifaceted, influencing both the theoretical underpinnings and practical applications of various fields.

CSE professionals work in various industries, such as technology, finance, healthcare, and entertainment, developing software, designing systems, and solving complex problems. The field is constantly evolving, with new technologies and innovations driving its advancement. Careers in CSE can be rewarding and offer opportunities for growth and innovation.

The 4-year professional program emphasizes acquiring knowledge and industry-relevant skills in computing systems through a student-centric learning approach. The core subjects include Contemporary Programming Languages, Computer Networks, Cloud Computing, Artificial Intelligence, Machine Learning, Mobile Application Development, Augmented Reality and Virtual Reality.

Why Study CSE@IARE

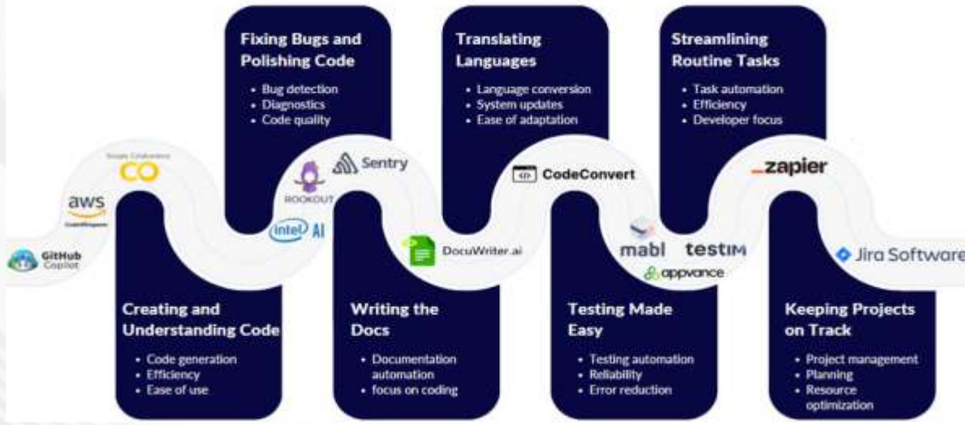
- → **Highest demand Bachelor program**
- → **Outstanding Infrastructure and Facilities**
- → **Strengthening the next generation with an industry-aligned curriculum**
- → **Well-acclaimed faculty**
- → **State of the art Laboratory facilities and a conducive environment for students.**
- → **Hands-on learning to personalized guidance**
- → **International Exposure for students via mobility programs and student exchange**
- → **Industry-supported Laboratories**
- → **Collaborate on cutting-edge research**
- → **A launchpad to become a trailblazer**

SOARING HIGH WITH **HOLISTIC DEVELOPMENT**

Alongside an array of academic facilities that prepare students to meet the challenges of the future, the following knowledge dimensions ensure the overall intellectual growth of this young technodexterous.

AI Augmented Software Development

In AI-enhanced software engineering, a new era in software development builds software better and faster. This approach speeds up the whole process by taking care of the repetitive stuff and even makes the code itself more solid than the old way of doing everything by hand. AI tools are stepping in to help write code, sort out bugs, and put together documentation, marking a big move away from the old-school way of coding that depended a lot on manual work.



Cloud Computing

Data is stored in a cloud data warehouse from a vendor such as Amazon Redshift, Google Big Query, Microsoft Azure, or Snowflake. Data comes from both cloud and on-premises sources and applications. The best cloud platforms can manage hybrid data delivery and application automation. Examples of data sources include transactional, website usage, social media, and CRM data. The cloud tool uses this data to let you perform a variety of analytics use cases such as creating visualizations, dashboards, and cloud reporting. The best tools go further by enabling you to perform augmented analytics and predictive analytics, machine learning or AutoML (automated machine learning), embed analytics into other applications, and trigger alerts and actions in other systems.

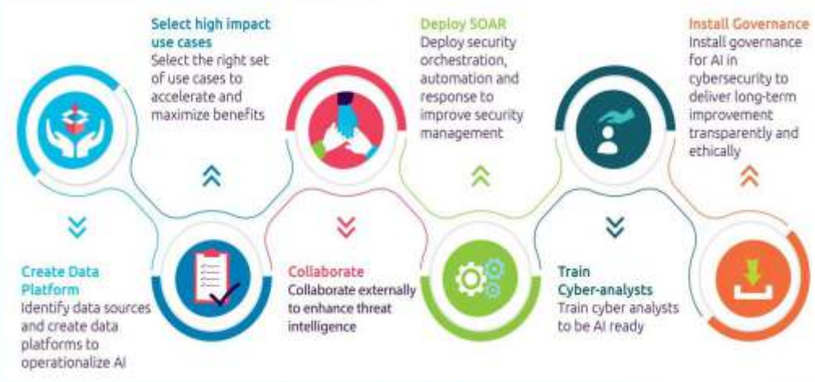
Mobile and Web Application Development

Artificial Intelligence is changing the course of the future and the way of building new products and services. While the development languages are primary to this development, these frameworks have made integrating AI and other technologies into an application easier. Hence, to target high-quality APP creation some of the best AI app development frameworks developers can use for their solutions.

Web application tools

Cyber Security

AI is playing an increasingly important role in cybersecurity, both for defending against cyber threats and for identifying vulnerabilities in systems. AI-powered tools can analyze vast amounts of data to detect anomalies, predict attacks, and strengthen defences.:

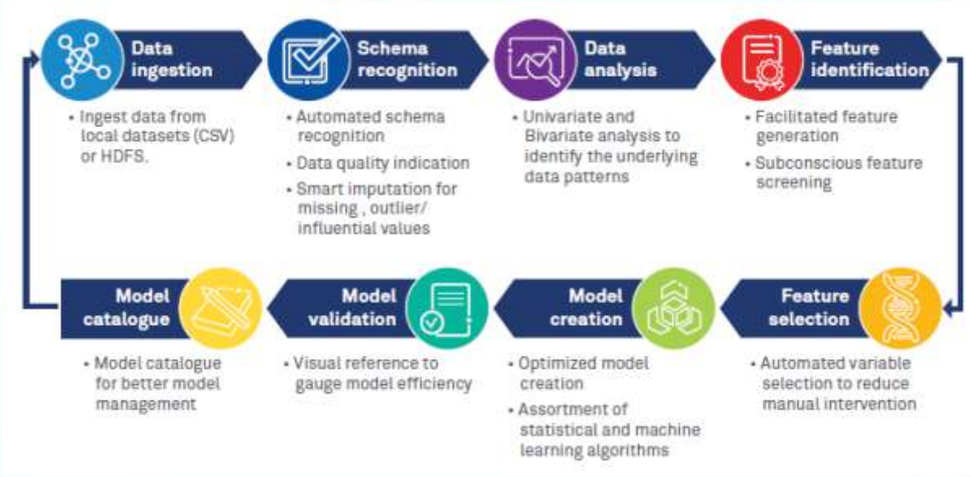


Continuous Threat Exposure Management (CTEM)

Continuous Threat Exposure Management represents a proactive and holistic approach to cybersecurity, enablingorganizations to adapt to the evolving threat landscape and reduce their risk exposure over time

Data Science Framework

The Data Science framework provides a structured approach to the development and deployment of AI and data science projects. While specific frameworks may vary depending on organizational needs and objectives, here is a generalized outline of a typical AI Data Science framework.



DEPARTMENT **SPECIFIC LABORATORIES**

Big Data and Analytics Laboratory

Big data and analytics are integral components of modern organizations across various industries.

Big Data refers to large and complex datasets that are difficult to manage and process using traditional data processing applications. Big data is characterized by the three Vs: Volume (the sheer amount of data), Velocity (the speed at which data is generated and processed), and Variety (the different types of data, structured and unstructured, coming from various sources). Examples of big data sources include social media, sensors, mobile devices, and transaction records.

Analytics involves the systematic computational analysis of data or statistics. It's about extracting meaningful insights, patterns, and trends from data to aid decision-making and optimize processes. Analytics can be descriptive, diagnostic, predictive, or prescriptive. There are various analytics techniques and tools, including statistical analysis, data mining, machine learning, and artificial intelligence.

Big data and analytics intersect to unlock value from large datasets. Organizations leverage big data analytics to gain insights into customer behavior, improve operational efficiency, enhance decision-making, develop new products or services, and gain a competitive edge. This can involve techniques such as predictive modeling, sentiment analysis, recommendation systems, and more.

In essence, big data and analytics enable organizations to turn data into actionable insights, driving innovation, efficiency, and growth.

Big data and analytics laboratories typically employ a variety of tools to handle and analyze large datasets efficiently. Here are some commonly used tools in such environments:

Hadoop: An open-source framework that allows for the distributed processing of large data sets across clusters of computers using simple programming models. It's widely used for storing and processing big data.

Apache Spark: A fast and general-purpose cluster computing system that provides in-memory data processing capabilities. Spark is known for its speed and ease of use in building large-scale data processing applications.

Apache Kafka: A distributed streaming platform that is used for building real-time data pipelines and streaming applications. It's often used for collecting and processing large streams of data in real time.

Apache Flink: Another distributed stream processing framework that is highly scalable and fault-tolerant. Flink is commonly used for processing continuous streams of data with low latency and high throughput.

Apache Storm: A real-time stream processing system that is designed for processing large volumes of data with low latency. Storm is often used for real-time analytics and event processing.

Apache HBase: A distributed, scalable, big data store that is designed to store and manage large volumes of structured data. HBase is commonly used for random, real-time read/write access to big data.

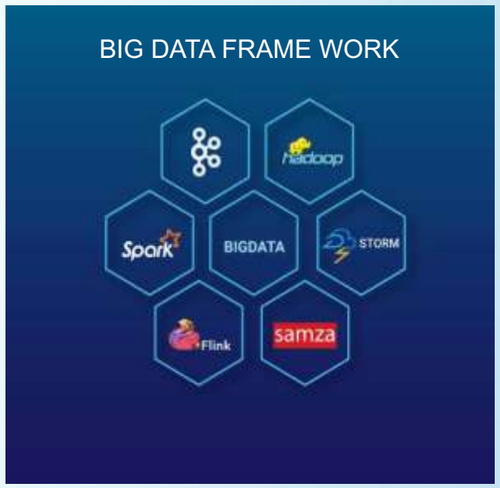
Apache Hive: A data warehouse infrastructure built on top of Hadoop that provides tools to enable easy data summarization, ad-hoc querying, and analysis of large datasets stored in Hadoop files.

Apache Drill: A distributed SQL query engine that supports a variety of NoSQL and Hadoop file formats. Drill allows users to query big data sources using standard SQL syntax.

Apache Cassandra: A distributed NoSQL database that is designed for handling large volumes of data across multiple commodity servers. Cassandra is known for its high availability and linear scalability.

Jupyter Notebooks: An open-source web application that allows users to create and share documents that contain live code, equations, visualizations, and narrative text. Jupyter notebooks are commonly used for interactive data analysis and visualization.

These tools are just a subset of the many options available for building and operating big data and analytics laboratories. The choice of tools often depends on specific use cases, requirements, and the expertise of the team managing the laboratory.



Digital Image Processing and Computer Vision Laboratory

Digital image processing is a field that involves the manipulation and analysis of digital images using computer algorithms. It encompasses a wide range of techniques and methods aimed at enhancing, interpreting, and extracting information from digital images. Here are some key aspects and applications of digital image processing:

Image Enhancement: Image enhancement techniques aim to improve the visual quality of images by emphasizing certain features or reducing noise. This includes methods like histogram equalization, contrast stretching, and spatial filtering.

Image Restoration: Image restoration techniques are used to recover degraded or corrupted images caused by factors such as noise, blur, or compression artifacts. This involves methods like image deblurring, denoising, and inpainting.

Image Segmentation: Image segmentation involves partitioning an image into meaningful regions or segments based on similarities in color, intensity, texture, or other features. Segmentation is used in applications like object detection, medical imaging, and scene analysis.

Feature Extraction: Feature extraction involves identifying and extracting relevant information or features from images. These features can include edges, corners, texture patterns, or other characteristics that are useful for further analysis or recognition tasks.

Object Recognition and Classification: Object recognition and classification involve identifying and categorizing objects within images. This can include methods like template matching, machine learning-based classifiers, and deep learning approaches such as convolutional neural networks (CNNs).

Image Registration: Image registration involves aligning or matching multiple images of the same scene taken from different viewpoints or at different times. This is useful for tasks like image fusion, stereo vision, and medical image analysis.

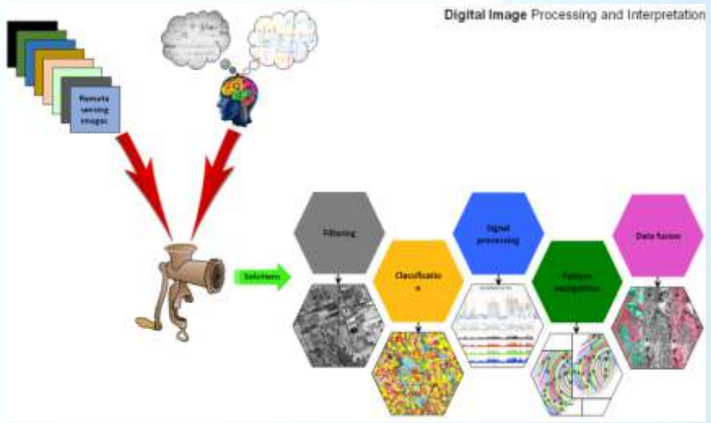
Morphological Processing: Morphological processing involves analyzing and manipulating the shape and structure of objects within images. This includes operations like dilation, erosion, opening, and closing, which are used for tasks like noise removal, edge detection, and object segmentation.

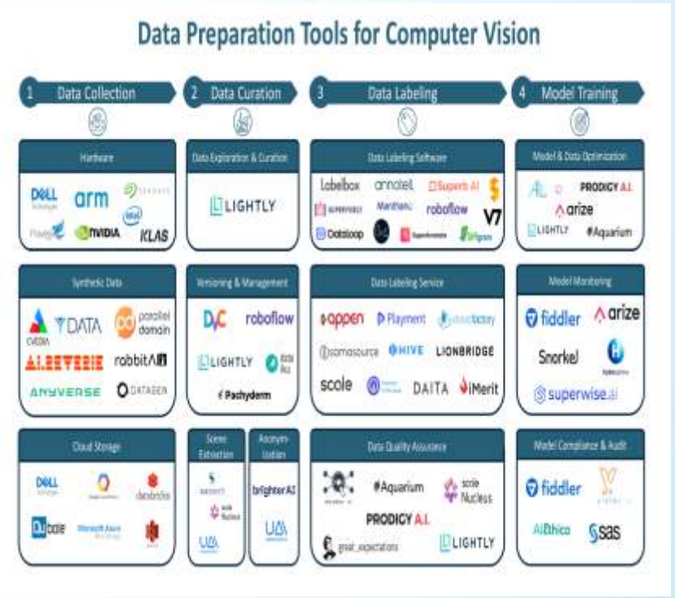
Image Compression: Image compression techniques aim to reduce the storage space required for storing or transmitting digital images while minimizing loss of image quality. This includes methods like JPEG, PNG, and various wavelet-based compression algorithms.

Image Understanding: Image understanding involves interpreting and extracting high-level semantic information from images. This includes tasks like scene understanding, object recognition, and image captioning, which often require integrating multiple levels of image analysis.

Biomedical Image Processing: Digital image processing is extensively used in medical imaging for tasks like diagnosis, image-guided surgery, and medical image analysis. This includes techniques like MRI image processing, CT scan analysis, and microscopy image analysis.

These are just a few examples of the many applications and techniques within the field of digital image processing. It is a multidisciplinary field that draws from areas such as computer vision, signal processing, and machine learning, and it finds applications in diverse domains including medicine, remote sensing, robotics, and entertainment.





Laboratory **Details**

1 Object Oriented Programming With Java Laboratory

This laboratory provides a solid foundation in object-oriented programming concepts and hands-on experience in using them. It introduces the concepts of abstraction and reusable code design via the object-oriented paradigm. Through a series of examples and exercises, students gain coding skills and develop an understanding of professional programming practices. Mastering Java facilitates the learning of other technologies.

Major Equipment

Computer Systems – 36 Nos

Make: Lenovo

Model: Think Center

Configuration: 12th Generation Intel Core I5-Processor, 16 GB RAM, 512 GB HDD, Bluetooth, Wi-Fi,22" Monitor, Keyboard, Mouse

Software: Java Development Kit 18.0.0

2 Programming For Problem-solving Laboratory

This laboratory aims to provide exposure to problem-solving through programming. Useful graph theory concepts, numerical techniques, and their applications to real-world problems are discussed. Graph theoretical notions and the use of algorithms, both in the mathematical theory of graphs and their applications are discussed. The student will also learn how to implement and interpret numerical solutions by writing well-designed computer programs with their efficiency and suitability for real-life applications. Desktop

Major Equipment

Computer Systems – 36 Nos

Make: Lenovo **Model:** Think Center

Configuration: 12th Generation Intel Core I5-Processor, 16 GB RAM, 512 GB HDD, Bluetooth, WiFi,22" Monitor, Keyboard, Mouse

Software: Python 3.11

3 Data Structures Laboratory

The laboratory covers some of the general-purpose data structures and algorithms, and software development. Topics covered include managing complexity, analysis, static data structures, dynamic data structures, and hashing mechanisms. The main objective of the course is to teach the students how to select and design data structures and algorithms that are appropriate for problems that they might encounter in real life.

Major Equipment

Desktop Computer Systems – 36 Nos

Make: Lenovo

Model: Think Center

Configuration: 12th Generation Intel Core I5-Processor, 16 GB RAM, 512 GB HDD, Bluetooth, Wi-Fi,22" Monitor, Keyboard, Mouse

Software: Python 3.11

4 Operating Systems Laboratory

The laboratory covers some of the design aspects of operating system concepts. Topics covered include process scheduling, memory management, deadlocks, disk scheduling strategies, and file allocation methods. The main objective is to teach the students how to select and design algorithms that are appropriate for problems that they might encounter in real life.

Major Equipment

Desktop Computer Systems – 36 Nos

Make: Lenovo

Model: Think Center

Configuration: 12th Generation Intel Core I5-Processor, 16 GB RAM, 512 GB HDD, Bluetooth, Wi-Fi,22" Monitor, Keyboard, Mouse

Software: Python 3.11

5 Programming With Objects Laboratory

This laboratory covers some of the general-purpose data structures and algorithms, and software development. Topics covered include managing complexity, analysis, static data structures, dynamic data structures, and hashing mechanisms. The main objective of this laboratory is to teach the students how to select and design data structures and algorithms that are appropriate for problems that they might encounter in real life.

Major Equipment

Desktop Computer Systems – 36 Nos

Make: Lenovo

Model: Think Center

Configuration: 12th Generation Intel Core I5-Processor, 16 GB RAM, 512 GB HDD, Bluetooth, Wi-Fi,22" Monitor, Keyboard, Mouse

Software: Java Development Kit 18.0.0

6 Design And Analysis Of Algorithms Laboratory

Design and analysis of algorithm laboratory provides hands-on experience in implementing different algorithmic paradigms and develops competence in choosing appropriate data structures to improve the efficiency of the technique used. This laboratory implements sorting techniques using the divide and conquer strategy, shortest distance algorithms based on Greedy, Dynamic programming techniques, Minimum spanning tree construction, and applications of Backtracking, Branch, and Bound. This is essential for developing software in areas of Information storage and retrieval, Transportation through networks, Graph theory, and Optimization problems.

Major Equipment

Desktop Computer Systems – 36 Nos

Make: Lenovo

Model: Think Center

Configuration: 12th Generation Intel Core I5-Processor, 16 GB RAM, 512 GB HDD, Bluetooth, Wi-Fi,22" Monitor, Keyboard, Mouse

Software: Java Development Kit 18.0.0

7 Web Systems Engineering Laboratory

This laboratory will give you the basic terminology and fundamental concepts to build modern web applications. This course introduces students to developing web applications. It provides the basics of HTML5 and CSS3 for Web application development using HTML links and HTML forms. Introduction to the use of React router and its use in developing single-page applications, redux to develop React-Redux powered applications, client-server communication, and the use of REST API on the server side and react primitives render to native platform UI. It also provides the students with the front-end framework Bootstrap and basic security mechanisms for server-side web application development.

Major Equipment

Desktop Computer Systems – 36 Nos

Make: Lenovo

Model: Think Center

Configuration: 12th Generation Intel Core I5-Processor, 16 GB RAM, 512 GB HDD, Bluetooth, Wi-Fi,22" Monitor, Keyboard, Mouse

Software: Visual Studio, XAMPP Server

8 Database Management Systems Laboratory

The purpose of this laboratory is to provide a clear understanding of fundamentals with emphasis on their applications to create and manage large data sets. It highlights on technical overview of database software to retrieve data from n database. It includes database design principles, normalization, concurrent transaction processing, security, recovery, and file organization techniques.

Major Equipment

Desktop Computer Systems – 36 Nos

Make: Lenovo

Model: Think Center

Configuration: 12th Generation Intel Core I5-Processor, 16 GB RAM, 512 GB HDD, Bluetooth, Wi-Fi,22" Monitor, Keyboard, Mouse

Software: SQL Server, Oracle

9 Object Oriented Software Engineering Laboratory

The Object-Oriented Software Engineering Laboratory serves as a dynamic environment where students, and researchers, can explore, experiment with, and apply modern software engineering techniques, with a particular emphasis on object-oriented approaches. The laboratory focuses on fostering creativity, collaboration, and innovation in software development.

Major Equipment

Desktop Computer Systems – 36 Nos

Make: Lenovo

Model: Think Center

Configuration: 12th Generation Intel Core I5-Processor, 16 GB RAM, 512 GB HDD, Bluetooth, Wi-Fi,22" Monitor, Keyboard, Mouse

Software: Rational Rose

10 Cloud Application Development Laboratory

The Cloud Application Development Laboratory serves as a dynamic environment for students, and professionals to learn, collaborate, and innovate in the realm of cloud computing and application development. The laboratory focuses on harnessing the power of cloud platforms to build scalable, resilient, and cost-effective software solutions. A wide array of tools and technologies are available within the laboratory to support cloud application development activities. This includes cloud platforms such as Amazon Web Services (AWS), Microsoft Azure, Google Cloud Platform (GCP), and IBM Cloud, as well as development frameworks like Docker, and Kubernetes.

Major Equipment

Desktop Computer Systems – 36 Nos

Make: Lenovo **Model:** Think Center

Configuration: 12th Generation Intel Core I5-Processor, 16 GB RAM, 512 GB HDD, Bluetooth, Wi-Fi,22" Monitor, Keyboard, Mouse

Software: VMWare 2.0, Ubuntu 21.10, XAMPP Server and WAMP

11 Big Data And Analytics Laboratory

The Big Data and Analytics Laboratory is a cutting-edge facility equipped with advanced technologies and tools dedicated to processing, analyzing, and deriving insights from vast volumes of data. The laboratory serves as a hub for experimentation and practical applications in the field of big data analytics. Its primary objective is to harness the power of large datasets to extract valuable information that can drive decision-making, innovation, and problem-solving across various domains.

Major Equipment

Desktop Computer Systems 36 Nos

Make: Lenovo **Model:** Lenovo M70C

Configuration: 12th Generation

Intel Core I5-Proessor, 16 GB RAM, 512 GB HDD, Bluetooth, Wi-Fi, 22" Monitor, Keyboard, Mouse

Software Required: R Studio 1.1, Python 3.11

12 Cyber Security Laboratory

The Cyber Security Laboratory is a specialized facility dedicated to research, experimentation, and practical applications in the field of cybersecurity. It serves as a hub for developing cutting-edge technologies, conducting cybersecurity assessments, and training professionals to address the evolving challenges in safeguarding digital assets and mitigating cyber threats. A wide range of tools and technologies are available within the laboratory to support cybersecurity activities. This includes penetration testing frameworks like Metasploit, vulnerability assessment tools such as Nessus and OpenVAS, network monitoring solutions like Wireshark and Snort, and malware analysis platforms such as Cuckoo Sandbox.

Major Equipment

Desktop Computer Systems 36 Nos

Make: Lenovo **Model:** Lenovo M70C

Configuration: 12th Generation

Intel Core I5-Proessor, 16 GB RAM, 512 GB HDD, Bluetooth, Wi-Fi, 22" Monitor, Keyboard, Mouse

Software Required: Python 3.11

FACULTY **INFORMATION**

Dr. C Madhusudhana Rao

Professor & Head

Ph.D (2019),
Sri Venkateswara University, Tirupati, AP

M.Tech (2001),
Visveswaraya Technological University, Belgaum, Karnataka

B.Tech (1990), Acharya Nagarjuna University, Guntur, AP

AREA OF SPECIALIZATION

Cyber Security, Deep Learning, Blockchain Technologies, System Design and Development

Dr. M Lakshmi Prasad

Professor & Deputy Head

Ph.D (2017), Doctoral Degree, KLU, Guntur
M.E (2009), Anna University, Chennai, TN
B.Tech (2007), SV University, Tirupati, AP

AREA OF SPECIALIZATION

Cognitive Science, Data Mining, Software Engineering, Data Structures, Artificial Intelligence, Deep Learning

Dr. Y Mohana Roopa

Professor & Dean

Ph.D (2017), Doctoral Degree, JNTUA, AP
M.Tech (2002), JNTU Kakinada, AP
B.Tech (2000), SV University, Tirupati, AP

AREA OF SPECIALIZATION

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Dr. Ch Srinivasulu

Professor

Ph.D (2018), Doctoral Degree, JNTU Kakinada, AP
M.Tech (2009), JNTU, Hyderabad
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AREA OF SPECIALIZATION

Parallel Computing, Software Engineering

Dr. P Govardhan

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Ph.D (2012), Doctoral Degree SV University, Tirupati, AP
M.Tech (2010), SV University, Tirupati, AP
M.Sc (1984), SV University, Tirupati, AP

AREA OF SPECIALIZATION

Computational Intelligence, Image Processing

Dr. B J D Kalyani

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Ph.D (2020), AN University, Guntur, AP
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B.Tech (2005), Annamalai University, Chidambaram, Tamil Nadu

AREA OF SPECIALIZATION

Software Engineering, Cloud Computing

Dr. K Suvarchala

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Ph.D (2017), Doctoral Degree, SV University, Tirupati, AP
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MSC (1985), SV University, Tirupati, AP

AREA OF SPECIALIZATION

Database Technology, Data Mining, Big Data, Data Modeling

Dr. D Durga Bhavani

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Ph.D (2020), Doctoral Degree JNTUH, Hyd
M.Tech (2009), JNTUH, Hyderabad
B.Tech (2004), JNTUH, Hyderabad

AREA OF SPECIALIZATION

Software Engineering, Data Analytics

Dr. C V Rama Padmaja

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Ph.D (2020), Doctoral Degree JNTU, Kakinada
M.Tech (2008), AU, Visakhapatnam, AP
B.Tech (1994), AU, Visakhapatnam, AP

AREA OF SPECIALIZATION

Software Engineering, Cloud Computing

Dr. G Chandra Sekhar

Assistant Professor& Vice Principal

Ph.D (2020), Doctoral Degree VelTech (DU), Chennai, Tamil Nadu
M.Tech (2012), JNTU, Hyderabad
B.Tech (2002), Osmania University, Hyd

AREA OF SPECIALIZATION

Software Engineering, Data Mining and Data Warehousing, Network Security, Computer Networks, IoT, Machine Learning, Deep Learning

Dr. Madhavi Devi B

Assistant Professor

Ph.D (2022), Doctoral Degree JNTU, Kakinada
M.Tech (2008), VIT, Vellore, Tamil Nādu
M.SC (1997), SV University, Tirupati, AP

AREA OF SPECIALIZATION

Operating Systems, Computational Intelligence, Image Processing

Dr. RM Noorullah

Assistant Professor

Ph.D (2023), Doctoral Degree, KLU, Guntur, AP
M.Tech (2002), JNTU Hyderabad
B.Tech (1990), SV University, Tirupati, AP

AREA OF SPECIALIZATION

Social Network Analysis, Data Analysis

Dr. S Janardhana Rao

Assistant Professor

Ph.D (2017), Doctoral Degree, ANU, Guntur
M.Tech (2010), TIETE, Delhi
B.Tech (2004), TIE, Calcutta, West Bengal

AREA OF SPECIALIZATION

Software Engineering, Computer Vision, Network Security, Machine Learning, Computer Networks

Dr. G Mary Swarna Latha

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Ph.D (2023), Doctoral Degree, KLU, Guntur
M.Tech (2011), JNTU Hyderabad
B.Tech (2005), JNTU Hyderabad

AREA OF SPECIALIZATION

Embedded Systems, VLSI

Dr. A Krishna Chaitanya

Assistant Professor

Ph.D (2023), KLU, Guntur
M.Tech (2008), JNTU Hyderabad
B.Tech (2004), University of Madras, Tamil Nadu

AREA OF SPECIALIZATION

Data Mining, Machine Learning.

Assistant **Professors**

Mr. EKR Patro
Ms. D Rajani
Ms. Ch Srividya
Ms. B K Aishwarya
Mr. A Suresh Babu
Mr. C Praveen Kumar
Mr. V Venkata Reddy
Mr. M Harikrishna
Ms. Ch Veena
Mr. P V Narasimha Rao
Ms. D Swetha
Mr. T Roopesh Kumar
Mr. Ch Vijayendar Reddy
Ms. P Harika
Ms. Gopu Srilekha
Ms. K Mounika
Mr. P Suresh Kumar
Mr. N Rajasekhar
Ms. Ala Harika
Ms. K Sangeetha
Mr. J Tirupathi
Ms. K Mayuri
Ms. G Lalitha
Ms. T Jayasree Devi
Ms. S Kavitha
Ms. K Aswani
Ms. B Poojitha
Mr. B Madhusudhana Rao
Ms. D Keerthana
Ms. G Gowthami

COURSE MENU

Curriculum is designed based on professional modules from Microsoft, Alibaba, Huawei, CTS ,IEEE, ACM, and AICTE Model Curriculum in several subjects and so that students have opportunity to obtain professional certificates from the companies upon graduation.

Microsoft

Alibaba.com

Cognizant

HUAWEI

IEEE

acm Association for Computing Machinery

I SEMESTER			
Course Code	**Course Name**	**Credits**	**Prerequisite**
THOERY			
AHSD02	Matrices and Calculus	4	Mathematics
AHSD03	Engineering Chemistry	3	Chemistry
AHSD07	Applied Physics	3	Physics
ACSD01	Object Oriented Programming	3	----
PRACTICAL			
AHSD09	Applied Physics Laboratory	1	Applied Physics
ACSD02	Object Oriented Programming with Java Laboratory	2	Object Oriented Programming
AHSD05	Engineering Chemistry Laboratory	1	Engineering Chemistry
AMED03	Engineering Graphics	2	----
EXPERIENTIAL ENGINEERING EDUCATION (ExEED)			
ACSD04	Mobile Applications Development	1	----
TOTAL CREDITS		20	
CUMULATIVE CREDITS		20	

II SEMESTER			
Course Code	**Course Name**	**Credits**	**Prerequisite**
THOERY			
AHSD01	Professional Communication	3	English
AHSD08	Differential Equations and Vector Calculus	4	Mathematics
ACSD05	Essentials of Problem Solving	3	----
AEED01	Elements of Electrical and Electronics Engineering	3	Physics
PRACTICAL			
AHSD04	Professional Communication Laboratory	1	Professional Communication
AEED03	Electrical and Electronics Engineering Laboratory	1	Elements of Electrical and Electronics Engineering
ACSD06	Programming for Problem Solving Laboratory	2	Essentials of Problem Solving
AMED02	Manufacturing Practice	2	----
EXPERIENTIAL ENGINEERING EDUCATION (ExEED)			
ACSD03	Essentials of Innovation		----
TOTAL CREDITS		20	
CUMULATIVE CREDITS		40	

III SEMESTER			
Course Code	**Course Name**	**Credits**	**Prerequisite**
THOERY			
AECD04	Digital Design and Embedded Systems	3	----
ACSD08	Data Structures	3	Essentials of Problem Solving
ACSD09	Computer Architectures and Operating Systems	3	----
AHSD11	Probability and Statistics	4	Mathematics
AITD01	Mathematics for Computing	3	Mathematics
PRACTICAL			
ACSD10	Operating Systems Laboratory	1	Computer Architectures and Operating Systems
ACSD11	Data Structures Laboratory	1	Data Structures
AITD02	Programming with Objects Laboratory	1	Programming for Problem Solving
EXPERIENTIAL ENGINEERING EDUCATION (ExEED)			
ACSD12	Prototype and Design Building	1	----
TOTAL CREDITS		20	
CUMULATIVE CREDITS		60	

IV SEMESTER			
Course Code	**Course Name**	**Credits**	**Prerequisite**
THOERY			
ACSD13	Design and Analysis of Algorithms	3	Data Structures
ACSD14	Web Systems Engineering	3	Object Oriented Programming
ACSD15	Object Oriented Software Engineering	3	Object Oriented Programming
AITD03	Database Management Systems	3	Operating Systems
AITD04	Computer Networks	3	Operating Systems
PRACTICAL			
ACSD16	Design and Analysis of Algorithms Laboratory	1	Design and Analysis of Algorithms
ACSD17	Web Systems Engineering Laboratory	1	Web Systems Engineering
AITD05	Database Management Systems Laboratory	1	Database Management Systems
SKILL ENHANCEMENT PROJECT			
ACSD18	DevOps Engineer #	2	---
TOTAL CREDITS		20	
CUMULATIVE CREDITS		80	

V SEMESTER			
Course Code	**Course Name**	**Credits**	**Prerequisite**
THOERY			
ACSD19	Data Mining and Knowledge Discovery	3	Database Management Systems
ACCD04	Information Security Management	3	
ACSD20	Cloud Application Development	3	
ACSD21	Artificial Intelligence	3	
	Program Elective – I	3	----
PRACTICAL			
ACSD26	Artificial Intelligence Laboratory	1	Artificial Intelligence
ACSD27	Cloud Application Development Laboratory	1	Cloud Application Development
SKILL ENHANCEMENT PROJECT			
ACSD29	Engineering Design Project	1	----
ACSD30	Skill #	2	----
TOTAL CREDITS		20	
CUMULATIVE CREDITS		100	

VI SEMESTER			
Course Code	**Course Name**	**Credits**	**Prerequisite**
THOERY			
ACSD31	Theory of Computation	3	Data Structures
ACSD32	Machine Learning and Neural Computing	3	Artificial Intelligence
	Program Elective – II	3	----
	Program Elective – III	3	----
	Open Elective – I	3	----
PRACTICAL			
ACSD41	Computer System Internals and Linux Laboratory	1	Operating Systems
ACSD42	Machine Learning and Neural Computing Laboratory	1	Machine Learning and Neural Computing
SKILL ENHANCEMENT PROJECT			
ACSD44	Data Scientist / AI Specialist # (Skill)	2	----
ACSD45	Development Project	1	----
TOTAL CREDITS		20	
CUMULATIVE CREDITS		120	

VII SEMESTER			
Course Code	**Course Name**	**Credits**	**Prerequisite**
THOERY			
AITD19	Cyber Physical Systems	3	Computer Networks
ACSD46	Compiler Construction	3	Theory of Computations
	Program Elective - IV	3	----
	Program Elective - V	3	----
	Open Elective - II	3	----
PRACTICAL			
ACSD54	Computing Things Laboratory	1	
ACSD55	Security Protocols Laboratory	1	
PROJECT WORK			
ACSD56	Project Work (Phase - I)	3	----
TOTAL CREDITS		20	
CUMULATIVE CREDITS		140	

VIII SEMESTER			
Course Code	**Course Name**	**Credits**	**Prerequisite**
THOERY			
AHSD15	Managerial Economics and Financial Analysis	3	--
	Program Elective - VI	3	----
	Open Elective - III	3	----
PROJECT WORK			
ACSD60	Project Work (Phase - II)	11	----
TOTAL CREDITS		20	
CUMULATIVE CREDITS		160	

ELECTIVE **COURSES**

PROGRAM ELECTIVES COURSES (PEC)

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

Course Code	Name of the Course	Prerequisites	Preferred Semester	Credits
ACSD22	Programming Language Paradigms	Object Oriented Programming	V	3
ACSD23	Security Threats and Modelling	Computer Networks	V	3
ACSD24	Advanced Computer Architecture	Computer Architecture and Operating Systems	V	3
ACCD05	Computer Vision	Computer Architecture and Operating Systems	V	3
ACSD25	Software Project Management	Object Oriented Software Engineering	V	3
ACSD33	System Analysis and Design	Object Oriented Software Engineering	VI	3
ACSD34	Security Coding	Computer Networks	VI	3
ACCD28	Parallel Programming	Programming Language Paradigms	VI	3
ACSD35	Malware Analysis and Reverse Engineering	Information Security and Management	VI	3
AITD22	Software Testing Methodologies	Object Oriented Software Engineering	VI	3
ACDD09	Mobile Computing	Computer Networks	VI	3
ACSD36	IoT Security and Attacks	Computer Architecture and Operating Systems	VI	3
ACSD37	Social, Text, and Media Analytics	Data Mining	VI	3
ACSD38	Software Architecture and Design Patterns	Object Oriented Programming	VI	3
AITD16	Agile Development and Scrum Practices	Object Oriented Software Engineering	VI	3
ACSD47	Wireless Sensors Networks	Computer Networks	VII	3
AITD13	High Performance computing	Computer Architecture and Operating Systems	VII	3
ACAD26	Augmented Reality and Virtual Reality	Computer Vision	VII	3
AITD14	Game Theory	Web Application Development	VII	3
ACSD48	Business Intelligence	Cloud Application Development	VII	3
ACSD49	Cyber Crime and Digital Forensics	Information Security and Management	VII	3
ACSD50	Fog Computing	Computer Networks	VII	3
ACSD51	Advanced Algorithms	Problem-Solving	VII	3
AITD30	Cyber Security	Information Security and Management	VII	3
AITD11	Natural Language Processing	Artificial Intelligence	VII	3
ACAD14	Human Computer Interaction (UI & UX)	Scripting Languages	VIII	3
ACSD57	Blockchain Technologies	Computer Networks	VIII	3
AITD12	Quantum Computing	High-Performance computing	VIII	3
ACSD58	Digital Visualizations	Probability and Statistics	VIII	3
ACDD25	Deep Learning Techniques	Machine Learning Algorithms	VIII	3

OPEN ELECTIVE COURSES (OEC)

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

Course Code	Course Name	Credits
ACSD39	Cyber Laws and Security	3
ACSD40	Intellectual Property Rights and Management	3
ACSD52	Bio-Informatics	3
ACSD53	Ethical Hacking	3
ACSD59	Enterprise Computing	3
AITD31	E-Commerce	3

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

1. Data Scalability and Distribution (Amazon Web Services, Microsoft Azure, Google Cloud Platform, etc.
2. Software Developer (Restful web services / Microservices, Rust programming, MEAN, MERN, MEVN)
3. Data Science (Data visualization, Data wrangling, data technologies, Business Intelligence etc.)
4. Testing (Selenium, TestNG)
5. Cyber Security (Network Security, Threat Intelligence and Analysis / Risk Assessment and Management

COMPETENCY BUILDING COURSES

1. Block Chain (Hyperledger, Ethereum, Ripple, Quorum)
2. Extended Reality(AR/VR/MR)
3. AI Augmented Development
4. Salesforce
5. C# and .Net
6. Mobile Application Development-Flutter
7. Pega
8. Amazon Web Services
9. Microsoft Azure
10. Robotics Process Automation
11. Democratized Generative AI
12. Continuous Threat Exposure Management (CTEM)
13. UI/UX Design
14. VM Ware

CAREER DEVELOPMENT COURSES

1. Competitive Programming
2. JAVA Full Stack
3. Developer
4. DevOps
5. Cloud Application Development
6. Database Design
7. Computer Network
8. Puzzle
9. Aptitude and Reasoning
10. Professional Communication & Soft Skills

The component of the curriculum is divided as follows

Course Component	Curriculum Content (% of total number of credits of the program)	Total number of contact hours	Total number of credits
Basic Sciences	11.87	21	19
Basic Engineering	11.25	23	18
Humanities and Social Sciences	2.5	5	4
Program Core	41.87	79	67
Program Electives	11.25	18	18
Open Electives	5.62	09	09
Project(s)	8.75	28	14
Any other (Skill)	6.87	19	11
		Total number of credits	160

COURSE STRUCTURES WITH TRACKS (HONORS &MINORS)

HONOURS

An honour is the field in which a student focuses during the course of his/her degree. An Honours degree typically refers to a higher level of academic achievement in the major area. Minor is a secondary concentration of courses that often complements the honours. Minor are coherent sequences of courses that may be taken in addition to the courses required for the B.Tech degree. Honors Certificate for Vertical in his/her major for Research orientation; Minor in any OTHER branch for Improving Employability.

Only students having no credit arrears and a CGPA of 7.5 or above at the end of the fourth semester are eligible to register for B.Tech (Honors / Minor). After registering for the B.Tech (Honors / Minor) program, if a student fails in any course, s/he will not be eligible for B.Tech (Honors / Minor).

HONOURS IN COMPUTER SCIENCE AND ENGINEERING

S.NO	COURSE CODE	NAME OF THE COURSE	SEMESTER	CREDITS
1	HCSC01	Parallel Computer Architecture	V	3
	HCSC02	Advanced Computer Architecture	V	
2	HCSC03	An Introduction to Artificial Intelligence	V	3
3	HCSC04	Basics of Computational Complexity	VI	3
4	HCSC05	Machine Learning for Engineering and science applications	VI	3
5	HCSC06	Advanced Computer Networks	VII	3
6	HCSC07	Blockchain and its application	VII	3
7	HCSC08	Technical Paper Writing	VIII	2

MINOR

The philosophy behind Engineering as an academic discipline has been to orient knowledge seekers in a manner that shatters the theoretical boundaries and pushes them into the realms of a practical worldview. The focus of the institute has always been to orient the students towards the technologies that shall drive the world in the years to come; with this philosophy, the institute has decided to launch the Bachelor of Technology in a particular branch with a minor in a specified program.

The Bachelor of Technology (B. Tech.) with Minor program focuses on the fundamental principles of multiple Engineering disciplines, critical and analytical thinking, and the ability to develop a distinctive approach to interdisciplinary problems.

The key objectives of offering B. Tech. with Minor program are:

1. To expand the domain knowledge of the students in one of the other branches of engineering.
2. To increase the employability of undergraduate students keeping them given better opportunities in interdisciplinary areas of engineering & technology.
3. To provide an opportunity for students to pursue their higher studies in the inter-disciplinary areas in addition to their branch of study.
4. To offer knowledge in the areas which are identified as emerging technologies/thrust areas of Engineering.

MINOR IN CSE (CYBER SECURITY)

NO	SEMESTER	COURSE CODE	NAME OF THE COURSE	CREDITS
1	V	MCC001	Privacy And Security in Online social media	3
		MCC002	Computer Networks and Internet Protocol	3
2	V	MCC003	Foundations of Cyber-Physical Systems	3
3	VI	MCC004	Foundations of Cryptography	3
		MCC005	Advanced Computer Networks	3
4	VI	MCC006	Blockchain and its Applications	3
5	VII	MCC007	Introduction To Industry 4.0 And Industrial Internet Of Things	3
		MCC008	Affective Computing	3
		MCC009	Data Analytics with Python	3
6	VIII	MCC010	GPU Architectures And Programming	3
		MCC011	Secure Computation: Part I	3
			Total	18

MINOR IN CSE (ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

.NO	SEMESTER	COURSE CODE	NAME OF THE COURSE	CREDITS
1	V	MAMC01	An Introduction to Artificial Intelligence	3
		MAMC02	Introduction to Machine Learning	3
2	V	MAMC03	Reinforcement Learning	3
3	VI	MAMC04	Artificial Intelligence: Knowledge Representation And	3
		MAMC05	Natural Language Processing	3
4	VI	MAMC06	Deep Learning	3
5	VII	MAMC07	Blockchain and its Applications	3
		MAMC08	Artificial Intelligence: Search Methods for Problem Solving	3
		MAMC09	Applied Natural Language Processing	3
6	VIII	MAMC10	Machine Learning For Engineering And Science Applications	3
		MAMC11	Deep Learning for Computer Vision	3
			Total	18

MINOR IN CSE (DATA SCIENCE)

O	SEMESTER	COURSE CODE	NAME OF THE COURSE	CREDITS
1	V	MDSC01	The Joy of Computing Using Python	3
		MDSC02	Parallel Computer Architecture	3
2	V	MDSC03	Data Analytics with Python	3
3	VI	MDSC04	Machine Learning for Engineering and science applications	3
		MDSC05	GPU Architectures and Programming	3
4	VI	MDSC06	Business Intelligence & Analytics	3
5	VII	MDSC07	Deep Learning	3
		MDSC08	Reinforcement Learning	3
6	VIII	MDSC10	Blockchain and its Applications	3
			Total	18

COURSE **SYNOPSIS**

CORE **COURSES**

OBJECT ORIENTED PROGRAMMING

The course provides a solid foundation in object-oriented programming concepts in using them. It includes concepts object-oriented concepts such as information hiding, encapsulation, and polymorphism. It contrasts the use of inheritance and composition as techniques for software reuse. It provides an understanding of object-oriented design using graphical design notations such as Unified Modeling Language (UML) as well as object design patterns.

MOBILE APPLICATIONS DEVELOPMENT

This course focuses on hands-on experience in designing, developing, and testing mobile applications for various platforms. It helps to gain practical skills in mobile app development, including user interface design, memory management, input methods, data handling, network techniques, and URL loading. Students will be able to undertake engineering challenges such as designing and developing mobile applications.

ESSENTIALS OF PROBLEM SOLVING

This course aims to provide exposure to problem-solving through programming. Useful graph theory concepts, numerical techniques, and their applications to real-world problems are discussed. Graph theoretical notions and the use of algorithms, both in the mathematical theory of graphs and their applications are discussed. The student will also learn how to implement and interpret numerical solutions by writing well-designed computer programs with their efficiency and suitability for real-life applications.

COMPUTER ARCHITECTURES AND OPERATING SYSTEMS

Computer Architecture And Operating Systems course provides theoretical knowledge about computer architecture; the structure of operating systems, processes, memory management and virtual memory implementation principles, input-output management and deadlock avoidance, and file system structure. It deals with the transfer of programs in and out of memory; and organizes processing time between programs and users. Learned knowledge will be implemented in the design and development of hybrid operating systems, command control systems, and real-time environments

DATA STRUCTURES

The course covers some of the general-purpose data structures and algorithms, and software development. Topics covered include managing complexity, analysis, static data structures, dynamic data structures, and hashing mechanisms. The main objective of the course is to teach the students how to select and design data structures and algorithms that are appropriate for problems that they might encounter in real life. This course teaches students through PowerPoint presentations, lecture notes, and labs that involve problem-solving in mathematical and engineering areas.

DESIGN AND ANALYSIS OF ALGORITHMS

Design and analysis of algorithms is the process of finding the computational complexity of algorithms. It helps to design and analyze the logic of how the algorithm will work before developing the actual code for a program. It focuses on introduction to algorithm, asymptotic complexity; sorting and searching using divide and conquer, greedy method, dynamic programming, backtracking, branch and bound. NP-hard and NP-complete problems. The applications of algorithm design are used for information storage, retrieval, transportation through networks, and presentation to users.

DATABASE MANAGEMENT SYSTEMS

The purpose of this course is to provide a clear understanding of fundamentals with emphasis on their applications to create and manage large data sets. It highlights on technical overview of database software to retrieve data from n database. The course includes database design principles, normalization, concurrent transaction processing, security, recovery, and file organization techniques

COMPUTER NETWORKS

The main emphasis of this course is on the organization and management of local area networks (LANs) and wide area networks (WANs). The course includes learning about computer network organization and implementation and obtaining a theoretical understanding of data communication and computer networks. Topics include layered network architectures, addressing, naming, forwarding, routing, communication reliability, the client-server model, and web and email protocols. The applications of this course are to design, implement, and maintain basic computer networks

WEB SYSTEMS ENGINEERING

This course introduces students to create concurrently a web app and a native app (for Android and iOS) with React Native and React Native Web. It covers HTML for structuring and presenting content on the World Wide Web. CSS is being used to format structured content. To create a dynamic and interactive experience for the user it covers JAVASCRIPT. To build the applications using React concepts such as JSX, REDUX, and PHP.

OBJECT ORIENTED SOFTWARE ENGINEERING

This course concentrates on developing a basic understanding of various activities that are involved in software development. This course enables the student to develop the necessary skills for developing a product or application. The course focuses on all activities involved in software development (communication, planning, modeling, construction, deployment).In this course; students will gain a broad understanding of the discipline of software engineering and its application to the development and management of software systems. Student can implement and gain knowledge about the development of the software and gain knowledge of basic engineering methods and practices, and their appropriate application

DATA MINING AND KNOWLEDGE DISCOVERY

Data mining refers to extracting or mining knowledge from large amounts of data. It emphasizes various techniques and algorithms used to explore, analyze, and leverage data and turn it into valuable and actionable information. It includes data warehousing and data mining functionalities such as association mining, classification, clustering, and outlier analysis. The techniques are used to tackle data-centric applications in various domains such as financial analysis, the telecommunication industry, intrusion detection, and complex data mining applications in stream, web, text, spatial, and other scientific applications.

INFORMATION SECURITY MANAGEMENT

Information Security Management is a critical area in the field of information technology that focuses on protecting information assets from threats, vulnerabilities, and risks. The course covers various aspects of information security management, including policies, procedures, technologies, and best practices.

CLOUD APPLICATION DEVELOPMENT

This course focuses on cloud API development. Those represent the two major components of the class: cloud-based computing and API development. Cloud computing is computing that is done on distributed computers all over the world. Web API development involves creating applications that internet-connected devices can interact with to accomplish certain tasks. The combination will mean that we are creating applications on cloud-based computers which we can interact with over the internet. This course covers the topics of cloud infrastructures, cloud service providers, virtualization, software, defined networks and storage, cloud storage, cloud resource scheduling and management, programming models, and cloud security.

ARTIFICIAL INTELLIGENCE

Artificial Intelligence has emerged as an increasingly impactful discipline in science and technology. AI applications are embedded in the infrastructure of many products and industries search engines, medical diagnoses, speech recognition, robot control, web search, advertising, and even toys.

MACHINE LEARNING AND NEURAL COMPUTING

The course "Machine Learning and Neural Computing" is an in-depth study of the principles, algorithms, and applications of machine learning (ML) and neural networks (NNs). It covers foundational concepts such as supervised and unsupervised learning, reinforcement learning, and deep learning. Students learn about various ML techniques, including decision trees, support vector machines, and clustering algorithms. Students gain practical experience through hands-on projects and assignments, where they apply ML and NN techniques to real-world problems. By the end of the course, students are expected to have a solid understanding of ML and NNs and the ability to apply them to solve complex problems.

CYBER PHYSICAL SYSTEMS

Cyber-Physical Systems (CPS) are integrations of computation, networking, and physical processes. These systems are becoming increasingly prevalent in various domains, including transportation, healthcare, and smart cities. CPS courses typically cover the fundamental concepts, design principles, and challenges associated with these systems.

COMPILER CONSTRUCTION

The course will teach the students the fundamental concepts and techniques used for building a simple compiler. It focuses on both theory and practice, we will use a sample language to explore the lexical, syntactic, and semantic structures of programming languages, and learn to use those structures in implementing a demonstrative compiler. The main objective of this course is to introduce the major concept areas of language translation and compiler design and to develop an awareness of the function and complexity of modern compilers. This course describes the theory and practice of compilation the lexical analysis, parsing code generation, and optimization phases of compilation, and the design of a compiler for a concise programming language.

PROFESSIONAL **ELECTIVES**

Programming Language Paradigms

Programming Language Paradigms is a course that explores different approaches to programming and the underlying principles that guide them. It covers a range of paradigms, including imperative, functional, logic, and object-oriented programming. Students learn about the strengths and weaknesses of each paradigm, as well as how they can be applied in various contexts. The course also examines how languages evolve to incorporate multiple paradigms, leading to the development of hybrid languages. Overall, the course aims to provide students with a deep understanding of programming language design and the ability to choose the right paradigm for a given problem.

Security Threats and Modelling

The course provides an in-depth understanding of security threats and how to model them. It covers various types of threats, their implications, and strategies to mitigate them. Students learn about the importance of security modeling in designing secure systems.

Advanced Computer Architecture

Advanced Computer Architecture is a course that delves into the design and organization of modern computer systems, focusing on performance, power efficiency, and scalability. It builds upon foundational concepts in computer architecture and explores advanced topics such as pipelining, instruction-level parallelism, memory hierarchies, and multi-core and multi-threaded architectures. Throughout the course, students are typically expected to engage in hands-on projects or assignments to apply the theoretical concepts to real-world problems.

Computer Vision

Computer vision is a field of study focused on enabling computers to interpret and understand the visual world. It involves the development of algorithms and techniques that allow machines to extract meaningful information from images or videos

Software Project Management

Software Project Management (SPM) is a critical discipline that focuses on planning, organizing, and managing software projects from inception to completion. It involves various activities such as defining project scope, estimating costs and resources, scheduling tasks, managing risks, and ensuring quality deliverables.

Systems Analysis and Design

Systems Analysis and Design typically covers the process of developing information systems, focusing on understanding and specifying in detail what the system should do and how it should be implemented. Throughout the course, students learn about tools and techniques used in systems analysis and design, such as Unified Modeling Language (UML), data flow diagrams, and CASE tools (Computer-Aided Software Engineering). The course also emphasizes the importance of communication, collaboration, and project management skills in the development process.

Security Coding

Security Coding typically refers to the practice of writing code that is secure and resilient against potential cyber threats. This course likely covers various aspects of secure coding practices. Overall, the course likely focuses on equipping developers with the knowledge and skills to write code that is secure, resilient, and protects against potential cyber threats.

Parallel Programming

Parallel programming is the practice of using multiple processors or cores concurrently to solve a problem, often to improve performance or efficiency. It involves breaking down a problem into smaller parts that can be solved simultaneously, and then coordinating the execution of those parts to produce the result.

Malware Analysis and Reverse Engineering

Malware Analysis and Reverse Engineering is a comprehensive course that explores the techniques and tools used to analyze and understand malicious software. The course covers topics such as static and dynamic analysis, code reverse engineering, behavior analysis, and malware classification. Students learn to use tools like debuggers, disassemblers, and sandbox environments to dissect malware samples and understand their functionality. The course also delves into reverse engineering principles, such as code decompiling and understanding assembly language.

Software Testing Methodologies

Software Testing Methodologies is a course that focuses on various approaches, techniques, and tools used in the field of software testing. It covers both theoretical concepts and practical aspects of software testing to ensure the quality and reliability of software systems.

Mobile Computing

Mobile Computing is a course that explores the concepts, technologies, and applications related to computing on mobile devices. It covers various aspects of mobile computing, including mobile hardware, operating systems, networking, and mobile application development.

IoT Security and Attacks

IoT Security and Attacks is a course that focuses on the security challenges and potential attacks associated with the Internet of Things (IoT) devices. The course covers various aspects of IoT security, including the vulnerabilities of IoT devices, common attack vectors, and strategies to mitigate these risks. Students learn about the importance of securing IoT devices to protect against potential threats such as data breaches, privacy violations, and device manipulation. The course also explores the role of encryption, authentication, and access control in ensuring the security of IoT ecosystems.

Social, Text, and Media Analytics

Social, Text and Media Analytics is a course that focuses on the analysis of social media data, text data, and multimedia data. The course covers various techniques and tools used in analyzing these types of data to extract meaningful insights.

Software Architecture and Design Patterns

Software Architecture and Design Patterns is a course that focuses on the fundamental principles and practices of designing software systems. It covers topics such as architectural styles, design patterns, and best practices for creating scalable, maintainable, and flexible software applications.The course typically begins by introducing the concept of software architecture and its importance in the development process. It then discusses different architectural styles, such as layered architecture, client-server architecture, and microservices architecture, highlighting their strengths and weaknesses in various scenarios.

Agile Development and Scrum Practices

Agile Development and Scrum Practices is a course that focuses on modern software development methodologies that prioritize flexibility, collaboration, and iterative development. The course covers the Agile Manifesto and its principles, emphasizing the importance of customer collaboration, responding to change, and delivering working software.

Wireless Sensors Networks

Wireless Sensor Networks typically cover the fundamental concepts, design principles, and applications of networks composed of spatially distributed autonomous sensors to monitor physical or environmental conditions.

High-Performance Computing

High-Performance Computing (HPC) refers to the use of parallel processing techniques and algorithms to solve complex computational problems. It involves the use of supercomputers and computer clusters to perform tasks that would be difficult or impossible to achieve with traditional computing resources.

Augmented Reality and Virtual Reality

Augmented Reality (AR) and Virtual Reality (VR) are immersive technologies that are increasingly being used in various fields such as gaming, education, healthcare, and marketing. AR enhances the real world by overlaying digital information such as images, videos, or 3D models onto the user's view of the real world. On the other hand, VR creates a completely virtual environment that users can interact with.

Game Development

A course on game development typically covers various aspects of creating video games, including game design, programming, graphics, audio, and project management.

Business Intelligence

Business Intelligence refers to the technologies, strategies, and practices used for the collection, integration, analysis, and presentation of business information. BI aims to support better decision-making within organizations by providing historical, current, and predictive views of business operations.

Cyber Crime and Digital Forensics

Cyber Crime and Digital Forensics is a course that explores the world of cybercrime and the techniques used to investigate and mitigate its effects. The course covers a range of topics, including the types of cybercrimes, the tools and techniques used by cybercriminals, and the legal and ethical issues surrounding cybercrime investigations.

Fog Computing

Fog Computing is a course that focuses on the emerging paradigm of extending cloud computing to the edge of the network. It covers the concept of fog computing, which brings computing resources closer to the data source, thereby reducing latency and improving efficiency in data processing and analysis. The course likely discusses the motivation behind fog computing, its architecture, key technologies, and applications. It may also cover topics such as security, privacy, and management challenges in fog computing.

Advanced Algorithms

This course delves into advanced topics in algorithm design and analysis, building on foundational concepts. It covers a range of complex algorithms and data structures used in solving computational problems efficiently.

Cyber Security

Cyber Security typically covers a range of topics related to protecting computer systems, networks, and data from cyberattacks, damage, and unauthorized access.

Human Computer Interaction (UI & UX)

Human-Computer Interaction (HCI) is a field of study focused on the design, evaluation, and implementation of interactive computing systems for human use. It encompasses both the user interface (UI) design, which deals with the aesthetics and layout of the interface, and the user experience (UX) design, which focuses on how users perceive and interact with the system.

Natural Language Processing

Natural Language Processing (NLP) is a field of artificial intelligence (AI) that focuses on the interaction between computers and humans using natural language. It involves the development of algorithms and models that enable computers to understand, interpret, and generate human language.

Blockchain Technologies

Blockchain Technologies is a course that covers the fundamentals and advanced concepts of blockchain technology. It includes topics such as the history of blockchain, decentralized systems, cryptography, smart contracts, consensus mechanisms, and the practical applications of blockchain in various industries.

Quantum Computing

Quantum computing is a rapidly evolving field that explores the principles and applications of quantum mechanics to process information. This course covers foundational concepts, algorithms, and practical implementations of quantum computing.

Digital Visualizations

Digital Visualizations is a course that focuses on creating and interpreting visual representations of data using digital tools. The course covers various aspects of digital visualization, including principles of design, data representation techniques, and tools for creating visualizations. Students learn how to use software such as Tableau, Power BI, or Python libraries like Matplotlib and Seaborn to create effective visualizations that communicate complex information clearly and persuasively.

Deep Learning

Deep Learning covers advanced topics in machine learning, focusing on algorithms and models inspired by the structure and function of the brain called artificial neural networks. Deep Learning involves training large neural networks on massive amounts of data to solve complex problems such as image and speech recognition, natural language processing, and autonomous driving.

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