

KOLHAPUR INSTITUTE  
OF TECHNOLOGY'S  
**COLLEGE OF  
ENGINEERING**  
(AUTONOMOUS),  
**KOLHAPUR**

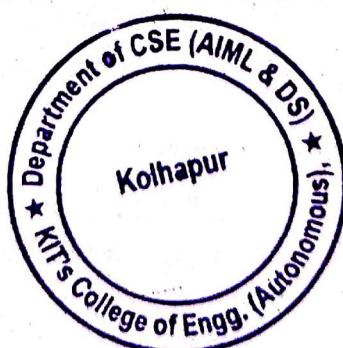
**Structure for**  
**B.Tech in**  
**Computer Science & Engineering (DS)**  
**(To be Implemented w.e.f. Academic Year 2022-23)**

**Department of Computer Science & Engineering (DS)**

**Kolhapur Institute of Technology's  
College of Engineering (Autonomous), Kolhapur,  
Maharashtra, INDIA**

*Agreed*

Dr. U. P. Gurav  
Head, Department of CSE(DS)



*[Signature]*  
Prof Dr. A. S. Patil  
Dean Academics

**SEM V**

**Kolhapur Institute of Technology's  
College of Engineering (Autonomous), Kolhapur**  
Teaching and Evaluation scheme for

**Third Year B. Tech. Program in Computer Science & Engineering (DS) Semester-V**

Course Code	Course Name	Curriculum Component	Hrs/Week				Evaluation Scheme				
			L	T	P	Credit s	Componen t	Ma	Min for Passing		
UDSC0501	Design and Analysis of Algorithms	PC	3	1	-	4	ISE I	10	20		
							MSE	30			
							ISE II	10			
							ESE	50	40		
UDSC0502	Database Management System	PC	3	-	-	3	ISE I	10	20		
							MSE	30			
							ISE II	10			
							ESE	50	40		
UDSC0503	Exploratory Data Analysis	PC	3	-	-	3	ISE I	10	20		
							MSE	30			
							ISE II	10			
							ESE	50	40		
UDSE05**	Program Elective - I	PE	3	-	-	3	ISE I	10	20		
							MSE	30			
							ISE II	10			
							ESE	50	40		
UDSO05**	Open Elective - I	OE	3	-	-	3	ISE I	10	20		
							MSE	30			
							ISE II	10			
							ESE	50	40		
UDSC0531	Database Management System lab	PC	-	-	2	1	ISE	25	10		
							ESE(POE)	50			
UDSC0532	Exploratory Data Analysis Lab	PC	-	-	2	1	ISE	25	10		
							ESE (POE)	25			
UDSC0533	Web Technology Lab	PC	2	-	2	3	ISE	25	10		
							ESE (POE)	50			
UDSC0551	Mini Project-II	PW	-	-	2	1	ISE-I	25	20		
							ISE-II	25			
UDSA0561	Software System Tools	Audit Course	2	-	-	-	ISE-I	50	40		
							ISE-II	50			
								750			
			<b>1</b>	<b>9</b>	<b>1</b>	<b>8</b>	<b>22</b>	<b>500 + 250 = 750 + Audit Course</b>			

**Total Credits - 22, Total Contact hours – 28**

Program Elective – I (PE-I)			Open Elective – I (OE-I)		
UDSE0521			UDSO0511		
AI for Cyber Security			Data Science for Everyone		
UDSE0522					
STQA					
UDSE0523					
Internet of Things Analytics					
UDSE0524					
Text Analytics					

<b>Course Code:</b>	UDSC0501	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
<b>Course Name:</b>	Design and Analysis of Algorithms	<b>3</b>	<b>1</b>		<b>4</b>

<b>Course Prerequisites:</b>	Data Structures
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<b>Course Description:</b>	This course introduces fundamental concepts and key techniques for designing and analyzing algorithms along with studying and applying different algorithm design methods namely, greedy method, divide and conquer, dynamic programming and backtracking.
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<b>Course Outcomes:</b>	After the completion of the course the student will be able to -
<b>CO1</b>	Define basic concepts of algorithms and measure the efficiency of algorithms.
<b>CO2</b>	Apply various algorithmic strategies such as divide and conquer, greedy algorithms, dynamic programming, backtracking to solve real life problems
<b>CO3</b>	Analyze performance efficiency of designed algorithm's time and space complexity .

<b>CO-PO Mapping:</b>		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>		2	3	2	2	1								1	1
<b>CO2</b>		2	3	2	2	2								1	1
<b>CO3</b>		2	3	2	3	2								1	1

<b>Assessment Scheme:</b>			
<b>SN</b>	<b>Assessment</b>	<b>Weightage</b>	<b>Remark</b>
<b>1</b>	In Semester Evaluation 1 (ISE1)	10%	Assignment, Test, Quiz, Seminar, Presentation, etc.
<b>2</b>	Mid Semester Examination (MSE)	30%	50% of course contents
<b>3</b>	In Semester Evaluation 2 (ISE2)	10%	Assignment, Test, Quiz, Seminar, Presentation, etc.
<b>4</b>	End Semester Examination (ESE)	50%	100% course contents

<b>Course Contents:</b>		
<b>UNIT 1</b>	<b>INTRODUCTION</b>	<b>7 Hours</b>
What is algorithm, Algorithm Specification: Pseudocode Conventions, Recursive Algorithm, Performance Analysis: Space Complexity, Time Complexity, Asymptotic Notations, Practical Complexities, Performance Measurement Recurrences: The substitution method, recursion tree method, Master Theorem		
<b>UNIT 2</b>	<b>ALGORITHM DESIGN AND ANALYSIS TECHNIQUES-I</b>	<b>7 Hours</b>
Divide and Conquer-The general method, Binary search, Finding the maximum and minimum, Merge sort, Quick sort and analysis of these algorithms. The Greedy method: The general method, Knapsack problem, Job sequencing with deadlines, Optimal storage on tapes, Optimal merge patterns, Huffman codes.		

<b>UNIT 3</b>	<b>ALGORITHM DESIGN AND ANALYSIS TECHNIQUES-II</b>	<b>7 Hours</b>
Dynamic Programming: The general method, Multistage graphs, Optimal binary search trees, 0/1 knapsack, Reliability design, Traveling Salesperson problem.		
<b>UNIT 4</b>	<b>GRAPH ALGORITHMS: ELEMENTARY GRAPH ALGORITHMS:</b>	<b>7 Hours</b>
Representations of graphs , Breadth-first search, Depth first search, Strongly connected components, Minimum Spanning Trees: Growing a minimum spanning tree, The algorithms of Kruskal and Prim Single-Source Shortest Paths: The Bellman-Ford algorithm, Single-source shortest paths in directed acyclic graphs, Dijkstra's algorithm, The Floyd-Warshall algorithm		
<b>UNIT 5:</b>	<b>BACKTRACKING</b>	<b>7 Hours</b>
The general method, 8-queen problem, Sum of subsets, Graph Coloring, Knapsack Problem, Branch & Bound Algorithms , Hamiltonian Cycle.		
<b>UNIT 6:</b>	<b>COMPLEXITY CLASSES :P &amp; NP - COMPLETE</b>	<b>7 Hours</b>
Polynomial time, Polynomial-time verification, Decidability , NP completeness and reducibility, NP-complete problems ,string matching algorithms, case studies		

**Text Books:**

1. Thomas Cormen, Charles Leiserson, Ronald Rivest and Clifford Stein, "Introduction to Algorithms", PHI
2. Fundamentals of Computer Algorithms - Ellis Horowitz, Satraj Sahani, Sagathevar Rajasekaran, Universities Press, Second Edition.

**Reference Books:**

1. Fundamentals of Algorithmics – Gilles Brassard, Paul Bratley (Pearson Education).
2. Mastering Algorithms with C – Kyle Loudon (SPD O'Reilly).
3. Computer Algorithms- Introduction to Design and Analysis – Sara Baase, Allen Van Gelder (Pearson Education).

<b>Course Code:</b>	UDSC0502	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
<b>Course Name:</b>	Database Management System	<b>3</b>			<b>3</b>

<b>Course Prerequisites:</b>
File Systems

<b>Course Description:</b>
This course presents the fundamental concepts of database design and use. It provides a study of data models, data description languages, relational algebra, SQL, data normalization and transactions.

<b>Course Outcomes:</b>	<b>After the completion of the course the student will be able to -</b>
<b>CO1</b>	Explain the fundamental database concepts.
<b>CO2</b>	Apply the normalization techniques and SQL queries on database.
<b>CO3</b>	Interpret various indexing and concurrency control techniques.
<b>CO4</b>	Develop a database application using database design principles.

<b>CO-PO Mapping:</b>															
		<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
	<b>CO1</b>	3													
	<b>CO2</b>	2	3												1
	<b>CO3</b>	2	1												2
	<b>CO4</b>			3											2

<b>Assessment Scheme:</b>			
<b>SN</b>	<b>Assessment</b>	<b>Weightage</b>	<b>Remark</b>
<b>1</b>	In Semester Evaluation 1 (ISE1)	10%	Assignment, Test, Quiz, Seminar, Presentation, etc.
<b>2</b>	Mid Semester Examination (MSE)	30%	50% of course contents
<b>3</b>	In Semester Evaluation 2 (ISE2)	10%	Assignment, Test, Quiz, Seminar, Presentation, etc.
<b>4</b>	End Semester Examination (ESE)	50%	100% course contents

<b>Course Contents:</b>	
<b>UNIT 1</b>	<b>Introduction to Database Concepts</b>
Purpose of Database Systems, View of Data, Data Models, Database Architecture, Roles in Database Environment, The Entity-Relationship Model, Entity-Relationship Diagrams, Reduction to Relational Schemas, Introduction to Relational Model, Relational Query Languages- The Relational Algebra.	
<b>UNIT 2</b>	<b>Relational Database Design</b>
The purpose of Normalization, Data Redundancies and Update Anomalies, Functional Dependencies, The Process of Normalization, First Normal Form, Second Normal Form, Third Normal Form, Boyce-Codd Normal Form, Fourth Normal Form, Fifth Normal Form.	

<b>UNIT 3</b>	<b>Relational Model and Structured query Language</b>	<b>6 Hours</b>
Structure of Relational Databases, SQL Data Definition Language, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Subqueries, Modification of the Database, Join Expressions, Views, Integrity Constraints, Accessing SQL from a Programming Language.		
<b>UNIT 4</b>	<b>Transactions and Concurrency Control</b>	<b>8 Hours</b>
Simple Transaction Model, Serializability, Concurrency Control- Lock-Based Protocols, Two phase locking protocols, Graph-based protocols, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols.		
<b>UNIT 5</b>	<b>File Structure, Indexing and Hashing</b>	<b>6 Hours</b>
Overview of Physical Storage Media, File Organization, Organization of Records in Files, Data-Dictionary Storage, Database Buffer. Basic Concepts of Indexing and Hashing, Ordered Indices, B+-Tree Index Files, B-Tree Index Files, Multiple-Key Access, Static Hashing, Dynamic Hashing.		
<b>UNIT 6</b>	<b>Overview of NoSQL</b>	<b>6 Hours</b>
Overview and History of NoSQL Databases. Definition of the Four Types of NoSQL Database, The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedance Mismatch.		
<b>Text Books:</b>		
1. Fundamentals of Database Systems – by Ramez Elmasri and Shamkant Navathe Publisher -Pearson Education, 5th Edition. 2. Database Systems: Design, Implementation and Management.- PeterRof, Carlos Coronel (7th Edition), Cengage Learning.		
<b>Reference Books:</b>		
1. DataBase System Concept by Henry F. Korth, Abraham Silberschatz, Sudarshan (McGraw Hill Inc.) Sixth Edition. 2. Database Systems- A practical approach to Design, Implementation and Management by Thomas Connolly, Carolyn Begg, 3rd Edition, Pearson Education		

<b>Course Code:</b>	UDSC0503	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
<b>Course Name:</b>	Exploratory Data Analysis	<b>3</b>			<b>3</b>

<b>Course Prerequisites:</b>	Statistics and Linear Algebra, Python Programming
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<b>Course Description:</b>	This course will cover the exploratory data analytics , data pre-processing and data preparation for machine learning model.
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<b>Course Outcomes:</b>	<b>After the completion of the course the student will be able to -</b>
<b>CO1</b>	Explain the fundamentals of exploratory data analysis.
<b>CO2</b>	Interpret different EDA techniques to gain insights, identify patterns, detect missing values, outliers, and understand the underlying structure of a real-world datasets.
<b>CO3</b>	Identify appropriate EDA techniques for different data types such as numerical, categorical, or time series data.
<b>CO4</b>	Choose appropriate EDA techniques for feature scaling, feature extraction and data visualization.

<b>CO-PO Mapping:</b>		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	2	1	1	1		1		2					1	2	3
<b>CO2</b>	2	2	1	2	2	1		3					1	3	3
<b>CO3</b>	2	2	2	2	2	1		3					1	3	3
<b>CO4</b>	2	2	2	2	3	1		3					1	2	3

<b>Assessment Scheme:</b>		<b>Remark</b>												
<b>SN</b>	<b>Assessment</b>	<b>Weightage</b>												
<b>1</b>	In Semester Evaluation 1 (ISE1)	10%	Assignment, Test, Quiz, Seminar, Presentation, etc. (10											
<b>2</b>	Mid Semester Examination (MSE)	30%	50% of course contents. (30 Marks)											
<b>3</b>	In Semester Evaluation 2 (ISE2)	10%	Assignment, Test, Quiz, Seminar, Presentation, etc. (10											
<b>4</b>	End Semester Examination (ESE)	50%	100% course contents. (50 Marks)											

<b>Course Contents:</b>		<b>6 Hours</b>
<b>UNIT 1</b>	<b>Data Foreseeing</b>	
Data engineering, technical requirements of data during machine learning modeling:- identify numerical and categorical variables, missing data, determine cardinality in categorical variables, identify linear relationship, identify normal distribution, highlighting outliers.		
<b>UNIT 2</b>	<b>Handling Missing Data and Data Encoding</b>	<b>7 Hours</b>
Impute missing data: - remove missing data, impute missing data by mean, mode or median, replacing missing values with value at the end of the distribution, multivariate imputation. Data Encoding: - Why encoding? one hot encoding, replace categories with ordinal numbers, encoding with integers, encoding with mean of the target.		

<b>UNIT 3</b>	<b>Variable Discretization and Working with Outliers</b>	<b>6 Hours</b>
Variable Discretization:- divide the variables into equal intervals, perform discretization followed by categorical encoding. Working with outliers:- Outliers means?, trimming outliers, capping the variables at arbitrary max and min values, performing zero coding.		
<b>UNIT 4</b>	<b>Feature Scaling</b>	<b>7 Hours</b>
Standardizing features, mean normalization, scaling to max and min values, scaling with the median and quantiles, scaling to vector unit length, deriving new features with decision trees, and carrying out PCA.		
<b>UNIT 5</b>	<b>Feature Creation with transaction and time series data</b>	<b>6 Hours</b>
Aggregating transaction with mathematical operations, aggregating transaction in a time window, determining the number of local maxima and minima, deriving time elapsed between time-stamped events, creating features from transaction.		
<b>UNIT 6</b>	<b>Feature Extraction from text and Case study</b>	<b>6 Hours</b>
Counting characters, words, vocabulary, estimating text complexity by counting sentences, create features with bag-of-words and n-grams. Case study: - Data preprocessing @given dataset(includes exploratory data analysis(EDA), pipelining)		
<b>Text Books:</b>	 "Python Feature Engineering Cookbook" by Soledad Galli - Packt Publication.	
<b>Reference Books:</b>	 "Python for data analysis " by Wes Mckinney - O'Reilly Publication.	



<b>UNIT 3</b>	<b>DETECTION OF MALICIOUS WEB PAGES, URLs.</b>	<b>7 Hours</b>
<b>URL Blacklisting</b> – Drive by download URL- Command and Control URLs – Phishing URLs – Using Heuristics to detect Malicious Pages – Data for the analysis – Feature Extraction – Lexical Features – Web Content based Features – Host based features – site Popularity features.		
<b>UNIT 4</b>	<b>CAPTCHA AND SCAN DETECTION</b>	<b>6 Hours</b>
Using AI to crack CAPTCHA – Types of CAPTCHA – ReCAPTCHA – Breaking a CAPTCHA – Solving CAPTCHA with neural network - Machine Learning in Scan Detection - Machine-Learning Applications in Scan Detection		
<b>UNIT 5</b>	<b>AI AND IDS</b>	<b>6 Hours</b>
Architecture of IDS based on Neural networks – Intelligent flow based IDS - Multi-Agent IDS – AI based Ensemble IDS – Machine Learning in Hybrid Intrusion Detection Systems - MachineLearning Applications in Hybrid Intrusion Detection: Anomaly - Misuse Sequence Detection System - Parallel Detection System.		
<b>UNIT 6</b>	<b>AI AND MAIL SERVER</b>	<b>6 Hours</b>
Types of Mail Server – Data Collection from mail server – Naive Bayes theorem to detect spam – Laplace smoothing – Featurization Techniques to covert text based emails to numeric values – Logistic regression to spam filters - Anomaly detection techniques for SMTP and HTTP.		
<b>Text Books:</b>		
<ol style="list-style-type: none"> <li>1. Hands-On Machine Learning for Cyber Security: Safeguard your system by making your machine intelligence using the python ecosystem, Soma Harder, Sinan Ozdemir, Packt Publishing Ltd, 2018.</li> <li>2. The state of the Art in Intrusion Detection System, Al-Sakib Khan Pathan, CRC Press, Taylor &amp; Francis Group, 2014</li> <li>3. Data Mining and Machine Learning in Cyber Security, Sumeet Dua and Xian Du, CRC Press, 2011.</li> </ol>		
<b>Reference Books:</b>		
<ol style="list-style-type: none"> <li>1. Cybersecurity for Dummies, Brian Underdahl, Wiley, 2011</li> <li>2. Cryptography and Network security, Behrouz A. Forouzan , Debdeep Mukhopadhyay, McGraw Hill Education, 2nd Edition, 2011</li> </ol>		



<b>UNIT 3</b>	<b>Regression Testing</b>	<b>8 Hours</b>
What is regression testing, Regression Test cases selection, Reducing the number of test cases, Risk analysis, Code coverage prioritization techniques Object oriented testing: What is Object orientation, What is object-oriented testing, Path testing, State based testing, Class testing		
<b>UNIT 4</b>	<b>Measurement</b>	<b>7 Hours</b>
Measurement in everyday life, Measurement in software engineering, scope of software Metrics and Models in Software testing: Software Metrics, Categories of Metrics, Object oriented Metrics used in testing, what should we measure during testing, Software Quality attributes prediction models		
<b>UNIT 5</b>	<b>Measuring Internal Product</b>	<b>7 Hours</b>
Attribute Size, Aspects of software size, Length, Reuse, Functionality Measuring External Product Attributes: Modeling software quality, measuring aspects of software quality.		
<b>UNIT 6</b>	<b>Testing Web applications:</b>	<b>7 Hours</b>
What is web testing? Functional testing, UI testing, Usability testing, configurations and compatibility testing, security testing, performance testing, database testing, post deployment testing, web metrics. Automated Test data generation: Automated Test Data generation Approaches to test data generation, Test data generation tools.		

**Test Books:**

1. Software testing: Yogesh Singh, Cambridge University Press, First Edition
2. Software Metrics – A Rigorous & Practical approach: Norman Fenton, Shari Lawrence P fleeger, 2nd Edition Thomson Press
3. Software Quality Engineering, Jeff Tian, Wiley India Ltd.

**References Books:**

1. Foundations of Software testing: Aditya P. Mathur, Pearson, Second Edition
2. Software Testing: Ron Patton, Pearson (SAMS), Second Edition
3. Software Quality, Mordechai Ben Menachem, Garry S. Marliss, BS Publications

Course Code:	UDSC0523	L	T	P	Credit																		
Course Name:	Internet Of Things (I.O.T) Analytics	3			3																		
Course Prerequisites:	Knowledge of Computer Networking, Knowledge of Microprocessor, Knowledge of Python and Assembly																						
Course Description:	This Course Introduces to necessary fundamentals of IOT, introduction of Raspberry Pi with Python Programming and it aims to develop applications related to Smart Home Application, Electric vehicles and its Networks.																						
Course Outcomes:	<b>After the completion of the course the student will be</b>																						
CO1	Illustrate Key Concepts and Terminologies related to IOT.																						
CO2	Outline Raspberry Pi Programs and Arduino Programs.																						
CO3	Explain IOT Servers and Cloud Services.																						
CO4	Analyze IOT Solutions for real life Problems.																						
CO-PO Mapping:																							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2									
CO1	2	1																					
CO2	2	1	1		1									1									
CO3	2	1																					
CO4	2	2	1		1								1	1									
Assessment Scheme:																							
SN	Assessment			Weightage	Remark																		
1	In Semester Evaluation 1 (ISE1)			10%	Assignment, Test, Quiz, Seminar, Presentation, etc.																		
2	Mid Semester Examination (MSE)			30%	50% of course contents																		
3	In Semester Evaluation 2 (ISE2)			10%	Assignment, Test, Quiz, Seminar, Presentation, etc.																		
4	End Semester Examination (ESE)			50%	100% course contents																		
Course Contents:																							
UNIT 1	<b>INTRODUCTION TO INTERNET OF THINGS</b>										<b>6 Hours</b>												
Introduction, Physical Design of IOT, Logical Design of IOT, Working with IOT Devices, IOT Templates, Application of IOT.																							
UNIT 2	<b>FUNDAMENTALS OF IOT MECHANISMS AND KEY TECHNOLOGIES</b>										<b>8 Hours</b>												
Structural Aspects of IOT: Environment Characteristics, Traffic Characteristics, Scalability, Interoperability, Security and Privacy. IOT Technologies: RFID, Sensor, Satellite, Nano, Smart Tech, Cloud Computing. IOT Standards: Bluetooth Smart, ULE, IEEE 802.11ah, Thread, Zigbee, Zwave, 6LoWPAN, IETF IPv6 Routing Protocols for RPL Roll.																							

<b>UNIT 3</b>	<b>PROGRAMMING RASPBERRY PI WITH PYTHON AND ARDUINO</b>	<b>6 Hours</b>
Introduction, Raspberry Pi Interfaces- Serial ,SPI, I2C . Controlling LED , Interfacing LED and Switch, Interfacing Light Sensor(LDR) with Raspberry Pi. Arduino UNO, Sensors in Arduino Kit, Programming with Arduino.		
<b>UNIT 4</b>	<b>IOT PHYSICAL SERVERS AND CLOUD OFFERINGS</b>	<b>8 Hours</b>
Introduction to Cloud Storage Models and Communication API's, WAMP- AutoBahn for IOT, Amazon Web Services for IOT, Xively Cloud Services, Django Model and Architecture, Python Web Application Framework		
<b>UNIT 5</b>	<b>IOT AND M2M</b>	<b>6 Hours</b>
Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT- Software Defined Networking, Network Function Virtualization		
<b>UNIT 6</b>	<b>CASE STUDIES ILLUSTRATING IOT DESIGN</b>	<b>6 Hours</b>
Introduction, Home Automation- Smart Lighting,Home Intrusion Detection, Cities-Smart Parking Environment-Weather Monitoring System, Air Pollution Monitoring,Forest Fire Detection, Agriculture- Smart irrigation, Productivity Applications-IOT Printer		
<b>Text Books:</b>		
1. IOT- for Automated and Smart Application- Yasser Ismail 2. IOT- Hands on Approach- A Bagha 3. Intelligence in IoT-enabled Smart Cities, Fadi Al,Turjan,CRC Press 2019		
<b>Reference Books:</b>		
1. IOT- Hands of Approach- Arshdeep Bahga, Vijay Madisetti 2. Arduino Project Handbook- Mark Geddis 3.IOT Technologies in Smart Cities- Fadi Al,Turjan, Muhammad Imran,2020 IET. 4. Selected Journal Papers on FANET's, VANET's,IOV and Smart Cities.		

<b>Course Code:</b>	UDSE0524	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
<b>Course Name:</b>	Text Analytics	3			3

**Course Prerequisites:**

Natural Language Processing and Machine Learning

**Course Description:**

This course facilitates students to understand the concepts related to text classification, summarization and clustering.

**Course Outcomes:** **After the completion of the course the student will be able to -**

<b>CO1</b>	Explain the basic concepts of text analysis
<b>CO2</b>	Interpret the steps involved in text processing.
<b>CO3</b>	Demonstrate the text classification and summarization methods
<b>CO4</b>	Apply the knowledge of text analytics to use cases.

**CO-PO Mapping:**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	2														
<b>CO2</b>	1	2													
<b>CO3</b>	1	3												1	
<b>CO4</b>		3	1											1	

**Assessment Scheme:**

SN	Assessment	Weightage	Remark
1	In Semester Evaluation 1 (ISE1)	10%	Assignment, Test, Quiz, Seminar, Presentation, etc.
2	Mid Semester Examination (MSE)	30%	50% of course contents
3	In Semester Evaluation 2 (ISE2)	10%	Assignment, Test, Quiz, Seminar, Presentation, etc.
4	End Semester Examination (ESE)	50%	100% course contents

**Course Contents:**

<b>UNIT 1</b>	<b>Introduction to Text Processing and Language Modeling</b>	<b>7 Hours</b>
Natural Language, Linguistics, Language Syntax and Structure, Language Semantics, Text Corpora, Natural Language Processing, Text Analytics.		
<b>UNIT 2</b>	<b>Processing and Understanding Text</b>	<b>7 Hours</b>
Text Tokenization, Sentence Tokenization, Word Tokenization, Text Normalization: Cleaning Text, Tokenizing Text, Removing Special Characters, Expanding Contractions, Case Conversions, Removing Stopwords, Correcting Words, Stemming, Lemmatization, Understanding Text Syntax and Structure.		

<b>UNIT 3</b>	<b>Text Classification</b>	<b>7 Hours</b>
Text Classification, Automated Text Classification, Text Classification Blueprint, Text Normalization, Feature Extraction, Classification Algorithms, Evaluating Classification Models, Building a Multi-Class Classification System, Applications and Uses.		
<b>UNIT 4</b>	<b>Text Summarization</b>	<b>7 Hours</b>
Text Summarization and Information Extraction, Text Normalization, Feature Extraction, Keyphrase Extraction, Topic Modeling, Automated Document Summarization.		
<b>UNIT 5</b>	<b>Text Similarity and Clustering</b>	<b>6 Hours</b>
Text Normalization, Feature Extraction, Text Similarity, Analyzing Term Similarity, Analyzing Document Similarity, Document Clustering.		
<b>UNIT 6</b>	<b>Semantic and Sentiment Analysis</b>	<b>6 Hours</b>
Semantic Analysis, Exploring WordNet, Word Sense Disambiguation, Named Entity Recognition, Analyzing Semantic Representations, Sentiment Analysis.		
<b>Text Books:</b>		
1.Text Analytics with Python- A Practical Real-World Approach to Gaining Actionable Insights from Your Data, Dipanjan Sarka,Apress.		
<b>Reference Books:</b>		
1. John Atkinson-Abutridy, Text Analytics: An Introduction to the Science and Applications of Unstructured Information Analysis, CRC Press, 2022. 2. Srinivasa-Desikan, Bhargav. Natural Language Processing and Computational Linguistics: A practical guide to text analysis with Python, Gensim, spaCy, and Keras. Packt Publishing Ltd, 2018.		



<b>UNIT 3</b>	<b>CONCEPTS OF DATA SCIENCE:</b>	<b>6 Hours</b>
Traits of Big data, Web Scraping, Analysis vs Reporting, Introduction to Programming, Tools for Data Science, Toolkits using Python: Matplotlib, NumPy, Scikit-learn, NLTK		
<b>UNIT 4</b>	<b>MACHINE LEARNING:</b>	<b>6 Hours</b>
Overview of Machine learning concepts – Over fitting and train/test splits, Types of Machine learning – Supervised, Unsupervised, Reinforcement learning variables		
<b>UNIT 5</b>	<b>VISUALIZING DATA: BAR CHARTS, LINE CHARTS, SCATTERPLOTS:</b>	<b>6 Hours</b>
Working with data: Reading Files, Scraping the Web, Using APIs (Example: Using the Twitter APIs), Cleaning and Munging, Manipulating Data, Rescaling		
<b>UNIT 6</b>	<b>DATA SCIENCE FOR EVERYONE:</b>	<b>6 Hours</b>
<b>CASE STUDIES:</b> DS in Healthcare, Finance, Bio-Informatics, Robotics, IoT analytics, Weather forecasting, Stockmarket prediction, Object Recognition, Real Time Sentiment Analysis etc.		
<b>Text Books:</b>		
<ol style="list-style-type: none"> <li>1. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media</li> <li>2. Aurélien Géron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition, O'Reilly Media</li> <li>3. Jain V.K., "Data Sciences", Khanna Publishing House, Delhi</li> </ol>		

<b>Reference Books:</b>
1. Jain V.K., "Big Data and Hadoop", Khanna Publishing House, Delhi.
2. Jeeva Jose, "Machine Learning", Khanna Publishing House, Delhi.
3. Chopra Rajiv, "Machine Learning", Khanna Publishing House, Delhi.
4. Ian Goodfellow, Yoshua Bengio and Aaron Courville, "Deep Learning", MIT Press
5. Jiawei Han and Jian Pei, "Data Mining Concepts and Techniques", Third Edition, Morgan Kaufmann Publishers

<b>Course Code:</b>	UDSC0531	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
<b>Course Name:</b>	Database Management System lab			<b>2</b>	<b>1</b>

**Course Prerequisites:**

File systems

**Course Description:**

Upon completion, student should be able to write programs for database design and execute SQL queries.

**Course Outcomes:** After the completion of the course the student will be able to -

<b>CO1</b>	Design conceptual models of a database using ER modeling.
<b>CO2</b>	Apply normalization techniques for database design.
<b>CO3</b>	Develop relational models for the real time applications and apply SQL queries for the same.

**CO-PO Mapping:**

		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2													2
CO2	1	2													2
CO3			3												2

**Assessment Scheme:**

SN	Assessment	Weightage	Remark
1	ISE	100%	Quiz/ Mini-Project / Presentation/ Group Discussion/ Internal Oral
2	ESE(POE)	100%	Assessment is based on practical-oral examination

**Course Contents:**

<b>EXPERIMENT NO. 1</b>	<b>2 Hours</b>
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Draw ER diagram for an organization using any suitable software & convert it into table.

1. Install Dia software
2. Use E-R sheet to draw E-R diagram.
3. Convert each E-R diagram to relational schema.

<b>EXPERIMENT NO. 2</b>	<b>2 Hours</b>
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Consider the following schema for a Library Database:

BOOK (Book\_id, Title, Publisher\_Name, Pub\_Year)  
 BOOK\_AUTHORS (Book\_id, Author\_Name)  
 PUBLISHER (Name, Address, Phone)  
 BOOK\_COPIES (Book\_id, Branch\_id, No-of\_Copies)  
 BOOK\_LENDING (Book\_id, Branch\_id, Card\_No, Date\_Out, Due\_Date)  
 LIBRARY\_BRANCH (Branch\_id, Branch\_Name, Address)

Write SQL queries to

1. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each branch, etc.
2. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2023 to Jun 2023
3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.
4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.
5. Create a view of all books and its number of copies that are currently available in the Library

<b>EXPERIMENT NO. 3</b>	<b>2 Hours</b>
Consider the following schema for Order Database: <b>SALESMAN</b> (Salesman_id, Name, City, Commission) <b>CUSTOMER</b> (Customer_id, Cust_Name, City, Grade, Salesman_id) <b>ORDERS</b> (Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id) Write SQL queries to <ol style="list-style-type: none"> <li>1. Count the customers with grades above Kolhapur's average.</li> <li>2. Find the name and numbers of all salesmen who had more than one customer.</li> <li>3. List all salesmen and indicate those who have and don't have customers in their cities (Use UNION operation.)</li> <li>4. Create a view that finds the salesman who has the customer with the highest order of a day.</li> <li>5. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.</li> </ol>	
<b>EXPERIMENT NO. 4</b>	<b>2 Hours</b>
Consider the schema for Movie Database: <b>ACTOR</b> (Act_id, Act_Name, Act_Gender) <b>DIRECTOR</b> (Dir_id, Dir_Name, Dir_Phone) <b>MOVIES</b> (Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id) <b>MOVIE_CAST</b> (Act_id, Mov_id, Role) <b>RATING</b> (Mov_id, Rev_Stars)	
Write SQL queries to <ol style="list-style-type: none"> <li>1. List the titles of all movies directed by 'Hitchcock'.</li> <li>2. Find the movie names where one or more actors acted in two or more movies.</li> <li>3. List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation).</li> <li>4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title.</li> <li>5. Update rating of all movies directed by 'Steven Spielberg' to 5.</li> </ol>	
<b>EXPERIMENT NO. 5</b>	<b>2 Hours</b>
Consider the schema for College Database: <b>STUDENT</b> (USN, SName, Address, Phone, Gender) <b>SEMSEC</b> (SSID, Sem, Sec) <b>CLASS</b> (USN, SSID) <b>SUBJECT</b> (Subcode, Title, Sem, Credits) <b>IAMARKS</b> (USN, Subcode, SSID, Test1, Test2, Test3, Final_IA)	
Write SQL queries to <ol style="list-style-type: none"> <li>1. List all the student details studying in fourth semester 'C' section.</li> <li>2. Compute the total number of male and female students in each semester and in each section.</li> <li>3. Create a view of Test1 marks of student USN '1BI15CS101' in all subjects.</li> <li>4. Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.</li> <li>5. Categorize students based on the following criterion:            If FinalIA = 17 to 20 then CAT = 'Outstanding'            If FinalIA = 12 to 16 then CAT = 'Average'            If FinalIA &lt; 12 then CAT = 'Weak'            Give these details only for 8th semester A, B, and C section students.         </li> </ol>	

<b>EXPERIMENT NO. 6</b>	<b>2 Hours</b>
Consider the schema for Company Database: EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo) DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate) DLOCATION (DNo,DLoc) PROJECT (PNo, PName, PLocation, DNo) WORKS_ON (SSN, PNo, Hours)	
Write SQL queries to	
1. Make a list of all project numbers for projects that involve an employee whose last name is ‘Scott’, either as a worker or as a manager of the department that controls the project. 2. Show the resulting salaries if every employee working on the ‘IoT’ project is given a 10 percent raise. 3. Find the sum of the salaries of all employees of the ‘Accounts’ department, as well as the maximum salary, the minimum salary, and the average salary in this department 4. Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator). For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs. 6,00,000.	
<b>EXPERIMENT NO. 7</b>	<b>2 Hours</b>
Write a program to implement any concurrency control protocol.	
<b>EXPERIMENT NO. 8</b>	<b>2 Hours</b>
Write a PL/SQL program to demonstrate Functions.	
<b>EXPERIMENT NO. 9</b>	<b>2 Hours</b>
Design a simple NoSQL database e.g. MongoDB (Installation, Basic CRUD operations, Execution).	
<b>EXPERIMENT NO. 10</b>	<b>2 Hours</b>
To Design a simple GPS-Enabled Lab Location Tracking System using NoSQL (To have the pymongo library installed, which is the Python driver for MongoDB.)	
<b>Text Books:</b>	
1. Fundamentals of Database Systems – by Ramez Elmasri and Shamkant Navathe Publisher -Pearson Education, 5th Edition. 2. Database Systems: Design, Implementation and Management.- PeterRof, Carlos Coronel (7th Edition), Cengage Learning.	
<b>Reference Books:</b>	
1. DataBase System Concept by Henry F. Korth, Abraham Silberschatz, Sudarshan (McGraw Hill Inc.) Sixth Edition. 2. Database Systems- A practical approach to Design, Implementation and Management by Thomas Connolly, Carolyn Begg, 3rd Edition, Pearson Education	

<b>Course Code:</b>	UDSC0532	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
<b>Course Name:</b>	Exploratory Data Analysis Lab			2	1

<b>Course Prerequisites:</b>	Python Programming, Statistics and Linear Algebra
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<b>Course Description:</b>	This course will cover the exploratory data analytics , data pre-processing and data preparation for machine learning model.
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<b>Course Outcomes:</b>	<b>After the completion of the course the student will be able to -</b>
<b>CO1</b>	Apply appropriate EDA techniques to real-world datasets to understand its underlying structure and perform imputation and encoding.
<b>CO2</b>	Choose appropriate EDA techniques to perform time series analysis, PCA and data visualization.
<b>CO3</b>	Choose appropriate EDA techniques for text dataset for NLP.

<b>CO-PO Mapping:</b>		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
		<b>CO1</b>	2	1	2	1	2	1		1	2		1	1	3	3
		<b>CO2</b>	2	1	2	1	2	1		1	2	1	1	1	3	3
		<b>CO3</b>	2	1	2	1	2	1		1	2		1	1	3	3

<b>Assessment Scheme:</b>		<b>Assessment</b>	<b>Weightage</b>	<b>Remark</b>
1 ISE			100%	Lab assignments, Quiz, etc. (25 Marks)
2 ESE(POE)			100%	(25 Marks)

<b>Course Contents:</b>	
<b>EXPERIMENT NO. 1</b>	<b>2 Hours</b>
Load any dataset from Kaggle and perform the following using pandas:- 1. Read the dataset into Jupyter Notebook or Google Colab. 2. Understand the dataset using - head, tail, loc, iloc, info, describe, shape, dtypes etc.	

<b>EXPERIMENT NO. 2</b>	<b>2 Hours</b>
Perform following Exploratory data analysis on a dataset:- 1. Identify Missing Values. 2. Explore About the Numerical Variables. 3. Explore About categorical Variables. 4. Finding Relationship between features.	

<b>EXPERIMENT NO. 3</b>	<b>2 Hours</b>
Perform various types of data cleaning operations on the data collected in the previous lab using data exploration, imputation etc.	

<b>EXPERIMENT NO. 4</b>		<b>2 Hours</b>
Perform various types of data cleaning operations on the data collected in the previous lab using data exploration, imputation etc.		
1. Identify and work with duplicate values. 2. Identify and work with Outliers.		
<b>EXPERIMENT NO. 5</b>		<b>2 Hours</b>
Perform different label encoding on categorical variables using Scikit learn library.		
<b>EXPERIMENT NO. 6</b>		<b>2 Hours</b>
Perform merging, concatenation and train, test split of dataset as a case study. Perform above all data cleaning and preprocessing on the dataset and make it ready for training and testing on a model. Analyze observations out of it.		
<b>EXPERIMENT NO. 7</b>		<b>2 Hours</b>
Perform feature scaling and dimensionality reduction and identify the skewness on a given dataset and create various visualizations like histograms, scatter-plots, etc. to see the difference between the visualization with and without feaure scaling.		
<b>EXPERIMENT NO. 8</b>		<b>2 Hours</b>
Perform following with respect to Time Series Data:- 1. Read time series data 2. Understand Date Time Index, Time Resampling, Time Shifts 3. Mean Rolling Expanding 4. Time Series Visualization		
<b>EXPERIMENT NO. 9</b>		<b>2 Hours</b>
Perform following with respect to Time Series Data:- 1. Simple Moving Average 2. Cumulative Moving Average 3. Exponential Moving Average 4. Implement ARMA model		
<b>EXPERIMENT NO. 10</b>		<b>2 Hours</b>
Perform EDA for NLP (text dataset):- 1. Counting characters, words 2. Word frequency analysis 3. Sentence length analysis 4. Create features with bag-of-words and n-grams length analysis.		
<b>Text Books:</b>		
"Python for data analysis ", Oreilly Publications , Wes Mckinney		

### **PBL Implementation**

1. A team may include a maximum of 4 members.
2. Concepts studied in the subject to be used.
3. Down to earth application and innovative idea should have been attempted.
4. Report in Digital format with all evaluations and analysis to be submitted.
5. Assessment on a continuous basis with a minimum of 3 reviews.

Sample project domains:

1. Healthcare
2. E-Learning
3. Smart village
4. Smart agriculture Image recognition



<b>UNIT 3</b>	<b>JavaScript</b>	<b>4 Hours</b>
Introduction to Client-Side Scripting, Introduction to Java Script, Javascript Types, Variables in JS, Operators in JS, Conditions Statements, Java Script Loops, JS Popup Boxes, JS Events, JS Arrays, Working with Arrays, JS Functions, Using Java Script in Realtime, Validation of Forms, Related Examples		
<b>UNIT 4</b>	<b>Building Web Applications in Flask</b>	<b>6 Hours</b>
Introduction to Flask - Installation, Creating the Application Directory, Virtual Environments, Creating a Virtual Environment with Python 3, Installing Python Packages with pip, Basic Application Structure, Initialization, Routes and View Functions, Development Web Server, Templates, Web Forms, Databases, Python Database Frameworks, Database Management with Flask-SQL Alchemy, Database Operations, Integration with the Python Shell		
<b>UNIT 5</b>	<b>Introduction to FastAPI framework</b>	<b>5 Hours</b>
Services and APIs, Kinds of APIs, HTTP, REST (ful), JSON and API Data Formats, JSON: API, GraphQL, FastAPI Installation A FastAPI Application, HTTP Requests, URL Path, Query Parameters, Body, HTTP Header, Multiple Request Data, Complex Data, FastAPI and Async, FastAPI Path Functions		
<b>UNIT 6</b>	<b>Deploy Machine Learning Models</b>	<b>7 Hours</b>
Dataset, Dataset Preprocessing, ML Models, Pipeline Overview of ML Models, HTML Forms. Deploy ML Model using Flask – Flask Installation, Flask Web Server Configuration, Routes and Views, Input Web Pages, Output Web Pages Deploy ML Model using FastAPI – FastAPI installation, FastAPI Application, FastAPI end Point, test application using cURL, RESTApi endpoint, Authenticate and Secure FastAPI endpoints		
<b>Text Books:</b>		
1. HTML & CSS: The Complete Reference, Fifth Edition by Thomas Powell 2. JavaScript: The Definitive Guide, 6th Edition By David Flanagan 3. Flask Web Development, 2nd Edition by Miguel Grinberg Released March 2018 Publisher(s): O'Reilly Media, Inc. 4. FastAPI by Bill Lubanovic Released November 2023 Publisher(s): O'Reilly Media, Inc.		
<b>Reference Books:</b>		
1. Head First Servlets and JSP: Passing the Sun Certified Web Component Developer Exam -2nd Edition-Bryan Basham, Kathy Sierra, Bert Bates- O'REILLY		

**Suggested Experiment List:**

<b>EXPERIMENT NO. 1</b>	<b>2 Hours</b>
Design a user registration form and validate using JAVASCRIPT with following fields and validations 1. User Name (should contain first name and last name only characters allowed) 2. Gender radio button (Male & Female) 3. Date of Birth 4. List of States (any 5 states Dropdown) 5 Pin Code 6 digits only 7. Email (Should be valid email address) 8. Password (should be minimum 4 characters) 9. Confirm Password (should match to Password Entered)	
<b>EXPERIMENT NO. 2</b>	<b>2 Hours</b>
Design a simple college website using CSS a. Internal CSS [ID Selector, Class Selector, Element Selector and Group Selector] b. External CSS	
<b>EXPERIMENT NO. 3</b>	<b>2 Hours</b>
Develop EMI calculator using JavaScript a. Input: Amount, Duration [Month] and Interest Rate [Input Type=range] b. Output: Total Payable amount, Total Interest Amount and EMI	
<b>EXPERIMENT NO. 4</b>	<b>2 Hours</b>
Develop a Web application for student login with Student Username and Password and Login Button. Show Welcome Username as Message	
<b>EXPERIMENT NO. 5</b>	<b>2 Hours</b>
Deploy Student login web application in Flask and Test your Web Application.	
<b>EXPERIMENT NO. 6</b>	<b>2 Hours</b>
Create Web Application to take input from user and Train your ML Model. Deploy ML model using Flask to show prediction output to the User	
<b>EXPERIMENT NO. 7</b>	<b>2 Hours</b>
Create Machine learning web application in the domain Agriculture to take inputs as text, image from user. Provide prediction service using your ML Web Application. Deploy ML Web Application on Flask.	
<b>EXPERIMENT NO. 8</b>	<b>2 Hours</b>
Set up FastAPI Interactive API Documentation Swagger UI to add endpoints, methods, and schemas and Users	
<b>EXPERIMENT NO. 9</b>	<b>2 Hours</b>
Use FastAPI Interactive API Documentation Swagger UI to perform CRUD operation on Database	
<b>EXPERIMENT NO. 10</b>	<b>2 Hours</b>
Develop weather prediction ML Web Application. Configure FastAPI end point to send user data in request and get ML model output as response message	

<b>Course Code:</b>	UDSC0551	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
<b>Course Name:</b>	MiniProject-II			2	2

<b>Course Prerequisites:</b>
Knowledge of Software Development Tools and Technologies.

<b>Course Description:</b>
Course Description: In this mini project, the students will apply multi-course environment for solving different real-world problems. The students shall use the concepts they have learned in their previous & the courses they are learning in the current semester and students will develop a solution to an identified problem.

<b>Course Outcomes:</b>	After the completion of the course the student will be able to -
<b>CO1</b>	Identify real world problems which can be solved using CS concepts and technologies.
<b>CO2</b>	Describe the proposed solution to the real world problem using technical report
<b>CO3</b>	Implement the proposed solution using Computer Science & Engineering techniques
<b>CO4</b>	Build a detailed project report

<b>CO-PO Mapping:</b>		<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
		<b>CO1</b>	2	1				1		1	3	2	2	3	3
		<b>CO2</b>	2	2	3		3	1		2	3	3	3	3	3
		<b>CO3</b>	2	2	3		3	1		2	3	3	3	3	3
		<b>CO4</b>	2	1	1		3	1		2	3	3	3	3	3

<b>Assessment Scheme:</b>			
<b>SN</b>	<b>Assessment</b>	<b>Weightage</b>	<b>Remark</b>
<b>1</b>	In Semester Evaluation 1 (ISE1)	50%	Problem Statement, SRS, Design
<b>2</b>	In Semester Evaluation 2 (ISE2)	50%	Implementation, Presentation, Demo

## **Course Contents:**

### **Guidelines for Mini Project -II**

1. The primary objective of the mini project-II is to achieve multi course real world problem-based learning.
2. Course Instructor shall form the project team of 3 to 4 students in the batch of students
3. Each team shall use the knowledge they learned in the previous courses to identify the real world problem and solve using learnt technology
4. The solution shall be using the tools & techniques from multiple courses - e.g a solution shall be using data structures, Computer Networks, Data Science and ML modeling to develop mini project.
5. The evaluation shall be done in two phases
  - a. Phase 1 ISE-1 In ISE 1 the students shall be graded based on the skills demonstrated to identify the problem statement, define the problem statement & Designing its solution. The partial working model is expected to be completed.
  - b. Phase 2 ISE-2 In ISE 2 the students shall be graded based on the complete project implementation and its working. Followed by the detailed project report which shall cover the technical aspects of the project.
6. It's recommended to share a common project report format to all batches.
7. All course instructors shall coordinate and work towards a common evaluation process.
8. Course instructors shall demonstrate and discuss sample case studies with students to help them understand the mini project deliverables.

### **Guidelines for the Evaluations:**

Below Criteria points can be used for Students Project Evaluation.

Problem Statement

Software Requirement Specification (SRS)

Detailed Design

Implementation

Testing and Team Communication

Checking Projects for Expected Analysis and Result

Project Final Demonstration with detailed Report

<b>Course Code:</b>	UDSA0561	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
<b>Course Name:</b>	Software Systems Tools	2			

<b>Course Description:</b>
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In Software Systems students will learn necessary tools and techniques required for report writing and project management. This course will empower students with knowledge and practices that will help student in versioning projects, testing authenticity of work, generating reports and developing build for deployment of project.

<b>Course Outcomes:</b>	<b>After the completion of the course the student will be able to -</b>
<b>CO1</b>	Apply report writing tools and plagiarism testing tools for checking research work for genuine and authenticity.
<b>CO2</b>	Utilize Smart Tools & Technologies in Industry 4.0 project management tools to track and manage progress of project.
<b>CO3</b>	Describe the processes in product design & development tools like Watson Deep Learning, AI based Chatbot.

<b>CO-PO Mapping:</b>		<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
	<b>CO1</b>	2	2	3	3	2					3	3	2	3	3
	<b>CO2</b>	2	2	3	3	3			1		1	3	2	3	3
	<b>CO3</b>	3	3	3	3	3			1		1	3	2	3	3

<b>Assessment Scheme:</b>															
<b>SN</b>	<b>Assessment</b>			<b>Weightage</b>		<b>Remark</b>									
<b>1</b>	In Semester Evaluation 1 (ISE1)			10%		Assignment, Test, Quiz, Seminar, Presentation, etc.									
<b>2</b>	Mid Semester Examination (MSE)			30%		50% of course contents									
<b>3</b>	In Semester Evaluation 2 (ISE2)			10%		Assignment, Test, Quiz, Seminar, Presentation, etc.									
<b>4</b>	End Semester Examination (ESE)			50%		100% course contents									

<b>Course Contents:</b>															
<b>UNIT 1</b>	<b>REPORT WRITING AND PLAGARISM TOOLS</b>														<b>6 Hours</b>

**Effective Report Writing:** LateX- using document classes. Inserting graphics, tables, references, TikZ- creating diagrams, flowcharts, workflow etc.

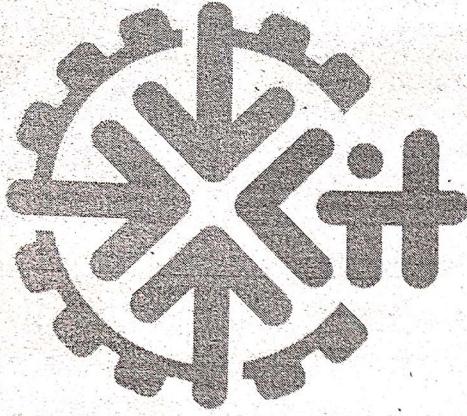
**Language Checking Tools:** Language Checking, Use of tools like grammarly.

**Plagiarism Detections:** Plagiarism meaning. Testing an article for plagiarism. Use of tools like viper, turnitin, ithenticate etc.

<b>UNIT 2</b>	<b>PROJECT MANAGEMENT TOOLS</b>														<b>6 Hours</b>
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**Project Management Tools:** Maintaining project versions using branching technique. JIRA, ClearQuest ,Use of tools like GITHUB to manage project progress.

<b>UNIT 3</b>	<b>PRODUCT DEVELOPMENT LIFE CYCLE</b>	<b>4 Hours</b>
<b>Product Development Life Cycle tools</b> - Process Models - Prototyping - Agile Models New Product Development Processes – Project tracking techniques such as Agile, SCRUM Master.		
<b>UNIT 4</b>	<b>BUIL MANAGEMENT SYSTEM</b>	<b>4 Hours</b>
<b>Build Management Systems:</b> Study of various build management systems such as ,MAVEN , make install, WAF, configure etc. OneNote, Microsoft Project Plane (MPP),		
<b>UNIT 5</b>	<b>DATA PLATFORM</b>	<b>4 Hours</b>
<b>Data Platform :</b> Weka, Canva ,figma ,wireframe ,idea boards, GitHub, Build Tool starUML, Rational Rose -UML diagram, 3D printing		
<b>UNIT 6</b>	<b>WATSON</b>	<b>4 Hours</b>
<b>WATSON</b> : Watson Deep Learning, AI based Chatbot, Natural Language Classifier, Language Identifications and Translations, Visualization and Rendering		
<b>Text Books:</b>		
1. LaTeX: A Document Preparation System (2nd Edition)by Leslie Lamport 2. Learning Agile by Andrew Stellman & Jennifer Greene 3. Learning Python: Powerful Object-Oriented Programming 4th Edition by Mark Lutz 4. R for Data Science: Import, Tidy, Transform, Visualize, and Model Data 1st Edition by Hadley Wickham, Garrett Grolemund 5. Smart Product Design, Sendpoints Publications, 2017		
<b>Reference Books:</b>		
1. Git online documentation. <a href="https://git-scm.com/docs/git-help">https://git-scm.com/docs/git-help</a> 2. Pyplot online documentation <a href="https://matplotlib.org/api/pyplot_api.html">https://matplotlib.org/api/pyplot_api.html</a>		



KOLHAPUR INSTITUTE  
OF TECHNOLOGY'S  
**COLLEGE OF  
ENGINEERING**  
(AUTONOMOUS),  
**KOLHAPUR**

**Structure for  
B.Tech in  
Computer Science & Engineering (DS)**  
**(To be Implemented w.e.f. Academic Year 2022-23)**

**Department of Computer Science & Engineering (DS)**

**Kolhapur Institute of Technology's  
College of Engineering (Autonomous), Kolhapur,  
Maharashtra, INDIA**

*U.P. Gurav*  
Dr. U. P. Gurav  
Head, Department of CSE(DS)

*A.S. Patil*  
Prof Dr. A. S. Patil  
Dean Academics



**SEM VI**



**Kolhapur Institute of Technology's  
College of Engineering (Autonomous), Kolhapur**  
Teaching and Evaluation scheme for

**Third Year B. Tech. Program in Computer Science & Engineering (DS) Semester-VI**

Course Code	Course Name	Curriculum Component	Teaching Scheme				Evaluation Scheme		
			L	T	P	Credits	Components	Marks	
			Max	Min for Passing					
UDSC0601	Natural Language Processing	PC	3	-	-	3	ISE-I	10	20
							ISE-II	10	
							MSE	30	
							ESE	50	
UDSC0602	Operating System	PC	3	-	-	3	ISE-I	10	20
							ISE-II	10	
							MSE	30	
							ESE	50	
UDSC0603	Machine Learning	PC	3	-	-	3	ISE-I	10	20
							ISE-II	10	
							MSE	30	
							ESE	50	
UDSC0604	Image Processing & Computer Vision	PC	3	1	-	4	ISE-I	10	20
							ISE-II	10	
							MSE	30	
							ESE	50	
UDSE06**	Program Elective - II	PE	3	-	-	3	ISE-I	10	20
							ISE-II	10	
							MSE	30	
							ESE	50	
UDSO06**	Open Elective - II	OE	3	-	-	3	ISE-I	10	20
							ISE-II	10	
							MSE	30	
							ESE	50	
UDSC0631	Machine Learning Lab	PC	-	-	2	1	ISE	25	10
							ESE (POE)	25	
UDSC0632	Natural Language Processing Lab	PC	-	-	2	1	ISE	25	10
							ESE (POE)	25	
UDSC0651	Mini Project - III	PW	-	-	2	1	ISE-I	25	20
							ISE-II	25	
UDSA0661	Communication and Personality Development	Audit Course	2	-	-	-	ESE	100	40
								750	
			20	1	6	22	<b>500 + 250 = 750 + Audit Course</b>		

**Total Credits - 22, Total Contact hours – 27**

Program Elective – II (PE-II)			Open Elective – II (OE-II)		
UDSE0621	Immersive Technology - ARVR		UDSO0614	Python for Data Science	
UDSE0622	Business Intelligence				
UDSE0623	Nature Inspired Computing				
UDSE0624	Information Storage Management				



<b>UNIT 3</b>	<b>Semantic analysis</b>	<b>8 Hours</b>
Semantic Analysis: Meaning Representation, Lexical Semantics, Ambiguity, Word Sense Disambiguation. Discourse Processing: cohesion, Reference Resolution, Discourse Coherence and Structure. Knowledge Representation, reasoning.		
<b>UNIT 4</b>	<b>Natural language generation</b>	<b>8 Hours</b>
Natural Language Generation (NLG): Architecture of NLG Systems, Generation Tasks and Representations, Application of NLG. Machine Translation: Problems in Machine Translation, Characteristics of Indian Languages, Machine Translation Approaches, Translation involving Indian Languages.		
<b>UNIT 5</b>	<b>Information retrieval and lexical resources</b>	<b>8 Hours</b>
Information Retrieval: Design features of Information Retrieval Systems, Classical, Non-classical, Alternative Models of Information Retrieval, valuation Lexical Resources: World Net, Frame Net, Stemmers, POS Tagger.		
<b>UNIT 6</b>	<b>Case Studies</b>	<b>4 Hours</b>
Case Studies - Bidirectional Encoder Representations from Transformers (BERT). Transformer (machine learning model), Graph Neural Networks.		
<b>Reference Books:</b>		
<b>Text Books:</b>		
1. Natural Language understanding by James Allen, Pearson Education, 2002. 2. NLP: A Paninian Perspective by Akshar Bharati, Vineet Chaitanya, and Rajeev Sangal, Prentice Hall, 2016. 3. Meaning and Grammar by G. Chirchia and S. McConnell Ginet, MIT Press, 1990. 4. An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition by Daniel Jurafsky and James H. Martin, Pearson Education, 2006. 5. Natural language processing in Prolog by Gazdar, & Mellish, Addison-Wesley		
<b>Reference Books:</b>		
1. Daniel Jurafsky and James H Martin. Speech and Language Processing, 2e, Pearson Education, 2009		

<b>Course Code:</b>	UDCS0602	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
<b>Course Name:</b>	Operating Systems	3			3

**Course Prerequisites:**

Fundamentals of Electronics and Computer

**Course Description:**

This is one of the core course of Computer Science & Engineering Programme. In this course you will become familiar with the core concepts of OS - how OS work, how processes & threads are created, inter-process communication & synchronisation, the various scheduling algorithms, memory management & memory allocation strategies, etc. This course will be also helpful for exams like GATE.

**Course Outcomes:** After the completion of the course the student will be able to -

<b>CO1</b>	Describe the basic concepts of operating systems.											
<b>CO2</b>	Evaluate the performance of various scheduling & page replacement algorithms.											
<b>CO3</b>	Distinguish techniques of inter process communication and synchronization.											
<b>CO4</b>	Identify potential deadlock situations and propose appropriate strategies to handle or avoid deadlocks.											
<b>CO5</b>	Interpret internal representation of file and buffer cache management.											

**CO-PO Mapping:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	1	2								1		2		
<b>CO2</b>	2	2			2				1	2				
<b>CO3</b>	1	1	2	1	3							1		1
<b>CO4</b>	1			1								1		

**Assessment Scheme:**

SN	Assessment	Weightage	Remark
1	In Semester Evaluation 1 (ISE1)	10%	Assignment, Test, Quiz, Seminar, Presentation, etc.
2	Mid Semester Examination (MSE)	30%	50% of course contents
3	In Semester Evaluation 2 (ISE2)	10%	Assignment, Test, Quiz, Seminar, Presentation, etc.
4	End Semester Examination (ESE)	50%	100% course contents

**Course Contents:**

<b>UNIT 1</b>	<b>Introduction</b>	<b>5 Hours</b>
Introduction to OS, OS Structure, Types of OS, OS Kernel, OS Services, Users Perspective of OS, System Boot Process, Architecture of UNIX OS.		
<b>UNIT 2</b>	<b>Process, Threads &amp; Scheduling</b>	<b>7 Hours</b>
Process: Concept, States and Transitions, Context, Creation (fork), Termination (exit), Signals (signal, kill), Awaiting Process Termination(wait, waitpid), Invoking other programs (exec), Threads (pthreads) Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms.		

<b>UNIT 3</b>	<b>Synchronization and Communication (Process &amp; Thread)</b>	<b>8 Hours</b>
Inter-Process Communication - Pipe, Shared Memory, Message Passing Inter-Process Synchronization: The Critical Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classical Problems of Synchronization		
<b>UNIT 4</b>	<b>Deadlocks</b>	<b>5 Hours</b>
Deadlock: System Model; Deadlock Characterization; Methods for Handling Deadlocks; Deadlock Prevention; Deadlock Avoidance; Deadlock Detection and Recovery from Deadlock		
<b>UNIT 5</b>	<b>Buffer Cache and Internal Representation of Files</b>	<b>7 Hours</b>
Buffer Cache: Buffer Headers, Structure of the Buffer Pool, Scenarios for Retrieval of a Buffer, Reading and Writing Disk Blocks, Advantages and Disadvantages of Cache. Internal Representation of Files: I-nodes, Structure of a Regular File, Directories, Conversion of a pathname to i-node		
<b>UNIT 6</b>	<b>Memory Management</b>	<b>8 Hours</b>
Memory background, Hierarchy, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Virtual Memory, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.		
<b>Text Books:</b>		
1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: Operating System Principles, 8th edition, Wiley India, 2009. 2. The Design of Unix Operating System - Maurice J. Bach (PHI)		
<b>Reference Books:</b>		
1. Operating Systems –Concepts and design –Milan Milenkovic (TMGH) 2. Operating Systems: Internals and Design Principles (8th Edition)- by William Stallings (Pearson Education) 3. Modern Operating Systems by Andrew S. Tanenbaum (Pearson Education International) 4. Unix concepts and administration – 3rd Edition – Sumitabha Das (TMGH).		



<b>UNIT 3</b>	<b>FEATURE ENGINEERING</b>	<b>6 Hours</b>
<b>Feature Engineering:</b> Feature transformation, Feature subset selection <b>Bayesian Concept Learning :</b> Bayes theorem: Prior and Posterior Probability, Likelihood, Concept Learning, Bayesian Belief Network		
<b>UNIT 4</b>	<b>SUPERVISED LEARNING-I</b>	<b>6 Hours</b>
Basics of supervised learning , classification model , K Nearest neighbor , Decision tree, Random forest , Support vector machine		
<b>UNIT 5</b>	<b>SUPERVISED LEARNING-II</b>	<b>6 Hours</b>
Regression –simple linear regression, multiple linear regression, Assumptions in regression analysis ,other regression techniques ,improving accuracy of the linear regression model ,polynomial regression model, logistic regression.Support Vector Machines		
<b>UNIT 6</b>	<b>UNSUPERVISED LEARNING</b>	<b>8 Hours</b>
Unsupervised vs. Supervised learning , Applications on Unsupervised learning , Clustering basics (Partitioned, Hierarchical and Density based) , K-Means clustering , K-medoids , Hierarchical clustering , Density based methods , DBSCAN , Association rules. Neural Networks Basics of neural network: Exploring the artificial neuron. Ensemble Learning :Bagging and Boosting (Random forests)		
<b>Text Books:</b>		
1. Saikat Dutt, Subramanian Chandramouli, Amit Kumar Dos, "Machine Learning", 1 st edition, Pearson, 2019. 2. Ethem Alpaydin,"Introduction to Machine Learning", MIT Press, Prentice Hall of India, Third Edition 2014. 3. Tom Mitchell, —Machine Learning, McGraw Hill, 3rd Edition,1997. 4.. Jeeva Jose, Introduction to Machine Learning, Khanna Book Publishing 2020. 4.Christopher M. Bishop, —Pattern Recognition and Machine Learning, Springer 2011 Edition.		
<b>Reference Books:</b>		
1. Aurelien Geron , " Hands on Machine Learning with Scikit -learning , Keras & Tensorflow ",Concepts , Tools & Techniques to build Intelligent systems 2. Andreas Muller, "Introduction to Machine Learning with Python: A Guide for Data Scientists", 1st Edition, O'Reilly Media, 2017. 3. Rajiv Chopra, Machine Learning, Khanna Book Publishing 2021 4. Kevin P. Murphy, Machine Learning: a Probabilistic Perspective, The MIT Press, 2012. 5. <a href="https://www.coursera.org/learn/bayesian-methods-in-machine-learning?specialization=aml">https://www.coursera.org/learn/bayesian-methods-in-machine-learning?specialization=aml</a>		



<b>UNIT 3</b>	<b>Image Restoration</b>	<b>7 Hours</b>
Using Spatial Filters, Wiener Filter; Introduction to Color Spaces and Color Image Processing; Morphological Image Processing – Erosion and Dilation, Opening and Closing, Hit-Or-Miss Transform, Thinning and Shape Decomposition		
<b>UNIT 4</b>	<b>Image Segmentation</b>	<b>6 Hours</b>
Point, Line, and Edge Detection, Thresholding: Basic Global Thresholding, Optimum Global Thresholding Using Otsu's Method, Multiple Thresholds, Region-Based Segmentation		
<b>UNIT 5</b>	<b>Image Compression</b>	<b>6 Hours</b>
Fundamentals, Lossless Coding, Predictive Coding, Transform Coding. Coding Redundancy, Spatial and Temporal Redundancy, Irrelevant Information, Image Compression Models, Some Basic Compression Methods: Huffman Coding, Arithmetic Coding.		
<b>UNIT 6</b>	<b>Vision</b>	<b>6 Hours</b>
Cameras and projection models, clustering; shape reconstruction from stereo, object recognition, scene recognition, face detection and human motion categorization.		
<b>Text Books:</b>		
1. Digital Image Processing, Rafael C. Gonzalez and Richard E. Woods, Fourth Edition, Pearson, 2018. 2. Richard Szeliski, Computer Vision: Algorithms and Applications, 2nd Edition, The University of Washington, 2022. 3. Milan Sonka, Vaclav Hlavac, Roger Boyle, "Image Processing Analysis and Machine Vision", Fourth Edition, Cengage Learning		
<b>Reference Books:</b>		
1. Milan Sonka, Vaclav Hlavac, Roger Boyle, "Image Processing Analysis and Machine Vision", Fourth Edition, Cengage Learning		

<b>Course Code:</b>	UDSE0621	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>									
<b>Course Name:</b>	Immersive Technology - ARVR	3			3									
<b>Course Prerequisites:</b>														
Computer Graphics, Basics of Animation														
<b>Course Description:</b>														
This course is introduced at third year level to get the students familiar with Immersive Technologies related to AR-VR.														
<b>Course Outcomes:</b>	<b>After the completion of the course the student will be able to -</b>													
<b>CO1</b>	Differentiate between Augmented Reality and Virtual Reality													
<b>CO2</b>	Demonstrate the Unity Game Engine													
<b>CO3</b>	Create Content for Virtual and Augmented Reality													
<b>CO4</b>	Explain the different Use Cases in AR-VR applications													
<b>CO-PO Mapping:</b>														
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO1</b>	1				1			1					1	
<b>CO2</b>		1	2	1	3	2	1	1			1	1	3	1
<b>CO3</b>	1	2	3	2	3	2	2	2			1	1	3	3
<b>CO4</b>		1	1	2										1
<b>Assessment Scheme:</b>														
<b>SN</b>	<b>Assessment</b>			<b>Weightage</b>	<b>Remark</b>									
<b>1</b>	In Semester Evaluation 1 (ISE1)			10%	Assignment, Test, Quiz, Seminar, Presentation, etc.									
<b>2</b>	Mid Semester Examination (MSE)			30%	50% of course contents									
<b>3</b>	In Semester Evaluation 2 (ISE2)			10%	Assignment, Test, Quiz, Seminar, Presentation, etc.									
<b>4</b>	End Semester Examination (ESE)			50%	100% course contents									
<b>Course Contents:</b>														
<b>UNIT 1</b>	<b>Introduction to Augmented Reality and Virtual Reality</b>					<b>4 Hours</b>								
Introducing Virtual Reality and Augmented Reality, Other Types of Virtual and Augmented Reality-Mixed Reality, Augmented Virtuality, Extended Reality, Quick History tour of AR-VR, Evaluating the Technology Hype Cycle														
<b>UNIT 2</b>	<b>Exploring Augmented Reality and Virtual Reality</b>					<b>10 Hours</b>								
Looking at the Available Form Factors in VR, Focusing on Features-Room-scale versus stationary experience, Inside-out tracking, Haptic feedback, Audio, Considering Controllers-Toggle button, integrated hardware touchpad, Gaze controls, Keyboard and mouse, Standard gamepads, Motion controllers, Hand tracking, Eye tracking, Recognizing the Current Issues with VR-Simulator sickness, The screen-door effect, Movement in VR, Health effects, Looking at the Available Form Factors in VR-Mobile devices, AR headset, AR-glasses, Current Issues with Augmented Reality-Form factors and first impressions, Cost and availability, Perceived usefulness, Tracking, Field of view, Visuals.														

<b>UNIT 3</b>	<b>Content Creation in ARVR</b>	<b>8 Hours</b>
Choosing Virtual Reality, Choosing Augmented Reality, Planning Your Virtual Reality Project-Defining Your Virtual Reality Project, Exploring Design Principles in Virtual Reality, Planning Your Augmented Reality Project-Defining Your Augmented Reality Project, Exploring Design Principles in Augmented Reality		
<b>UNIT 4</b>	<b>Introduction to Game Engine</b>	<b>6 Hours</b>
Introduction to game engine, Game Engines Today, Introduction to Unity Engine-Install Unity, Configure Unity-on disk, in the cloud, Script Editor-VS Code, Navigating the unity interface, understanding the different window views, Configure and customize layout, The transform toolset, handle position control, unity project structure, VR and AR app development in Unity		
<b>UNIT 5</b>	<b>ARVR Multimedia Tools</b>	<b>8 Hours</b>
Assessing Design Software-User experience design software, VR/AR-based design tools, Capturing Real Life-Video-capture options, Mass-consumer models, Still-image capture options, Audio options-Voiceover, Sound effects, Background audio, Spatial audio		
<b>UNIT 6</b>	<b>Case Studies</b>	<b>8 Hours</b>
Exploring Virtual Reality Use Cases-Art, Education, Entertainment, Healthcare, Gaming, Exploring Augmented Reality Use Cases-Art, Education, Industry and commerce, Entertainment, Utilities		
<b>Text Books:</b>		
1. Virtual & Augmented Reality For Dummies, Published by: John Wiley & Sons, Inc. 2. Developing 2D games with unity-Independent game programming with C#-Jared Halpern		
<b>Reference Books:</b>		
1. The VR Book-Human Centered Design for Virtual Reality-Jason Jerald 2. Virtual and Augmented Reality, An educational handbook by Zeynep Tacgin, Cambridge scholars publishing 3. Virtual Reality-steven m lavalle, cambridge university press, copyright steven m lavalle 2019		

Course Code:	UDSE0622	L	T	P	Credit										
Course Name:	Business Intelligence	3			3										
Course Prerequisites:															
NIL															
Course Description:															
This course deals with applying Business intelligence related concepts and methods , and understands effects of business intelligence on various business functions.															
Course Outcomes: After the completion of the course the student will be able to -															
CO1	Define basic concepts ,Architecture and data warehousing related concepts of Business Intelligence														
CO2	To demonstrate the impact of business reporting, information visualization, and dashboards.														
CO3	To apply text analytics and web analytics business intelligence methods to various situations														
CO-PO Mapping:		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO1	1	2	2	2	3						1	2	3	2
	CO2	1	2	2	2							1	2	3	2
	CO3	1	2	2	2	2						1	2	3	2
Assessment Scheme:															
SN	Assessment			Weightage		Remark									
1	In Semester Evaluation 1 (ISE1)			10%		Assignment, Test, Quiz, Seminar, Presentation, etc.									
2	Mid Semester Examination (MSE)			30%		50% of course contents									
3	In Semester Evaluation 2 (ISE2)			10%		Assignment, Test, Quiz, Seminar, Presentation, etc.									
4	End Semester Examination (ESE)			50%		100% course contents									
Course Contents:															
UNIT 1   Introduction to Business Intelligence						8 Hours									
A Frame work for Business Intelligence (BI)- The Architecture of BI - Benefits of business intelligence- how business intelligence differs from competitive intelligence and knowledge management.															
UNIT 2   Data warehousing.						6 Hours									
Characteristics of Data Warehousing- Data Marts- Data warehousing process- Data warehousing Architectures – Data Integration and the Extraction, Transformation and Load (ETL) Process- OLAP Versus OLTP- Data warehousing implementation issues – Real time data warehousing.															
UNIT 3   Business Reporting, Visual Analytics and Business Performance Management.						6 Hours									
Data and Information Visualization – Different types of Charts and Graphs- Emergence of Data visualization and Visual analytics - Performance Dashboard - Balance Score Cards – Dashboards Versus Scorecards - Six Sigma as a performance measurement system.															

<b>UNIT 4</b>	<b>Data mining – Supervised and unsupervised learning.</b>	<b>8 Hours</b>
Data mining concepts and applications – Data mining process – Data mining methods – Classification techniques – Decision trees. Cluster Analysis – Partition and Hierarchical methods, Association rule mining – Data mining software Tools - Case studies. OLAP - ETL tools Case studies		
<b>UNIT 5</b>	<b>Text Analytics, Text Mining and Sentiment Analysis.</b>	<b>6 Hours</b>
Text analytics and Text mining concepts and definition – Text mining process – Text mining tools – Sentiment analysis overview – Sentiment analysis applications – Sentiment analysis process.		
<b>UNIT 6</b>	<b>Web Analytics, Web Mining, and Social Analytics</b>	<b>6 Hours</b>
Web mining overview – Web content and Web structure mining – Search Engines - Search Engine Optimization – Web usage mining – Web analytics maturity model and web analytics tools – Social analytics and social network analysis		
<b>Text Books:</b>		
1. Ramesh Sharda, Dursun Delen, Efraim Turban, Business Intelligence and Analytics, Pearson 10th edition, 2018 .		
<b>Reference Books:</b>		
1. Ramesh Sharda, Dursun Delen, Efraim Turban, Business Intelligence, Analytics, and Data Science: A Managerial Perspective, 4th Edition, Pearson, 2017 2. "Business Intelligence For Dummies" by Swain Scheps. 3. David Loshin Morgan, Kaufman, —Business Intelligence: The Savvy Manager's Guide  , Second Edition, 2012.		

<b>Course Code:</b>	UDSE0623	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
<b>Course Name:</b>	Nature Inspired Computing	3			3

<b>Course Prerequisites:</b>
Biology and Natural Systems, Artificial Intelligence and Machine Learning, Data Analysis and Statistics

<b>Course Description:</b>
Nature-inspired computing is a field of study that draws inspiration from natural processes and phenomena to develop computational techniques for solving complex problems. This course provides an in-depth exploration of various nature-inspired algorithms and their applications.

<b>Course Outcomes:</b>	After the completion of the course the student will be able to -
<b>CO1</b>	Explain the concepts and principles of nature-inspired computing.
<b>CO2</b>	Develop skills in implementing and applying nature-inspired algorithms to solve complex problems.
<b>CO3</b>	Outline the strengths, limitations, and applications of nature-inspired computing techniques.
<b>CO4</b>	Prepare critical thinking and problem-solving skills through the analysis and evaluation of nature-inspired algorithms.

CO-PO Mapping:		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
		CO1	2	3									1		
		CO2	2	1	2								1		
		CO3	1	3		1							3		
		CO4	3	2	2	3		2		3			3	3	3

<b>Assessment Scheme:</b>	
<b>SN</b>	<b>Assessment</b>
<b>1</b>	In Semester Evaluation 1 (ISE1)
<b>2</b>	Mid Semester Examination (MSE)
<b>3</b>	In Semester Evaluation 2 (ISE2)
<b>4</b>	End Semester Examination (ESE)
	<b>Weightage</b>
1	10%
2	30%
3	10%
4	50%
	<b>Remark</b>
1	Assignment, Test, Quiz, Seminar, Presentation, etc.
2	50% of course contents
3	Assignment, Test, Quiz, Seminar, Presentation, etc.
4	100% course contents

<b>Course Contents:</b>	
<b>UNIT 1</b>	<b>Introduction to Nature-Inspired Computing</b>
<b>8 Hours</b>	
<p>Overview of Nature-Inspired Computing: Definition, motivations, and historical background, Inspiration from Natural Systems: Introduction to biological and natural systems that serve as inspiration for nature-inspired algorithms. Computational Intelligence: Introduction to computational intelligence techniques, genetic algorithms, particle swarm optimization, ant colony optimization, and evolutionary strategies. Problem-Solving Paradigms: Understanding problem representation and solution evaluation in nature-inspired computing.</p>	
<b>UNIT 2</b>	
<b>Genetic Algorithms</b>	<b>6 Hours</b>
<p>Fundamentals of Genetic Algorithms: Representation, population initialization, selection mechanisms, crossover, and mutation operators. Genetic Programming, Multi-Objective Optimization: Techniques for handling multiple objectives in genetic algorithms, Hybrid Approaches of genetic algorithms with other optimization methods.</p>	

<b>UNIT 3</b>	<b>Swarm Intelligence and Optimization</b>	<b>6 Hours</b>
Particle Swarm Optimization (PSO): Concepts, behavior, and variations of PSO algorithms, Ant Colony Optimization (ACO): Principles of ant colony optimization, pheromone trails, and solution construction, Bee Algorithms: Introduction to bee-inspired optimization algorithms, such as the artificial bee colony algorithm, Firefly Algorithm: Basics of the firefly algorithm and its application in optimization problems		
<b>UNIT 4</b>	<b>Artificial Neural Networks</b>	<b>6 Hours</b>
Introduction to neural networks and deep learning, Convolutional neural networks (CNN) and recurrent neural networks (RNN), Applications in classification, regression, and pattern recognition		
<b>UNIT 5</b>	<b>Artificial Immune Systems</b>	<b>6 Hours</b>
Overview of artificial immune systems (AIS), Immune memory and antibody representation, Clonal selection and immune response, Negative selection and anomaly detection, Applications in optimization and pattern recognition		
<b>UNIT 6</b>	<b>Cellular Automata and DNA Computing</b>	<b>8 Hours</b>
Introduction to Cellular Automata, One and two Dimensional Cellular Automata, DNA Computing: Motivation, DNA Molecule, Adleman's experiment, Test tube programming language, Universal DNA Computers , Scope of DNA Computing.		
<b>Text Books:</b>		
1. Xin-She Yang, "Nature-Inspired Computation and Swarm Intelligence Algorithms, Theory and Applications", Elsevier, Academic Press, 2020.		
<b>Reference Books:</b>		
1. Leandro Nunes de Castro, "Fundamentals of Natural Computing, Basic Concepts, Algorithms and Applications", Chapman & Hall/ CRC, Taylor and Francis Group, 2007. 2. Floreano D. and Mattiussi C., "Bio-Inspired Artificial Intelligence: Theories, Methods, and Technologies", MIT Press, Cambridge, MA, 2008.		



<b>UNIT 3</b>	<b>Network -Attached Storage</b>	<b>8 Hours</b>
Local File Systems, Network File System and File Servers, Benefits of NAS, NAS file I/O, Components of NAS, NAS Implementations, NAS File sharing Protocols, NAS I/O operations, Factors affecting NAS Performance. Case Study: Direct Access File System, Shared Disk File System Comparison: NAS, Fibre Channel SAN and iSCSI SAN		
<b>UNIT 4</b>	<b>Storage Virtualization</b>	<b>7 Hours</b>
Introduction, Virtualization in the I/O path, Limitations and requirements, Definition of Storage Virtualization, Implementation considerations, Storage Virtualization on block, level, File level Virtualization, Storage Virtualization on various levels of the storage, network, Symmetric and Asymmetric Storage Virtualization.		
<b>UNIT 5</b>	<b>Business Continuity, Backup and Recovery</b>	<b>7 Hours</b>
Introduction, Information Availability, Cause of Information unavailability, Measuring information Availability, Consequences of down time, BC terminology, BC planning life cycle, Failure Analysis, BC Technology Solutions, Backup Purpose, Backup, Considerations, Backup Granularity, Recovery Considerations, Backup Methods, Backup, Process, Backup and Restore Operations, Backup Topology, Backup in NAS environment, Backup Technologies.		
<b>UNIT 6</b>	<b>Replication and Storage Security</b>	<b>6 Hours</b>
Local Replication, Uses of Local Replicas, Data Consistency, Local Replication Technologies, Restore and Restart Considerations. Storage Security: Storage Security Framework, Risk Triad, Storage Security Domains, Security Implementations in Storage Networking.		
<b>Text Books:</b>		
1. A Information Storage and Management by G. Somasudaram – EMC Education Services (Wiley India Edition). 2. Storage Networks Explained by Ulf Troppen, Rainer Erkens, Wolfgang Müller (Wiley India Edition).		

<b>Course Code:</b>	UDSO0614	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
<b>Course Name:</b>	Python for Data Science	<b>3</b>			<b>3</b>

<b>Course Prerequisites:</b>
Basic Knowledge of Programming

<b>Course Description:</b>
This course is intended to understand the basic concepts related to python for data science involved by data manipulation, cleaning, preparation, and visualization.

<b>Course Outcomes:</b>	<b>After the completion of the course the student will be able to -</b>
<b>CO1</b>	Identify the need for data science and solve basic problems using Python built-in data types and their methods.
<b>CO2</b>	Employ efficient storage and data operations using NumPy arrays
<b>CO3</b>	Apply powerful data manipulations, data pre-processing and visualization using Pandas.
<b>CO4</b>	Design an application with user-defined modules and packages.

<b>CO-PO Mapping:</b>		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>		2	1												
<b>CO2</b>		2	2	1		1								1	1
<b>CO3</b>		1	2	1	2	2								2	2
<b>CO4</b>		1	1	1											3

<b>Assessment Scheme:</b>			
<b>SN</b>	<b>Assessment</b>	<b>Weightage</b>	<b>Remark</b>
<b>1</b>	In Semester Evaluation 1 (ISE1)	10%	Assignment, Test, Quiz, Seminar, Presentation, etc.
<b>2</b>	Mid Semester Examination (MSE)	30%	50% of course contents
<b>3</b>	In Semester Evaluation 2 (ISE2)	10%	Assignment, Test, Quiz, Seminar, Presentation, etc.
<b>4</b>	End Semester Examination (ESE)	50%	100% course contents

<b>Course Contents:</b>	
<b>UNIT 1</b>	<b>Background &amp; Introduction</b>
Python for Data Analysis, essential python libraries, Installation and setup of different operating systems, important development environments (IDEs) and text editors, brief background of python, decision structures and Boolean logic, looping, built-in data types, and functions.	
<b>UNIT 2</b>	<b>Files, Input-Output, Errors, and Exceptions</b>
File objects, file built-in functions, file built-in methods, file built-in attributes, standard files, command-line arguments, file system, file execution, exception in python, detecting and handling exceptions, standard exceptions.	

<b>UNIT 3</b>	<b>Introduction to Numpy</b>	<b>8 Hours</b>
NumPy basics: arrays and vectorized computation- the NumPy ndarray, creating ndarrays, data types for ndarrays, arithmetic with NumPy arrays, basic indexing and slicing, boolean indexing, transposing arrays and swapping axes, universal functions: fast element-wise array functions, mathematical and statistical methods, Sorting, unique and other set logic		
<b>UNIT 4</b>	<b>Data Manipulation with Pandas</b>	<b>8 Hours</b>
Introduction to pandas data structures: series, dataframe, essential functionality- dropping entries, indexing, selection, and filtering, function application and mapping, sorting and ranking, summarizing and computing descriptive statistics, unique values value counts, and membership, reading and writing data in text format.		
<b>UNIT 5</b>	<b>Data Cleaning and Preparation</b>	<b>5 Hours</b>
Handling missing data-filtering out missing data, filling in missing data, data transformation-removing duplicates, transforming data using a function or mapping, replacing values, detecting and filtering outliers, string manipulation, vectorized string functions in pandas.		
<b>UNIT 6</b>	<b>Plotting and Visualization</b>	<b>5 Hours</b>
Matplotlib and libraries, figures and subplots, colors, markers and line styles, ticks, labels, and legends, Annotations and drawing on a subplot, saving plots to file, plotting with pandas-line plot, bar plot, histogram and density plots, scatter and point plots.		
<b>Text Books:</b>		
1.Wes McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", O'Reilly, 2nd Edition,2018. 2. Wesley J. Chun, "Core Python Programming", Second Edition, Pearson Education, 2010.		
<b>Reference Books:</b>		
Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", O'Reilly, 2017.		

Course Code:	UAMC0631		L	T	P	Credit									
Course Name:	Machine Learning Lab				2	1									
<b>Course Prerequisites:</b>		Python Programming Language													
<b>Course Description:</b>		Study and implement Machine Learning Concepts.													
<b>Course Outcomes:</b>		After the completion of the course the student will be able to -													
<b>CO1</b>	Demonstrate, visualize, analyze and preprocess the dataset from a real-time source.														
<b>CO2</b>	Apply appropriate Machine learning algorithms to the data.														
<b>CO3</b>	Analyze the results of algorithm and convert to appropriate information required for the real – time application														
<b>CO-PO Mapping:</b>															
		<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
	<b>CO1</b>	3	2	2	2	1				2				2	2
	<b>CO2</b>	2	2	2	2	2				2				2	2
	<b>CO3</b>	2	3	3	3	2				2				2	2
<b>Assessment Scheme:</b>															
<b>SN</b>	<b>Assessment</b>			<b>Weightage</b>		<b>Remark</b>									
<b>1</b>	ISE			100%		Quiz/Assignments/Group Discussions/Internal oral									
<b>2</b>	ESE(POE)			100%		Assesment is based on practice oral performance									
<b>Course Contents:</b>															
<b>EXPERIMENT NO. 1</b>		<b>2 Hours</b>													
Write a program for Linear & Multi-Linear Regression															
<b>EXPERIMENT NO. 2</b>		<b>2 Hours</b>													
Write a program for Naïve Bayes classifier															
<b>EXPERIMENT NO. 3</b>		<b>2 Hours</b>													
Write a program to implement Decision trees – ID3															
<b>EXPERIMENT NO. 4</b>		<b>2 Hours</b>													
Write a program to implement Decision trees- CART															
<b>EXPERIMENT NO. 5</b>		<b>2 Hours</b>													
Write a program to implement Logistic regression.															
<b>EXPERIMENT NO. 6</b>		<b>2 Hours</b>													
Write a program to implement Support Vector Machines															

<b>EXPERIMENT NO. 7</b>	<b>2 Hours</b>
Write a program to implement Artificial Neural networks	
<b>EXPERIMENT NO. 8</b>	<b>2 Hours</b>
Write a program for K-Means clustering	
<b>EXPERIMENT NO. 9</b>	<b>2 Hours</b>
Write a program for K Nearest neighbor algorithm	
<b>EXPERIMENT NO. 10</b>	<b>2 Hours</b>
Write a program for Random – forest ML algorithm	
<b>PROGRAM BASED LEARNING (PBL)</b>	
<b>A team may include to a maximum of 4 members.</b>	
1. Concepts studied in the subject to be used.	
2. Down to earth application and innovative idea should have been attempted.	
3. Report in Digital format with all evaluations and analysis to be submitted.	
Assessment on a continuous basis with a minimum of 3 reviews.	
<b>Sample project domains:</b>	
1. Healthcare	
2. E-Learning	
3. Smart village	
4. Smart agriculture Image recognition	
<b>Text Books:</b>	
1. Machine Learning Aurelien Geron , “ Hands on Machine Learning with Scikit -learning , Keras & Tensorflow ”,Concepts , Tools & Techniques to build Intelligent systems , O'Reilly Media	
2. Saikat Dutt, Subramanian Chandramouli, Amit Kumar Dos, “Machine Learning”, 1 st edition, Pearson, 2019.	
3. Andreas Muller, “Introduction to Machine Learning with Python: A Guide for Data Scientists”, 1st Edition, O'Reilly Media, 2017	

<b>Course Code:</b>	UDSC0632	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>									
<b>Course Name:</b>	Natural Language Processing Lab			2	1									
<b>Course Prerequisites:</b>														
Python Programming , Machine Learning														
<b>Course Description:</b>														
Study and implement Deep Learning Concepts.														
<b>Course Outcomes:</b> After the completion of the course the student will be able to -														
<b>CO1</b>	List the capabilities and limitations of current natural language technologies													
<b>CO2</b>	Explain linguistic phenomena with formal grammars													
<b>CO3</b>	Explain, implement and test algorithms for NLP problems													
<b>CO4</b>	Apply NLP techniques to design real world NLP applications													
<b>CO-PO Mapping:</b>														
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO1</b>	1	1	1	2	2								2	2
<b>CO2</b>	1	1	1	2	2								2	2
<b>CO3</b>	2	1	1	2	2								2	2
<b>CO4</b>	2	1	2	2	2								2	2
<b>Assessment Scheme:</b>														
<b>SN</b>	<b>Assessment</b>			<b>Weightage</b>	<b>Remark</b>									
<b>1</b>	ISE			100%	Quiz/Assignments/Group Discussions/Internal oral									
<b>2</b>	ESE(POE)			100%	Assesment is based on practice oral performance									
<b>Course Contents:</b>														
<b>EXPERIMENT NO. 1</b>						<b>2 Hours</b>								
Perform Pre-processing (Tokenization, Scrip validation, Stop Word removal and Stemming) of text.														
<b>EXPERIMENT NO. 2</b>						<b>2 Hours</b>								
Study and Implementation of Morphological analysis (Stop word removal).														
<b>EXPERIMENT NO. 3</b>						<b>2 Hours</b>								
Study and implementation of POS Tagging.														
<b>EXPERIMENT NO. 4</b>						<b>2 Hours</b>								
Implement Chunking to extract Noun Phrases.														
<b>EXPERIMENT NO. 5</b>						<b>2 Hours</b>								
Study and implement N-Gram Language Model.														
<b>EXPERIMENT NO. 6</b>						<b>2 Hours</b>								

Study and Implementation of NER (Name Entity Recognition).

<b>EXPERIMENT NO. 7</b>		<b>2 Hours</b>
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Identify Semantic Relationships Between the Words from Given Text.

<b>EXPERIMENT NO. 8</b>		<b>2 Hours</b>
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Study on Reference Resolution Algorithm

<b>EXPERIMENT NO. 9</b>		<b>2 Hours</b>
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Study Wordnet-Lesk Algorithm

<b>EXPERIMENT NO. 10</b>		<b>2 Hours</b>
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One real life Natural Language Application to be Implemented (Use Standard Datasets Available on the Web)

**Project :**

1. A team may include to a maximum of 4 members.
2. Concepts studied in the subject to be used.
3. Down to earth application and innovative idea should have been attempted.
4. Report in Digital format with all evaluations and analysis to be submitted.
5. Assessment on a continuous basis with a minimum of 3 reviews.

**Text Books:**

1. Natural Language understanding by James Allen, Pearson Education, 2002.
2. NLP: A Paninian Perspective by Akshar Bharati, Vineet Chaitanya, and Rajeev Sangal, Prentice Hall, 2016.
3. Meaning and Grammar by G. Chirchia and S. McConnell Ginnet, MIT Press, 1990.
4. An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition by Daniel Jurafsky and James H. Martin, Pearson Education, 2006.
5. Natural language processing in Prolog by Gazdar, & Mellish, Addison-Wesley

**Reference Books:**

Daniel Jurafsky and James H Martin. Speech and Language Processing, 2e, Pearson Education, 2009

Course Code:	UDSC0651														
Course Name:	MiniProject-III														
Course Prerequisites:	Knowledge of Software Development Tools and Technologies.														
Course Description:	In this mini project, the students will apply multi-course environment for solving different real-world problems. The students shall use the concepts they have learned in their previous & the courses they are learning in the current semester and students will develop a solution to an identified problem.														
Course Outcomes:	After the completion of the course the student will be able to -														
CO1	Identify real world problems which can be solved using CS concepts and technologies.														
CO2	Describe the proposed solution to the real world problem using technical report.														
CO3	Implement the proposed solution using Computer Science & Engineering techniques.														
CO4	Build a detailed project report.														
CO-PO Mapping:															
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO1	2	1	1	1		2	1	1			2		1	1
	CO2	2	2	2		2	1	1	2	3	2	1	1	2	1
	CO3	2	2	2		2	1	1	3	3	2	1	2	2	2
	CO4	2	1						1		1	2	1		
Assessment Scheme:															
SN	Assessment		Weightage	Remark											
1	ISE 1		50%	Problem Statement, SRS, Design											
2	ISE2		50%	Implementation, Presentation, Demo											
Course Contents:															
<b>Guidelines for Mini Project -I</b>															
<ul style="list-style-type: none"> <li>The primary objective of the mini project-I is to achieve multi course real world problem-based learning.</li> <li>Course Instructor shall form the project team of 3 to 4 students in the batch of students</li> <li>Each team shall use the knowledge they learned in the previous courses to identify the real world problem and solve using learnt technology</li> <li>The solution shall be using the tools &amp; techniques from multiple courses - e.g a solution shall be using data structures, Computer Networks, Data Science and ML modeling to develop mini project.</li> </ul>															
<b>Guidelines for Evaluation</b>															
<p>The evaluation shall be done in two phases</p> <ul style="list-style-type: none"> <li>Phase 1 ISE-1 In ISE 1 the students shall be graded based on the skills demonstrated to identify the problem statement, define the problem statement &amp; Designing its solution. The partial working model is expected to be completed.</li> <li>Phase 2 ISE-2 In ISE 2 the students shall be graded based on the complete project implementation and its working. Followed by the detailed project report which shall cover the technical aspects of the project.</li> <li>It is recommended to share a common project report format to all batches.</li> <li>All course instructors shall coordinate and work towards common evaluation process.</li> <li>Course instructors shall demonstrate and discuss sample case studies with students to help them understand</li> </ul>															

<b>Course Code:</b>	UDSA0661	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>									
<b>Course Name:</b>	Communication and Personality Development	2	-	-	2									
<b>Course Prerequisites:</b>														
Communication Skills, Communication Skills-Practice														
<b>Course Description:</b>														
The present course is the subsequent part of the course Communication Skills studied in FY Sem-I. Assuming that the														
<b>Course Outcomes:</b>	<b>After the completion of the course the student will be able to -</b>													
<b>CO1</b>	Comprehend the employment skills to have an effective first impression													
<b>CO2</b>	Construct effective technical reports and business proposals													
<b>CO3</b>	Illustrate various presentation skills and present oneself professionally													
<b>CO4</b>	Use various interpersonal skills as per the need of situation and context													
<b>CO-PO Mapping:</b>														
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO1</b>								2	2	3	1	1		
<b>CO2</b>					2			2	2	3	1	1		
<b>CO3</b>					3			2	2	3	1	1		
<b>CO4</b>								2	2	3	1	1		
<b>Assessment Scheme:</b>														
<b>SN</b>	<b>Assessment</b>		<b>Weightage</b>	<b>Remark</b>										
<b>1</b>	In Semester Evaluation 1 (ISE1)		10%	Assignment, Test, Quiz, Seminar, Presentation, etc.										
<b>2</b>	Mid Semester Examination (MSE)		30%	50% of course contents										
<b>3</b>	In Semester Evaluation 2 (ISE2)		10%	Assignment, Test, Quiz, Seminar, Presentation, etc.										
<b>4</b>	End Semester Examination (ESE)		50%	100% course contents										
<b>Course Contents:</b>														
<b>UNIT 1</b>	<b>Employment Communication</b>					<b>6 Hours</b>								
Covering letter and resume, Group discussion, Interviews														
<b>UNIT 2</b>	<b>Technical report writing</b>					<b>4 Hours</b>								
Importance of reports, objectives, characteristics, Types/categories, formats (Manuscript, memo, letter, Structure/elements of manuscript reports														
<b>UNIT 3</b>	<b>Presentation skills</b>					<b>4 Hours</b>								
Techniques of effective professional presentations, collaborative/team presentations, Team presentation of a technical report using ICT tools														

<b>UNIT 4</b>	<b>Business Meetings</b>	<b>2 Hours</b>
Types of meetings, strategies of conducting meetings effectively, Documentation (notice, agenda, minutes)		
<b>UNIT 5</b>	<b>Business proposals</b>	<b>2 Hours</b>
Types, components, format, layout and design, Key elements of winning business proposals		
<b>UNIT 6</b>	<b>Interpersonal skills</b>	<b>10 Hours</b>
Human values and professional ethics, Developing personality, Self esteem: Know thyself, Attitude building, Emotional Intelligence, Teamwork, Leadership, Time management, Netiquette		
<b>Text Books:</b>		
1. Communication Skills by Meenakshi Raman and Sangeeta Sharma, Oxford University Press (OUP), 2013. 2. Business Communication by S. Kalia and S. Agarwal, Wiley, 2015. 3. An Introduction to Professional English and Soft Skills by Das et al, Cambridge University Press, 2012.		
<b>Reference Books:</b>		
1. Business Communication by Urmila Rai and S.M. Rai, Himalaya, 2014. 2. Business Correspondence and Report Writing by R.C. Sharma and Krishna Mohan, Tata McGraw Hill, 2007. 3. Technical Communication by Meenakshi Raman and Sangeeta Sharma, OUP, 2013. 4. Business Communication by Raymond Lesikar et. al., McGraw Hill, 2015 5. Soft Skills by K. Alex, S. Chand and Company, 2013 6. Personal Development for Life and Work by Masters and Wallace, Cengage Learning, 2011. 7. Managing Soft Skills for Personality Development by B.N. Ghosh, Tata McGraw Hill, 2012. 8. Soft Skills by K. Alex, S. Chand and Company, 2014.		