NIRMA UNIVERSITY
Institute of Technology
B. Tech. Computer Science and Engineering
Semester – III

L	T	P	C
3	0	2	4

Course Code	**2CS301**
Course Title	**Data Structures and Algorithms**

Course Learning Outcome:

At the end of the course, students will be able to -

1. analyse various data structures and their applicability
2. comprehend and implement various techniques for searching and sorting
3. identify the appropriate data structure to design efficient algorithm for the given application

L	T	P	C
2	0	4	4

Course Code	**2CS302**
Course Name	**Object Oriented Programming**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

1. interpret the basic principles of object oriented programming
2. develop computer programs to solve real world problems based on object-oriented principles
3. implement multi-threaded applications with basic input-output operations and exception handling

L	T	P	C
2	0	2	3

Course Code	**2CS303**
Course Title	**Digital Electronics**

Course Learning Outcomes (CLOs):

At the end of the course, students will be able to -

1. describe the basic building blocks of various digital circuits
2. design combinational logic and sequential logic circuits using basic components
3. identify digital components in computer organization

L	T	P	C
2	1	0	3

Course Code	**2CS304**
Course Title	**Digital Communications**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

1. explain data/signal transmission over communication media
2. analyze various spread spectrum, multiplexing, and modulation techniques
3. apply concepts of data communication to solve various problems

L	T	P	C
2	1	0	3

Course Code	**2CS305**
Course Name	**Discrete Mathematics**

Course Learning Outcome:

At the end of the course, students will be able to

1. interpret the preliminaries of discrete mathematics
2. comprehend role of discrete mathematics in theoretical computer science
3. recognize the importance of formal approach for solving computing problems

NIRMA UNIVERSITY
Institute of Technology
B. Tech Computer Science and Engineering
Semester IV

L	T	P	C
3	1	0	4

Course Code	**2CS401**
Course Title	**Computer Architecture**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

1. outline and describe the basics of various architectural units of the Computer System
2. apply the knowledge of combinational and sequential logical circuits to mimic a simple computer architecture
3. design various architectural units of a basic computer system

L	**T**	**P**	**C**
3	0	2	4

Course Code	**2CS402**
Course Title	**Database Management Systems**

Course Outcomes (COs):

At the end of the course, students will be able to -

- relate various aspects of the relational database like models, functional dependencies and normalization
- evaluate various storage and retrieval methods to correlate with relational model through appropriate indexing
- interpret transaction processing, concurrency and recovery protocols for effective database management.

L	**T**	**P**	**C**
3	0	2	4

Course Code	**2CS403**
Course Title	**Operating Systems**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to -

1. illustrate basic components of operating systems

2. comprehend the mechanism of operating Systems to handle processes, memory and file management
3. demonstrate competence in recognizing and using operating system features

.

L	T	P	C
2	0	2	3

Course Code	**2CS404**
Course Name	**Programming for Scientific Computing**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

1. write computational programs at a high level of abstraction
2. use standard programming constructs like repetition, selection, functions, composition, modules, aggregated data
3. implement and evaluate the results of scientific computing problems, using established program libraries

L	T	P	C
0	0	4	2

Course Code	**2CS405**
Course Title	**Web Technologies**

Course Learning Outcome (CLOs):

At the end of the course, students will be able to –

1. explain tagging techniques for web development
2. apply the concepts of web technology in designing static and dynamic web pages
3. design interactive web pages incorporating validation techniques

NIRMA UNIVERSITY
Institute of Technology
B. Tech. Computer Science and Engineering
Semester – V

L	T	P	C
3	0	2	4

Course Code	2CS501
Course Title	Machine Learning

Course Outcomes:

At the end of the course, students will be able to –

1. comprehend statistical methods as basis of machine learning domain
2. apply variety of learning algorithms for appropriate applications
3. implement machine learning techniques to solve problems in applicable domains
4. evaluate and compare algorithms based on different metrics and parameters.

L	T	P	C
3	0	2	4

Course Code	2CS502
Course Title	Computer Networks

Course Outcomes:

At the end of the course, students will be able to -

1. comprehend the functionality of different layers of computer network architectures
2. analyze protocols related to various network architecture layers
3. design computer network configurations
4. simulate various protocols for different types of networks.

L	T	P	C
2	1	2	4

Course Code	2CS503
Course Title	Design and Analysis of Algorithms

Course Outcomes:

At the end of the course, students will be able to –

1. comprehend notion of algorithmic complexity and logic of fundamental algorithms
2. apply fundamental algorithms in real life problem solving
3. identify and evaluate suitable data structures to solve a problem effectively and efficiently.

L	T	P	C
3	0	2	4

Course Code	2CS504
Course Title	Software Engineering

Course Outcomes:

At the end of the course, students will be able to –

1. explain various phases of software development lifecycle
2. analyse and document the requirement specifications for a software project
3. develop the process model using standard tools and methodologies
4. implement a quality software project through effective team-building, planning, scheduling and risk assessment.

Nirma University
Institute of Technology
B.Tech. in Computer Science and Engineering
Semester- VI

L	T	P	C
3	1	0	4

Course Code	2CS601
Course Title	Theory of Computation

Course Outcomes:

At the end of this course, student will be able to:

1. understand formal language theory and its application to computer science
2. apply mathematical preliminaries to develop the basic components of language design
3. design simple computational machines using the concepts of language theory
4. correlate computability with formal computational machines.

L	T	P	C
2	0	2	3

Course Code	2CSDE51
Course Title	Mobile Communications

Course Outcomes:

At the end of the course, students will be able to -

1. comprehend the key concepts and techniques of wireless and mobile communication
2. explain the architecture and develop applications of current and next generation wireless networks
3. apply concepts of wireless networks to design of ad hoc networks and sensor networks.

L	T	P	C
2	0	2	3

Course Code	2CSDE52
Course Title	Optimization Techniques

Course Outcomes:

At the end of the course, students will be able to –

1. relate key concepts and applications of various optimization techniques
2. identify the appropriate optimization technique for the given problem
3. formulate appropriate objective functions and constraints to solve real life optimization problems.

L	T	P	C
2	0	2	3

Course Code	2CSDE53
Course Title	Information Retrieval Systems

Course Outcomes:

At the end of the course, students will be able to –

1. Correlate the concepts and various components of Information Retrieval (IR) systems
2. identify design and evaluation parameters for information retrieval systems
3. apply theoretical foundations for development of IR systems

L	T	P	C
2	0	2	3

Course Code	2CSDE54
Course Title	Information and Network Security

Course Outcomes:

At the end of the course, students will be able to –

1. illustrate principles and problems of cryptosystems for encryption, digital signing and authentication
2. apply methods to create core cryptographic algorithms
3. evaluate techniques to protect as well as attack a network.

L	T	P	C
2	0	2	3

Course Code	2CSDE55
Course Title	Agile Software Development

Course Outcomes:

At the end of the course, students will be able to –

1. appraise the business value of adopting Agile approaches and development practices
2. apply design principles, refactoring version control and continuous integration to achieve Agility
3. implement testing activities within an Agile project using various testing strategies.

L	T	P	C
2	0	2	3

Course Code	2CSDE56
Course Title	Graph Theory

Course Outcomes:

At the end of the course, students will be able to –

1. explain the concept of formal graph-theoretic definitions and notations
2. apply basic theoretical concepts in solving real-life problems and address optimization issues
3. analyse real-life problems to match with applications in computer science

L	T	P	C
2	0	2	3

Course Code	2CSDE57
Course Title	Embedded Systems

Course Outcomes:

At the end of the course, students will be able to -

1. comprehend the general structure of embedded systems, their design requirements and applications
2. analyze and evaluate real-time scheduling strategies as per the application specific needs
3. apply suitable communication protocols for designing embedded systems.

L	T	P	C
2	0	2	3

Course Code	2CSDE58
Course Title	High Performance Computing

Course Outcomes:

At the end of the course, students will be able to –

1. analyse the functionality of Modern Processor.
2. comprehend and implement various optimization techniques for serial code.
3. design the concept of parallel computing paradigm.

L	T	P	C
2	0	2	3

Course Code	2CSDE59
Course Title	Complexity Theory

Course Outcomes:

At the end of the course, students will be able to –

1. comprehend fundamental complexity classes with their complement classes
2. infer algorithmic relationship amongst various classes of problems through reductions and complexity analysis
3. analyse complexity of algorithms for intractable problems.

L	T	P	C
3	0	2	4

Course Code	2CSDE60
Course Title	Advanced Java

Course Outcomes:

At the end of the course, students will be able to –

1. describe and interpret the basics of Java technologies.
2. apply the concepts of Java technologies to design console based, GUI based and web based applications
3. develop applications using various Java frameworks
4. create, debug and run multi-tier and enterprise-level Java applications.

L	T	P	C
3	0	2	4

Course Code	2CSDE61
Course Title	Deep Learning

Course Outcomes:

At the end of the course, students will be able to -

1. appraise the need of deep learning approaches over machine learning
2. identify the deep learning algorithms which are appropriate for different types of learning tasks in various domains
3. implement deep learning algorithms and solve real-world problems
4. analyze and evaluate various deep learning models.

L	T	P	C
3	0	2	4

Course Code	2CSDE62
Course Title	Intrusion Detection Systems

Course Outcomes:

After successful completion of the course, student will be able to -

1. describe the practical aspects of intrusion detection systems
2. apply machine learning techniques to optimize performance of intrusion detection system
3. correlate user profile, attacks, reactions and responses in network systems
4. implement formal Or-BAC technique for dynamic policy adaptation.

L	T	P	C
3	0	2	4

Course Code	2CSDE63
Course Title	System and Database Administration

Course Outcomes:

At the end of the course, students will be able to -

1. analyze and appraise basic configurational aspects of computer systems
2. review the configuration and administration of database systems
3. adapt database components based on system requirements to achieve better performance
4. develop strategies of regular backup to ensure reliability

L	T	P	C
3	0	2	4

Course Code	2CSDE64
Course Title	Information Theory and Coding

Course Outcomes:

At the end of the course, students will be able to -

1. interpret and summarize the role of information theory and linear algebra in source coding and channel coding
2. make use of various error control encoding and decoding techniques
3. implement various error control techniques
4. analyze the performance of error control codes.

L	T	P	C
3	0	2	4

Course Code	2CSDE65
Course Title	System Programming

Course Outcomes:

At the end of the course student will be able to –

1. explain the concepts and principles of system programming and understand the roles and scope of a system programmer

2. interpret both theoretical and practical aspects of system programming, and understand techniques for designing and implementing system-level programs

3. apply knowledge of different phases and steps to mimic a simple language translator
4. analyze the working of various system software like assembler, loader, linker, editor and device driver.

L	T	P	C
3	0	2	4

Course Code	2CSDE66
Course Title	Internet of Things

Course Outcomes:

At the end of the course, students will be able to -

1. comprehend the architectural components and platforms of IoT ecosystem
2. apply appropriate access technology and protocols as per the application requirement
3. appreciate the role of big data, cloud computing and data analytics in a typical IoT system
4. design applications with suitable lightweight data processing and communication methodologies

L	T	P	C
3	0	2	4

Course Code	2CSDE67
Course Title	Cloud Computing

Course Outcomes:

At the end of the course, students will be able to -

1. explain core concepts of cloud computing, its services and models
2. discuss systems, hardware and application virtualization and outline their role in enabling cloud services
3. explore the issues related to cloud computing and its application
4. apply fundamental concepts in cloud infrastructures to build and deploy cloud applications.

L	T	P	C
3	0	2	4

Course Code	2CSDE68
Course Title	Parallel Algorithms

Course Outcomes:

At the end of the course, students will be able to –

1. appraise various parallel algorithmic strategies and their comparison with traditional algorithmic strategies
2. simulate different parallel algorithms, techniques and architectures
3. analyze complexity of various parallel algorithms
4. improve the parallel algorithms through debugging and performance tuning.

L	T	P	C
2	0	2	3

Course Code	2CSDE69
Course Title	LAMP Technology

Course Outcomes:

At the end of the course, students will be able to –

1. describe and interpret the basics of open source and LAMP technologies
2. Manage web server for different application scenarios
3. design and develop applications using open source technologies.

L	T	P	C
2	0	2	3

Course Code	2CSDE70
Course Title	Natural Language Processing

Course Outcomes:

At the end of the course, students will be able to –

1. discuss about major NLP issues and solutions
2. illustrate computational methods to understand language phenomena of word sense
3. design and develop applications with natural language capabilities.

L	T	P	C
2	0	2	3

Course Code	2CSDE71
Course Title	Data Mining

Course Outcomes:

At the end of the course, students will be able to –

1. interpret data types and infer various data pre-processing techniques for the mining process
2. apply basic principles and algorithms used in practical data mining
3. Choose and evaluate data mining algorithms for various real life problems.

L	T	P	C
2	0	2	3

Course Code	2CSDE72
Course Title	Secure Software Engineering

Course Outcomes:

At the end of the course, students will be able to –

1. identify software process vulnerabilities for an organization and interrelate security and software development process
2. design and develop a quality software project through effective team-building, planning, scheduling
3. implement security testing, verification and assessment of a software application.

L	T	P	C
2	0	2	3

Course Code	2CSDE73
Course Title	Stochastic Processes and Simulation

Course Outcomes:

At the end of the course, students will be able to –

1. define basic concepts in the theory of stochastic processes
2. solve simple problems on stochastic processes
3. implement simple stochastic simulation using computer programs.

L	T	P	C
2	0	2	3

Course Code	2CSDE74
Course Title	Design of Operating Systems

Course Outcomes:

At the end of the course, students will be able to -

1. describe the various components of Operating Systems.
2. analyze the different services provided by UNIX Operating System.

3. design and implement various system calls and concurrent processes requiring synchronization.

L	T	P	C
2	0	2	3

Course Code	2CSDE75
Course Title	Advanced Data Structures

Course Outcomes:

At the end of the course, students will be able to –

1. describe the importance of various data structures from application perspective
2. apply the knowledge of data structures for real time applications
3. solve the algorithmic problems optimally.

Nirma University
Institute of Technology
B.Tech. in Computer Science and Engineering
Semester- VII

L	T	P	C
3	0	2	4

Course Code:	2CS701
Course Title:	Compiler Construction

Course Learning Outcomes (CLO):
At the end of the course, students will be able to –
1. summarize the functionalities of various phases of compiler
2. apply language theory concepts to various phases of compiler design
3. identify appropriate optimization technique for compilation process
4. develop a miniature compiler using appropriate compiler design tool

L	T	P	C
2	0	2	3

Course Code:	2CS702
Course Title:	Big Data Analytics

Course Learning Outcomes (CLO):
At the end of the course, students will be able to -
1. outline the significance and challenges of big data
2. model big data using different tools and frameworks
3. apply big data techniques for useful business analytic applications
4. design algorithms for mining the data from large volumes

L	T	P	C
3	0	2	4

Course Code:	2CSDE76
Course Title:	Mobile Operating Systems

Course Learning Outcomes (CLO):
At the end of the course, students will be able to –
1. compare the similarities, differences and benefits of the current mobile operating systems
2. explain the functionalities of remote operations and security essential of mobile devices
3. analyze the latest trends in building Mobile OS
4. demonstrate the native applications required to build using mobile OS

L	T	P	C
3	0	2	4

Course Code:	2CSDE77
Course Title:	Microservice Architecture and Programming

Course Learning Outcomes (CLO):
At the end of the course, students will be able to –

1. recognize the key advantages and complexities present in microservice architectures
2. apply appropriate architectural approach for the design of microservices
3. implement microservice applications effectively with the suitable techniques and technologies
4. test the deployment of microservice applications on cloud platforms

L	T	P	C
3	0	2	4

Course Code:	2CSDE78
Course Title:	Digital Image Processing and Analysis

Course Learning Outcomes (CLO):
At the end of the course, students will be able to –

1. illustrate basic image acquisition mechanisms and image formats
2. identify various applications of digital image processing techniques
3. apply mathematical principles and signal processing concepts in digital image enhancement and restoration
4. develop various image representation stages for digital image processing applications

L	T	P	C
3	0	2	4

Course Code:	2CSDE79
Course Title:	Cloud Security and Frameworks

Course Learning Outcomes (CLO):
At the end of the course, students will be able to –

1. classify cloud architectural aspects
2. recognize the trusted platform for cloud computing.
3. identify the security risks associated with the cloud platforms
4. inspect the cloud computing security design patterns

L	T	P	C
3	0	2	4

Course Code:	2CSDE80
Course Title:	Software Testing and Quality Assurance

Course Learning Outcomes (CLO):
At the end of the course, students will be able to –
1. interpret different types of testing techniques in depth
2. apply modern software testing strategies in relation to software development
3. design project test plans, test cases, test data to conduct test operations
4. develop practical skills related to software quality assurance

L	T	P	C
3	0	2	4

Course Code:	2CSDE81
Course Title:	Complex Networks

Course Learning Outcomes (CLO):
At the end of the course, students will be able to –
1. illustrate various types of complex networks
2. analyze real world networks empirically
3. apply the fundamentals of graph theory and statistical methods to large scale networks
4. design networks for real world applications

L	T	P	C
3	0	2	4

Course Code:	2CSDE82
Course Title:	Real Time Operating Systems

Course Learning Outcomes (CLO):
At the end of the course, students will be able to –
1. summarize the characteristics of a real-time system
2. apply scheduling concepts to real time applications
3. examine the causes of fault occurrence in real time operating systems
4. evaluate intricacies of real time databases

L	T	P	C
3	0	2	4

Course Code:	2CSDE83
Course Title:	Modern Networks

Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

1. interpret the modern networking concepts and trends
2. demonstrate basic skills for cellular networks design
3. apply the modern networking fundamentals on real-time network analysis
4. design various types of networks using appropriate tools

L	T	P	C
3	0	2	4

Course Code:	2CSDE84
Course Title:	Probabilistic Algorithms

Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

1. illustrate the importance of probabilistic algorithms with computational models and related complexity classes
2. select appropriate data structures to increase efficiency and effectiveness of a randomized algorithm
3. evaluate complexity of a probabilistic algorithm formally
4. apply various tools and techniques to design probabilistic algorithms for given applications

L	T	P	C
3	0	2	4

Course Code:	2CSDE85
Course Title:	Artificial Intelligence

Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

1. explain the significance of Artificial Intelligence and knowledge representation,
2. demonstrate the design concepts of control and search strategies in AI Applications,
3. compare different search strategies for a given scenario
4. design applications using Artificial Intelligence.

L	T	P	C
3	0	2	4

Course Code:	2CSDE86
Course Title:	Application Development Frameworks

Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

1. interpret basic concepts of application development frameworks
2. explain message framework in Django
3. develop programs to solve real world problems based on concepts of Django

4. design applications using cross platform development concepts

L	T	P	C
3	0	2	4

Course Code:	2CSDE87
Course Title:	Ethical Hacking and Vulnerability Assessment

Course Learning Outcomes (CLO):
At the end of the course, students will be able to –
1. summarize the core concepts related to malware, hardware and software vulnerabilities and their causes
2. choose state-of-the-art tools to exploit the vulnerabilities related to computer system and networks
3. experiment with various tools to exploit web applications
4. solve the security issues in web applications

L	T	P	C
2	0	2	3

Course Code:	2CSDE88
Course Title:	Simulation and Mathematical Modeling

Course Learning Outcomes (CLO):
At the end of the course, students will be able to –
1. illustrate the need of simulation and mathematical modeling in Computer Science
2. demonstrate system activities through simulation
3. apply mathematical modelling to different real life applications
4. analyze behaviour of the system under various circumstances

L	T	P	C
2	0	2	3

Course Code:	2CSDE89
Course Title:	Robotics

Course Learning Outcomes (CLO):
At the end of the course, students will be able to –
1. interpret mathematical concepts to model robot manipulators and mobile robots
2. infer trade-off between different sensors, actuators and their processing algorithms
3. relate the computational challenges inherent in fundamental mobile robotic tasks
4. design appropriate algorithms for specific robotic applications

L	T	P	C
2	0	2	3

Course Code:	2CSDE90
Course Title:	Formal Methods in Software Engineering

Course Learning Outcomes (CLO):
At the end of the course, students will be able to –

1. explain the significance of formal methods in Software Engineering
2. infer formal specification languages based on propositional logic, predicate logic, relational calculus, and finite state machines
3. apply analysis techniques for formal specification languages with help of supporting tools
4. design formal specifications for software systems

L	T	P	C
2	0	2	3

Course Code:	2CSDE91
Course Title:	Contemporary Programming

Course Learning Outcomes (CLO):
At the end of the course, students will be able to –

1. interpret basic concepts of rust programming language
2. explain the concepts of programming with reference to error handling, message passing and concurrency control
3. develop dynamic programs to solve real-time problems
4. design communication module to create robust programs

L	T	P	C
2	0	2	3

Course Code:	2CSDE92
Course Title:	Human Machine Interface

Course Learning Outcomes (CLO):
At the end of the course, students will be able to –

1. explain requirements and components of Human Machine Interface (HMI) systems
2. evaluate user interfaces to detect usability problems in HMI applications
3. apply an appropriate interaction style for a given need
4. design a user interface using analytical methods such as cognitive walkthrough and to build multimodal GUI

L	T	P	C
2	0	2	3

Course Code:	2CSDE93
Course Title:	Blockchain Technology

Course Learning Outcomes (CLO):
At the end of the course, students will be able to –

1. summarize the concept of Blockchain technology
2. develop the structure of a Blockchain network
3. evaluate security issues relating to Blockchain and cryptocurrency
4. design the applications based on Blockchain technology

L	T	P	C
2	0	2	3

Course Code:	2CSDE94
Course Title:	Approximation Algorithms

Course Learning Outcomes (CLO):
At the end of the course, students will be able to –
1. explain importance of approximation algorithms with various approximation schemes
2. choose appropriate approximation scheme for combinatorial algorithms
3. develop Linear Programming based approximation algorithms for various graph problems
4. estimate hardness of approximation algorithms for classical NP-hard problems

L	T	P	C
2	0	2	3

Course Code:	2CSDE95
Course Title:	Computer Graphics

Course Learning Outcomes (CLO):
At the end of the course, students will be able to –
1. explain various aspects of computer graphics and computer visualization
2. infer the working of basic drawing and rendering algorithms in 2D and 3D
3. explain various 2D and 3D transformations
4. design components in 2D and 3D

L	T	P	C
2	0	2	3

Course Code:	2CSDE96
Course Title:	Interfacing with Microprocessors

Course Learning Outcomes (CLO):
At the end of the course, students will be able to –
1. illustrate basic architecture of microprocessors
2. utilize microcontrollers for interfacing of industrial applications
3. develop logic for programs in assembly language
4. design microprocessor-based systems for interfacing peripherals

L	T	P	C
0	0	4	2

Course Code:	2CS703
Course Title:	Minor Project

Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

1. make use of acquired knowledge for the problem identification and definition,
2. analyze the technical aspects of the project with a comprehensive and systematic approach,
3. propose and select the appropriate solution,
4. appraise the importance of an individual / team for effective execution,
5. compile and conclude the project with effective communication amongst peers, mentors and society.

L	**T**	**P**	C
0	0	0	1

Course Code:	2CS704
Course Title:	Summer Internship

Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

1. perceive a better understanding of the engineering workplace,
2. adapt competencies necessary for professional career,
3. value interpersonal and human relationship skills,
4. build the foundation for industrial internship / major project.

Nirma University
Institute of Technology
B.Tech. in Computer Science and Engineering
Semester- VIII

L	T	P	C
0	0	0	11

Course Code:	2CS801
Course Title:	Major Project / Internship

Major Project

Course Learning Outcomes (CLO):

After successful completion of the course, student will be able to –

1. make use of acquired knowledge for the problem identification and definition related to industry / research / societal need,
2. analyse the technical aspects of the project with a comprehensive and systematic approach,
3. select the appropriate modern tool(s) and technique(s) for problem solving,
4. propose and select the appropriate and cost effective solution,
5. appraise the importance of an individual / team for effective execution,
6. value the health, environment, safety and ethical practices during the project,
7. perceive the possibility of scalability and scope of intellectual property rights,
8. compile and conclude the project with effective communication amongst peers, mentors and society,
9. develop life-long learning skills for productive career.

NIRMA UNIVERSITY
Institute of Technology
B. Tech. Computer Science and Engineering
Open Elective

L	T	P	C
2	0	2	3

Course Code	2CSOE51
Course Title	Machine Learning

Course Outcomes:

At the end of the course, students will be able to –

1. comprehend statistical methods as basis of machine learning domain
2. learn variety of learning algorithms for appropriate applications
3. identify various machine learning techniques to solve problems in applicable domains

L	T	P	C
3	0	0	3

Course Code	2CSOE01
Course Title	IoT Analytics

Course Outcomes:

At the end of the course, students will be able to -

1. comprehend the architectural components and platforms of IoT ecosystem
2. apply appropriate access technology and protocols as per the application requirement
3. appreciate the role of big data, cloud computing and data analytics in a typical IoT system
4. design applications with suitable lightweight data processing and communication methodologies.

L	T	P	C
3	0	0	3

Course Code	2CSOE02
Course Title	Cloud Computing

Course Outcomes:

At the end of the course, students will be able to -

1. understand the hardware, software concepts and architecture of cloud computing
2. contrast the key technical and commercial issues concerning cloud computing versus traditional software models

3. realize the importance of virtualization technology in support of cloud computing
4. explore the issues related to cloud computing.

L	T	P	C
2	0	2	3

Course Code	2CSOE52
Course Title	Data Structures

Course Outcomes:

At the end of the course, students will be able to –

1. illustrate various data structures for efficient data storage and retrieval
2. correlate various data structure in algorithm design
3. analyse various searching, sorting, and indexing algorithms.

L	T	P	C
2	0	2	3

Course Code	2CSOE53
Course Title	Operating Systems

Course Outcomes:

At the end of the course, students will be able to -

1. describe the various components of Operating Systems
2. analyze the different services provided by UNIX Operating System
3. design and implement concurrent processes requiring synchronization.

L	T	P	C
3	0	0	3

Course Code	2CSOE03
Course Title	Data Analytics

Course Outcomes:

At the end of this course, student will be able to-

1. interpret the statistical parameters and its tendencies
2. compare different data distributions, descriptions and their applications
3. use statistical parameters for inferences and support it with valid arguments and values
4. apply statistical inferences for various real life problems.

L	T	P	C
2	0	2	3

Course Code	2CSOE76
Course Title	Object Oriented Programming

Course Outcomes:

At the end of the course, students will be able to –

1. interpret the basic principles of object oriented programming.
2. design and develop computer programs to solve real world problems based on object-oriented principles.
3. implement multi-threaded applications and exception handling.

L	T	P	C
2	0	2	3

Course Code	2CSOE77
Course Title	Web Technology

Course Outcomes:

After successful completion of this course, student will be able to:

1. understand the architecture of the internet and web technology
2. design an efficient web application
3. use programming language to develop a web application.

L	T	P	C
2	0	2	3

Course Code	2CSOE78
Course Title	Scientific Programming

Course Outcomes:

At the end of the course, students will be able to –

1. write computational programs at a high level of abstraction
2. use standard programming constructs like repetition, selection, functions, composition, modules, aggregated data
3. implement and evaluate the results of scientific computing problems, using established program libraries.

L	T	P	C
2	0	2	3

Course Code	2CSOE79
Course Title	Mobile Application Development

Course Outcomes:

At the end of the course, students will be able to –

1. explain the basic principles and constructs of object-oriented programming
2. design, develop, execute, debug and validate programs in object oriented programming environment
3. apply various tools and technologies to conceptualize and develop variety of mobile applications