

NIRMA UNIVERSITY

Institute of Technology

M Tech Computer Science and Engineering (Data Science)

Semester – I

L	T	P	C
3	0	2	4

Course Code	3CS1109
Course Title	Complexity Theory and Algorithms

Course Learning Outcomes (CLOs):

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

1. comprehend time & space complexity and formal aspects of algorithms
2. identify appropriate data structures and methodologies for efficient algorithm design
3. design and implement efficient algorithms using various approaches

L	T	P	C
3	0	2	4

Course Code	3CS1111
Course Name	Applied Machine Learning

Course Learning Outcomes (CLOs):

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

1. comprehend statistical methods as basis of machine learning domain
2. apply and evaluate variety of machine learning algorithms
3. implement machine learning techniques to solve problems in interdisciplinary domains

L	T	P	C
3	0	2	4

Course Code	3CS1112
Course Name	Advanced Database Systems

Course Learning Outcomes (CLO):

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

1. assess various storage and retrieval methods through appropriate indexing
2. design and analyze efficiency of algorithms for database operations
3. comprehend contemporary database architectures and its relevant issues

L	T	P	C
3	0	0	3

Course Code	3CS1113
Course Name	Applied Mathematics for Computer Science

Course Learning Outcomes (CLOs):

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

1. comprehend the mathematical fundamentals related to sets, probability, statistics, linear algebra and mathematical optimization
2. apply the mathematical principles to solve wide range of problems in computer science
3. use the mathematical concepts as per the need of the application

L	T	P	C
3	0	2	4

Course Code	3CS4101
Course Title	Introduction to Scalable Systems

Course Learning Outcomes (CLOs):

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

1. comprehend the distributed computing models for scalable systems
2. analyse the scalable systems in the context of various performance parameters
3. apply concepts of scalable systems in designing data intensive applications

L	T	P	C
1	0	0	0

Course Code	3SP1103
Course Title	Ethics for Data Science

Course Learning Outcomes (CLOs):

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

1. describe the principles of fairness, accountability and transparency in data science
2. realize the ethical considerations regarding research, privacy and control of information and big data
3. comprehend the contemporary practices in data handling

Semester – II

L	T	P	C
2	0	2	3

Course Code	3CS4201
Course Name	Exploratory Data Analysis

Course Learning Outcomes (CLOs):

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

1. comprehend the basic concepts of probability and statistics and their need in engineering
2. apply concepts and methods of probability and statistics in simulation and modeling of various computer science problems
3. perform probabilistic and statistical analysis of data related to computer science research and projects

L	T	P	C
2	-	-	2

Course Code	3SS1201
Course Title	Research Methodology and IPR

Course Outcomes (COs):

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

1. formulate a research problem for a given engineering domain.
2. analyse the available literature for given research problem.
3. develop technical writing and presentation skills.
4. comprehend concepts related to patents, trademark and copyright.

L	T	P	C
-	-	10	5

Course Code	3CS4202
Course Title	Minor Project

Course Outcomes (COs):

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

1. identify the issues related with the recent trends in the field of computer science and its applications
2. formulate the problem definition, analyze and do functional simulation of the same

3. design, implement, test and verify the proposed solution related to problem definition
4. compile, comprehend and present the work carried out

L	T	P	C
3	0	2	4

Course Code	3CS42D101
Course Name	Natural Language Computing

Course Learning Outcomes (CLOs):

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

1. comprehend the key concepts of NLP which are used to describe and analyse language
2. perform POS tagging and generate context free grammar for English language
3. realize semantics and pragmatics of English language for processing
4. implement natural language processing task

L	T	P	C
3	0	2	4

Course Code	3CS42D102
Course Name	Information Retrieval

Course Learning Outcomes (CLOs):

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

1. comprehend concepts, algorithms, data/file structures necessary to design, and implement IR systems
2. apply methodology for the design and evaluation of IR systems
3. compare major types of IR systems, the different theoretical foundations underlying these systems
4. develop the practical skills for IR systems design

L	T	P	C
3	0	2	4

Course Code	3CS42D103
Course Name	Advanced Statistical Learning

Course Learning Outcomes (CLOs):

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

1. comprehend the fundamentals of various statistical learning methods
2. interpret and critically evaluate the outcomes of statistical analysis
3. implement statistical learning methods

L	T	P	C
3	0	2	4

Course Code	3CS42D104
Course Title	Large Scale Graph Algorithms

Course Learning Outcomes (CLOs):

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

1. visualize real-life networks as large scale graphs
2. transform basic graph algorithms in to large scale graph algorithms for parallel and distributed environment
3. practice large scale graph algorithms on appropriate tools for complex data sources
4. comprehend various optimization techniques and considerations for achieving parallel scalability when processing irregular graph data

L	T	P	C
3	0	2	4

Course Code	3CS42D105
Course Name	Data Mining and Visualization

Course Learning Outcomes (CLOs):

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

1. identify a number of common data domains and corresponding analysis tasks, including multivariate data, networks, text and cartography
2. comprehend the key processes of data mining, data warehousing and knowledge discovery process

3. implement data mining techniques to solve problems in other disciplines in a mathematical way
4. exercise building and evaluating visualization systems

L	T	P	C
2	0	2	3

Course Code	3CS12D201
Course Name	Blockchain Technology

Course Learning Outcomes (CLOs):

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

1. comprehend the structure of a Blockchain networks
2. evaluate security issues relating to Blockchain and cryptocurrency
3. design and analyze the applications based on Blockchain technology

L	T	P	C
2	0	2	3

Course Code	3CS42D201
Course Name	Analytics for the IoT

Course Learning Outcomes (CLOs):

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

1. implement the architectural components and protocols for application development
2. identify data analytics and data visualization tools as per the problem characteristics
3. collect, store and analyse IoT data

L	T	P	C
2	0	2	3

Course Code	3CS42D202
Course Title	Advanced Storage Systems

Course Learning Outcomes (CLOs):

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

1. comprehend modern architecture for storage systems
2. identify appropriate storage approach applicable for the given application
3. analyse different distributed and parallel file system performance

L	T	P	C
2	0	2	3

Course Code	3CS42D203
Course Name	Bioinformatics

Course Learning Outcomes (CLOs):

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

1. comprehend the intersection of life and information sciences, gene expression, and database queries
2. explain how to locate and extract data from key bioinformatics databases and resources
3. apply the knowledge of the basic principles and concepts of biology, computer science and mathematics in an integrated way

L	T	P	C
2	0	2	3

Course Code	3CS42D204
Course Title	Data and Knowledge Security

Course Learning Outcomes (CLOs):

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

1. comprehend the security requirements of data and knowledge
2. analyse the security requirements of the big data systems
3. suggest security solutions for big data systems

L	T	P	C
3	0	2	4

Course Code	3CS12D301
Course Name	Big Data Systems

Course Learning Outcomes (CLOs):

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

1. analyse the big data analytic techniques for business applications.
2. manage big data using different tools and frameworks.
3. design efficient algorithms for mining the data from large volumes.
4. implement the HADOOP and MapReduce technologies associated with big data analytics

L	T	P	C
3	0	2	4

Course Code	3CS12D302
Course Name	Deep Learning and Applications

Course Learning Outcomes (CLOs):

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

1. comprehend the strengths and weaknesses of deep networks
2. analyze suitability of different deep networks for variety of problems
3. design and implement deep networks for solving problems pertaining to computer science and interdisciplinary research

L	T	P	C
3	0	2	4

Course Code	3CS12D304
Course Name	Multicore and GPU Computing

Course Learning Outcomes (CLOs):

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

1. comprehend modern multi-core processor micro-architectures and interconnect technologies
2. analyse the memory hierarchy and performance characteristics
3. recognize the need for atomic operations and variety of locking mechanisms
4. explore architecture of general purpose graphics processing units and their common programming models

L	T	P	C
3	0	2	4

Course Code	3CS42D301
Course Name	Econometrics

Course Learning Outcomes (CLOs):

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

1. use broad knowledge of regression analysis relevant for analyzing economic data
2. interpret and critically evaluate the outcomes of empirical analysis
3. apply elementary procedures for model validation in the single equation context
4. perform statistical tests to investigate whether the classical assumptions in regression analysis are satisfied
5. implement econometric methods

L	T	P	C
3	0	2	4

Course Code	3CS42D302
Course Name	Social Media Analytics

Course Learning Outcomes (CLOs):

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

1. comprehend the fundamental elements and basic concepts in social media analytics
2. use important metrics and models to characterize and measure networks
3. apply the principle of social media analyzing techniques such as community detection, influence propagation and maximization, link prediction

L	T	P	C
3	0	2	4

Course Code	3CS42D303
Course Name	Predictive Analytics

Course Learning Outcomes (CLOs):

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

1. apply statistical and regression analysis methods to identify new trends and patterns, uncover relationships, create forecasts, predict likelihoods, and test predictive hypotheses
2. compare the underlying predictive modeling techniques
3. develop the modeling skills from an industry perspective
4. select appropriate predictive modeling approaches suitable to various tasks

Semester-III

L	T	P	C
-	-	-	14

Course Code	3CS1302
Course Title	Major Project Part – I

Course Learning Outcomes (CLOs):

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

1. Understand the issues related with the recent trends in the field of engineering and its applications
2. Formulate the problem definition, analyze and do functional simulation of the same
3. Design, Implement, test and verify the engineering solution related to problem definition
4. Compile, Comprehend and Present the work carried out
5. Manage Project

Semester-IV

L	T	P	C
-	-	-	14

Course Code	3CS1402
Course Title	Major Project Part – II

Course Learning Outcomes (CLOs):

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

1. Understand the issues related with the recent trends in the field of engineering and its applications
2. Formulate the problem definition, analyze and do functional simulation of the same
3. Design, Implement, test and verify the engineering solution related to problem definition
4. Compile, Comprehend and Present the work carried out
5. Manage Project