

Branch Name:	Bachelor of Science (DS)
Program Code:	ET111
Semester/Year:	Semester - VI/ Third Year
Subject Title:	Machine Learning
Subject Code:	16-DSM304-3C
Pre-requisite:	Logic, Calculus, Linear Algebra, and Statistics

Course Objective: The course aims to develop understanding of supervised and unsupervised learning methods, feature engineering, probabilistic models, and Bayesian learning techniques. It also focuses on building practical skills in classification, regression, clustering, neural networks, and deep learning for solving real-world data-driven problems.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
03	00	02	04	50	25	-	25	100

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1	Introduction to Machine Learning and Data Preparation: Introduction to Machine Learning, Human Learning vs Machine Learning, Types and Applications of Machine Learning, Tools and Technologies for Machine Learning, Machine Learning Workflow, Types and Structures of Data, Data Quality and Remediation, Data Cleaning and Pre-processing, Dimensionality Reduction, Feature Subset Selection	6	15
2	Modeling, Feature Engineering and Evaluation: Predictive and Descriptive Modeling, Supervised Learning Process, Model Representation and Interpretability, Model Evaluation Metrics, Improving Model Performance, Introduction to Feature Engineering, Feature Transformation, Feature Construction and Extraction, Feature Selection Techniques, High-Dimensional Data Issues	8	25
3	Probability and Bayesian Learning : Statistical Foundations for Machine Learning, Probability Concepts, Random Variables, Discrete and Continuous Probability Distributions, Central Limit Theorem, Sampling Distributions, Hypothesis Testing, Monte Carlo Approximation, Bayes' Theorem, Bayesian Concept Learning, Bayesian Belief Networks	6	20

4	Supervised Learning: Classification and Regression Introduction to Supervised Learning, Classification Models, Classification Algorithms, Regression Concepts, Regression Algorithms, Learning Steps in Supervised Learning, Applications of Classification and Regression	10	20
5	Unsupervised Learning Supervised vs Unsupervised Learning, Applications of Unsupervised Learning, Clustering Techniques, Association Rule Mining and Pattern Discovery	8	15
6	Neural Networks and Deep Learning Introduction to Deep Learning and Neural Networks, Biological and Artificial Neurons, Activation Functions, Artificial Neural Network Architecture, Learning Process, Backpropagation Algorithm	4	05

List of Reference Books:

1. Machine Learning, Saikat Dull, S. Chjandramouli, Das, Pearson
2. Machine Learning with Python for Everyone, Mark Fenner, Pearson
3. Machine Learning, Anuradha Srinivasaraghavan, Vincy Joseph, Wiley
4. Machine Learning with Python, U Dinesh Kumar Manaranjan Pradhan, Wiley
5. Python Machine Learning, Sebastian Raschka, Vahid Mirjalili, Packt Publishing

List of Suggested titles of Experiments:

1. Implement Linear Regression from scratch
2. Build a Logistic Regression classifier
3. Implement k-Nearest Neighbors (k-NN)
4. Build a Decision Tree classifier
5. Implement k-Means Clustering
6. Build a Random Forest classifier using sklearn
7. Train a simple Neural Network (MLP) with Tensor Flow or PyTorch
8. Implement a Convolutional Neural Network (CNN) for image classification
9. Perform Hyper parameter Tuning with Grid Search or Random Search
10. Build a Sentiment Analysis classifier using NLP and Naive Bayes.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Course Learning Outcome	Bloom's Level
CLO1	Explain the basic concepts, learning types, ML workflow, data understanding and challenges.	1. Remembering, 2. Understanding
CLO2	Apply supervised learning methods such as regression, KNN, and decision trees to classification and prediction.	3. Applying, 4. Analyzing
CLO3	Evaluate and optimize ML models using cross-validation and performance metrics.	4. Analyzing 5. Evaluating,
CLO4	Apply unsupervised learning methods such as clustering and dimensionality reduction to real datasets.	3. Applying, 4. Analyzing
CLO5	Implement ML models using standard tools and justify model selection for real-world applications.	5. Evaluating 6. Creating

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CLO1	H	H	M	M	M	L	-	-	L	L	-	M	H	M	L	-
CLO2	H	H	H	H	H	M	-	-	M	M	-	M	H	H	H	M
CLO3	M	H	H	H	H	M	-	-	M	M	-	H	H	H	H	H
CLO4	M	M	H	H	H	L	-	-	M	M	-	M	M	H	H	M
CLO5	H	M	H	M	H	M	-	-	H	H	M	H	H	H	H	H

H: High, M: Medium, L: Low

Branch Name:	Bachelor of Science (DS)
Program Code:	ET111
Semester/Year:	Semester - VI/ Third Year
Subject Title:	Big Data Analytics
Subject Code:	16-DSM305-3C
Pre-requisite:	Working knowledge of programming language and database concepts

Course Objective: The objective of this course is to provide students with fundamental knowledge of Big Data Analytics concepts, technologies, and analytical techniques used for processing and analyzing large-scale data. The course focuses on understanding the features and applications of big data analytics for discovering patterns, identifying opportunities, and supporting data-driven decision-making.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
03	00	02	04	50	25	-	25	100

Subject Contents			
Sr. No	Topic	Lecture Hours	Weight age (%)
1	Introduction To Big Data And Hadoop: Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analyzing Data with Unix tools, Analyzing Data with Hadoop, Hadoop Streaming, Hadoop Echo System, IBM Big Data Strategy, Introduction to Infosphere Big Insights and Big Sheets.	10	13
2	HDFS(Hadoop Distributed File System) The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingest with Flume and Scoop and Hadoop archives, Hadoop I/O: Compression, Serialization, Avro and File-Based Data structures.	10	23
3	Map Reduce Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.	8	20
4	Hadoop Eco System Pig : Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators. Hive : Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying, Data and User Defined Functions. Hbase : HBasics, Concepts, Clients, Example, Hbase Versus RDBMS. Big SQL : Introduction	12	27

5	Data Analytics with R Machine Learning : Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering. Big Data Analytics with BigR.	6	17
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List of Text Books:

1. Tom White “Hadoop: The Definitive Guide” Third Edit on, O’reily Media, 2012.
2. Seema Acharya, Subhasini Chellappan, "Big Data Analytics" Wiley 2015.

List of Reference Books:

3. Radha Shankarmani, M Vijayalakshmi, Big Data Analytics, 2nd Edition, Wiley
4. Jure Leskovec, AnandRajaraman, Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge University Press, Second Edition, 2014.
5. Jiawei Han, Micheline Kamber, Jian Pei, “Data Mining Concepts and Techniques”, Morgan Kaufman Publications, Third Edition, 2011.
6. VigneshPrajapati, “Big Data Analytics with R and Hadoop”, Packet Publishing 2013
6. Big Data Black Book, DreamTech

List of Suggested titles of Experiments:

1. Setup Hadoop Cluster and write Complex MapReduce programs.
2. Learn data loading techniques using Sqoop and Flume.
3. Perform data analytics using Pig, Hive and YARN.
4. Implement HBase and MapReduce integration.
5. Implement Advanced Usage and Indexing.
6. Implement best practices for Hadoop development.
7. Study about different types of noSQL Databases.
8. Write a program to draw a Graph using NoSQL database.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Course Learning Outcome	Bloom's Level
CLO1	Explain big data concepts, Hadoop architecture and its ecosystem components.	1. Remembering, 2. Understanding
CLO2	Ingest and process large-scale data using HDFS, Flume, Sqoop and MapReduce operations.	3. Applying, 4. Analyzing
CLO3	Design and deploy analytical solutions using Hive, Pig, HBase and NoSQL tools.	5. Evaluating 6. Creating,
CLO4	Apply Machine Learning techniques with R for Big Data analytics and performance interpretation.	3. Applying, 5. Evaluating
CLO5	Compare and select appropriate big data frameworks for scalable data processing and business decision support.	4. Analyzing 5. Evaluating,

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CLO1	H	H	M	M	M	L	-	-	M	L	-	M	H	M	L	-
CLO2	M	H	H	H	H	L	-	-	M	M	-	M	H	H	M	M
CLO3	M	M	H	H	H	M	-	-	H	H	M	H	H	H	H	H
CLO4	M	M	H	H	H	M	-	-	M	M	-	H	H	H	H	H
CLO5	M	M	H	M	H	M	-	-	M	M	M	H	H	H	H	H

H: High, M: Medium, L: Low

Branch Name:	Bachelor of Science (DS)
Program Code:	ET111
Semester/Year:	Semester - VI/ Third Year
Course Title:	Time Series data Analysis
Course Code:	16-DSM306-3C
Pre-requisite Course:	Data Science fundamentals

Course Objectives: The objective of this course is to provide students with fundamental knowledge of Time Series Analysis and the properties of time series data. The course focuses on understanding autoregressive models, forecasting techniques, and various time series models used for data analysis and prediction. It also aims to develop practical skills in analyzing and modeling time series data using the R programming language.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	0	2	4	50	25	-	25	100

Course Contents:

Unit No	Topic	Total Hours	Weight age (%)
1	Introduction: Basic Properties of time-series data: Distribution and moments, Stationarity, Autocorrelation, Heteroscedasticity, Normality.	8	20
2	Autoregressive models and forecasting: AR, ARMA, ARIMA models. Random walk model: non-stationarity and unit-root process, Drift and Trend models.	9	25
3	Multivariate Statistical Modelling and Dimension Reduction in Time Series: - Regression analysis with time-series data using R programming. Principal Component Analysis (PCA) and Factor Analysis.	9	25
4	Conditional Heteroscedastic Models: ARCH, GARCH. T-GARCH, BEKK-GARCH. Introduction to Non-linear and regime-switching models: Markov regime-switching models, Quantile regression, Contagion models.	9	20
5	Introduction to Vector Auto-regressive (VAR) models: Impulse Response Function (IRF), Error Correction Models, Co-integration. Introduction to Panel data models: Fixed-Effect and Random-Effect models.	8	10

Text Book:

1. Chris Brooks “Introductory Econometrics for Finance,” Fourth Edition, Cambridge University Press.
2. Ruey S. Tsay “Analysis of Time-series data,” Third Edition, Wiley
3. John Fox and Sanford Weisberg “An R Companion to Applied Regression,” Third Edition, SAGE
4. Yves Croissant and Giovanni Millo “Panel Data Econometrics with R,” First Edition, Wiley

Course Learning Outcomes (CLO):

CLO	Course Learning Outcome	Bloom’s Level
CLO1	Explain statistical properties of time series including stationarity, autocorrelation and heteroscedasticity.	1. Remembering, 2. Understanding
CLO2	Apply AR, MA, ARIMA and random walk models for time series forecasting.	3. Applying, 4. Analyzing
CLO3	Analyze multivariate time series using regression, PCA and factor analysis in R.	4. Analyzing, 5. Evaluating
CLO4	Apply and evaluate conditional volatility models including ARCH, GARCH and switching models.	3. Applying, 5. Evaluating
CLO5	Implement VAR, VECM and panel data models and interpret impulse responses and co-integration results.	5. Evaluating 6. Creating,

Mapping of CLO with PO and PSO

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1	H	H	M	M	L	L	-	-	M	L	-	M	H	M	L	-
CLO2	M	H	H	M	H	L	-	-	M	M	-	M	H	H	H	M
CLO3	M	H	H	H	H	M	-	-	M	M	-	H	H	H	H	H
CLO4	M	M	H	H	H	M	-	-	M	M	-	H	H	H	H	H
CLO5	M	M	H	M	H	M	-	-	H	H	M	H	H	H	H	H

H: High, M: Medium, L: Low

Branch Name:	Bachelor of Science (DS)
Program Code:	ET111
Semester/Year:	Semester - VI/ Third Year
Course Title:	Ethical Hacking & Cyber Security
Course Code:	16-DSE306-3C
Pre-requisite Course:	Computer Networks and Operating Systems

Course Objectives: The objective of this course is to provide students with fundamental knowledge of Ethical Hacking and cybersecurity concepts used to identify and secure system vulnerabilities. The course focuses on Footprinting, scanning, system hacking techniques, malware analysis, and attack detection and prevention methods. It also aims to develop practical understanding of security threats, attack signatures, and defensive mechanisms used to protect systems and networks in different computing environments.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	0	2	4	50	25	-	25	100

Course Contents:

Unit No	Topic	Total Hours	Weight age (%)
1	An Introduction to ethical Hacking : Security Fundamental, Security testing, Hacker and Cracker, Descriptions, Test Plans-keeping It legal, Ethical and Legality	4	10
2	The Technical Foundations of Hacking: The Attacker's Process, The Ethical Hacker's Process, Security and the Stack	5	10
3	Footprinting and scanning : Information Gathering, Determining the Network Range, Identifying Active Machines, Finding Open Ports and Access Points, OS Fingerprinting Services, Mapping the Network Attack Surface	8	15
4	Malware Threats : Viruses and Worms, Trojans, Covert Communication, Keystroke Logging and Spyware, Malware Counter measures	5	15
5	Sniffers, Session Hijacking and Denial of Service : Sniffers, Session Hijacking, Denial of Service and Distributed Denial of Service	5	15
6	Web Server Hacking, Web Applications and Database Attacks: Web Server Hacking, Web Application Hacking, Database Hacking	5	15
7	Wireless Technologies, Mobile Security and Attacks : Wireless Technologies, Mobile Device Operation and Security, Wireless LANs	5	10
8	IDS, Firewalls and Honeypots : Intrusion Detection Systems, Firewalls, Honeypots	5	10

Reference Books:

1. Certified Ethical Hacker, Version 9, Second Edition, Michael Gregg, Pearson IT Certification
2. Hacking the Hacker, Roger Grimes, Wiley
3. The Unofficial Guide to Ethical Hacking, Ankit Fadia, Premier Press

List of Experiments:

1. List the tools for Ethical Hacking.
2. Implement Footprinting and Reconnaissance using tools 3d Traceroute, Alchemy Eye, DNS Tools and Network Solution Whois.
3. Implement Network Scanning using tools Advanced Port Scanner, Colasoft Ping Tool, Hide Your IP Address, Nessus and Nmap.
4. Implement Enumeration using tools Default Password List, Default Password List, OpUtil Network Monitoring Tool and OpUtil Network Monitoring Tool.
5. Implement system hacking using tools Actual spy, Alchemy Remote Executor, Armor Tool and F-Secure BlackLight.
6. Implement Trojan and Backdoors using tools Absolute Startup Manager, Absolute Startup Manager, Netwrx Services Monitor and StartEd Lite.
7. Implement Viruses and Worms using tools Anubis Analyzing UnknownBinaries, Filterbit, Sunbelt CWSandbox and ThreatExpert.
8. Implement sniffers using tools Colasoft Capsa Network Analyzer, EffeTech HTTP Sniffer, Packet Sniffer and PRTG Network Monitor.
9. Write a research paper in which Ethical Hacking tools are used to address any problem definition in cyber security.

Course Learning Outcomes (CLOs)

CLO	Course Learning Outcome	Bloom's Level
CLO1	Explain ethical hacking fundamentals, legal issues and hacker methodologies.	1. Remembering, 2. Understanding
CLO2	Apply foot printing, scanning and enumeration techniques using tools.	3. Applying, 4. Analyzing
CLO3	Demonstrate system hacking, password cracking and privilege escalation securely.	3. Applying, 5. Evaluating
CLO4	Analyze malware attacks, sniffing, session hijacking and DoS/DDoS threats.	4. Analyzing, 5. Evaluating
CLO5	Recommend defensive measures using IDS, firewalls, honeypots and secure configurations.	5. Evaluating 6. Creating

Mapping of CLO with PO and PSO

Course	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1	H	H	M	M	L	L	-	-	L	M	-	M	H	M	L	L
CLO2	M	H	H	M	H	L	-	-	M	M	-	M	H	H	M	M
CLO3	M	H	H	M	H	M	-	-	M	M	-	M	H	H	H	M
CLO4	M	M	H	H	H	M	-	-	M	M	-	H	H	H	H	H
CLO5	M	M	H	H	H	M	-	-	H	H	M	H	H	H	H	H

H: High, M: Medium, L: Low

Branch Name:	Bachelor of Science (DS/CS)
Program Code:	ET111/ET112
Semester/Year:	Semester - VI/ Third Year
Subject Title:	Image Processing
Subject Code:	16-DSE307-3C
Pre-requisite:	Logic, Calculus, Linear Algebra, and Statistics

Course Objective: The objective of this course is to provide students with fundamental knowledge of Digital Image Processing and computer vision techniques used for image analysis and intelligent systems. The course focuses on applying image processing methods for pattern recognition, surveillance, biometrics, and security-related applications. It also aims to develop practical skills in implementing image analytics solutions using machine learning, data science techniques, and Python libraries such as OpenCV and Scikit-image.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
03	00	02	04	50	25	-	25	100

Subject Contents				
Sr. No	Topic	Lecture Hours	Weight age (%)	
1	Digital Image Fundamentals and Data Representation: Introduction to Digital Image Processing, Image representation as data (pixels and matrices), Human visual system, Image sampling and quantization, Image datasets and formats, Image acquisition systems, Applications in Data Science and Cyber Security: surveillance systems, biometric authentication, malware image visualization	6	15	
2	Image Enhancement and Feature Extraction Gray level transformations, Histogram equalization and histogram matching, Spatial filtering (low-pass, high-pass filters), Edge detection (Sobel, Prewitt, Canny), Feature extraction from images, Image preprocessing for machine learning, Applications: object detection in surveillance, face detection systems, preprocessing images for data analytics	10	25	
3	Frequency Domain Processing and Image Restoration: Fourier Transform in image processing, Frequency domain filtering, Image smoothing and sharpening, Homomorphic filtering, Noise models in images, Image restoration techniques, Image denoising using machine learning, Applications: forensic image analysis, enhancement of CCTV images, improving low-quality security footage	10	25	

4	Colour Image Processing and Image Compression: Colour models (RGB, HSV, YCbCr) , Colour image processing techniques , Image compression fundamentals, Lossless and lossy compression, Huffman, Arithmetic and LZW coding, JPEG compression standard, Applications: multimedia data analysis, secure transmission of image data, storage optimization for surveillance systems	8	20
5	Morphological Processing and Computer Vision Applications: Morphological operations (erosion, dilation), Opening and closing operations, connected component analysis, Shape analysis and pattern detection, Image segmentation basics, Applications: biometric authentication systems, facial recognition and access control, anomaly detection in visual data	8	15

List of Reference Books:

1. Digital Image Processing, Second Edition by Rafael C. Gonzalez and Richard E. Woods, Pearson Education
2. Digital Image Processing by Bhabatosh Chanda and Dwijesh Majumder, PHI
3. Fundamentals of Digital Image Processing by Anil K Jain, PHI
4. Digital Image Processing Using Matlab, Rafael C. Gonzalez and Richard E. Woods, Pearson Education

List of Suggested titles of Experiments:

1. Image preprocessing using Python (OpenCV)
2. Histogram equalization and contrast enhancement
3. Edge detection using Sobel and Canny filters
4. Feature extraction from images
5. Image denoising techniques
6. Image compression using JPEG algorithm
7. Morphological operations on images
8. Face detection using OpenCV
9. Object detection from surveillance images
10. Mini project: Image analytics for security or data science application

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Course learning outcome	Bloom's Taxonomy Level
CLO1	Explain digital image formation and image data representation.	1. Remembering, 2. Understanding
CLO2	Apply image enhancement and feature extraction techniques for data analysis.	2. Understanding 3. Applying,
CLO3	Analyze images using frequency domain processing and restoration methods.	3. Applying, 4. Analyzing
CLO4	Apply compression and color processing techniques for multimedia data management.	3. Applying, 4. Analyzing
CLO5	Develop image processing solutions for applications in data science and cyber security.	3. Applying, 5. Evaluating

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CLO1	M	M	M	M	H	L	-	-	M	L	-	M	M	M	L	-
CLO2	M	M	H	M	H	L	-	-	M	M	-	M	H	H	M	L
CLO3	M	M	H	H	H	M	-	-	M	M	-	H	H	H	H	M
CLO4	M	M	H	H	M	L	-	-	M	M	-	M	M	H	H	M
CLO5	M	M	H	M	H	M	-	-	M	M	-	H	H	H	H	H
CLO6	M	M	M	M	H	L	-	-	M	L	-	M	M	M	L	-

H: High, M: Medium, L: Low

Branch Name:	Bachelor of Science (DS/CS)
Program Code:	ET111/ET112
Semester/Year:	Semester - VI/ Third Year
Subject Title:	Digital Communication
Subject Code:	16-DSE308-3C
Pre-requisite:	Basic knowledge of Analog Communication, Digital Electronics, and Signal Processing concepts

Course Objective: The objective of this course is to provide students with fundamental knowledge of Digital Communication systems and their core building blocks. The course focuses on understanding the differences between analog and digital communication and the advantages of digital transmission techniques. It also aims to develop analytical skills in sampling, quantization, coding methods, and various digital modulation techniques used in modern communication systems.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
03	00	02	04	50	25	-	25	100

Subject Contents				
Sr. No	Topic	Total Hours	Weight (%)	
1	Introduction to Digital Communication Basics of communication systems – analog vs digital; advantages of digital systems; block diagram of digital communication system; sampling theorem; noise and SNR.	6	15%	
2	Pulse and Baseband Digital Modulation Sampling, quantization, coding; PCM, DPCM, Delta modulation; time division multiplexing (TDM); line coding schemes (NRZ, RZ, Manchester).	8	20%	
3	Passband Modulation Techniques ASK, FSK, PSK, QPSK, M-ary modulation; transmitter and receiver models; detection techniques; probability of error; performance in AWGN.	10	20%	
4	Information Theory and Source Coding Concept of information and entropy; mutual information; source coding – Shannon-Fano and Huffman coding; channel capacity; Shannon's theorem.	7	15%	
5	Channel Coding and Error Control Error detection and correction; linear block codes; Hamming and cyclic codes; convolutional codes; Viterbi decoding; comparison of codes.	8	15%	
6	Multiplexing, Multiple Access and Wireless Channels TDM, FDM, CDMA; multiple access techniques; fading and multipath effects; introduction to OFDM; applications in modern communication networks.	6	15%	

List of Reference Books:

1. Simon Haykin, Digital Communications, John Wiley & Sons.
2. Bernard Sklar, Digital Communications: Fundamentals and Applications, Pearson.
3. Taub & Schilling, Principles of Communication Systems, McGraw-Hill.
4. B.P. Lathi, Modern Digital and Analog Communication Systems, Oxford University Press.

List of Suggested titles of Experiments:

1. Study of analog vs digital communication system components.
2. Simulation of PCM and DPCM systems.
3. Implementation of Delta Modulation and reconstruction of original signal.
4. Study and simulation of line coding techniques (NRZ, RZ, Manchester).
5. Simulation of ASK, FSK, PSK, and QPSK modulation & demodulation.
6. Plot and analyze BER vs SNR for different modulation schemes.
7. Implementation of Shannon-Fano and Huffman source coding for text data.
8. Demonstration of Hamming code generation and error correction.
9. Study of TDM and FDM multiplexing using simulation.
10. Mini-project: Design a simple digital communication link (transmitter–receiver) in software or hardware.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Course Learning Outcome	Bloom's Level
CLO1	Explain digital communication system model, sampling theorem, noise and SNR.	1. Remembering, 2. Understanding
CLO2	Analyze and apply baseband modulation techniques including PCM, DPCM, and TDM.	3. Applying, 4. Analyzing
CLO3	Analyze performance of passband modulation schemes (ASK, FSK, PSK, QPSK) in AWGN.	4. Analyzing, 5. Evaluating
CLO4	Apply information theory concepts including entropy, coding techniques and channel capacity.	3. Applying, 4. Analyzing
CLO5	Apply channel coding and error control techniques and evaluate system robustness.	3. Applying, 5. Evaluating
CLO6	Design and simulate digital communication models using modern tools.	3. Applying 6. Creating,

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CLO1	H	H	M	M	M	L	-	-	L	L	-	M	M	M	L	-
CLO2	H	H	H	M	H	L	-	-	M	M	-	M	H	H	M	L
CLO3	H	H	H	H	H	M	-	-	M	M	-	H	H	H	H	M
CLO4	M	M	H	H	M	L	-	-	M	M	-	M	M	H	H	M
CLO5	M	M	H	M	H	M	-	-	M	M	-	H	H	H	H	H
CLO6	M	M	H	M	H	M	-	-	H	H	M	H	H	H	H	H

H: High, M: Medium, L: Low

Branch Name:	B.Sc. (IT/DS/CS)
Program Code:	ET110/ET111/ET112
Semester/Year:	Semester - VI/ Third Year
Subject Title:	Social Media and Blog Writing
Subject Code:	16-AEC223-3C
Pre-requisite:	Basic Internet usage

Course Objective: To familiarize students with writing skills for the different kinds of media. To equip them with practical knowledge for the evolving writing ecology and empower them for employment.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
03	00	02	04	50	25	-	25	100

Subject Contents				
Sr. No	Topic	Total Hours	Weight (%)	
1	The Basics of Writing and Types of Writing - The basics of writing mechanics – Grammar, vocabulary, phrases and clauses - How to write – construction of clear, simple and precise sentences. - Writing for the reader – Role of reader and broadening the Reader – Response theory. - Different kinds of writing – Fiction, Non-fiction (including historical writing, travel writing, memoirs), scientific writing, journalistic writing	8	15	
2	Exploring the New Avenues for Writing - Differences between traditional print writing (Newspapers, magazines, books etc.) and writing in the age of the internet – need to adapt to change. - Different forms of media – Print, social media websites, blogs, online platforms etc. - Understanding writing for different media through examples.	10	25	
3	Customizing Online Writing Based on the Online Platform: - Long forms of writing- language, writing style, content, vocabulary focus, title, introduction and conclusion – film review, blog posts, scientific writing, e –magazines- with a minimum of two examples each. - Shorter forms of writing – language, writing style, content, vocabulary, focus, caption – Twitter feeds/poems, fanfiction, instagram stories, facebook posts etc – with a minimum of two examples each.	10	25	

	Photo and Video writing – language, writing style, content, vocabulary, focus, caption, introduction and conclusion, synchronizing content – Video logging, photo blogging etc		
4	Journalistic and Ad Writing: - Comparing Print and online writing – for newspapers, magazines, journals. - Understanding the evolving dynamics of the adspace - including pop up ads, scrolls, flash ads- change in language, font, style and incorporating doodling with ad writing	8	20
5	Writing and Publishing: - Students must undergo hands-on –training from a recognized print/digital media. - Publish an article in a print/digital media.	8	15

List of Reference Books:

1. How Images think – Burnett 2004.
2. Online Journalism – Reporting, Writing and Editing for New Media – Richard Craig 2005 CENGAGE Learning.
3. Broadcast News Handbook – Writing, Reporting, Producing in a converging Media –C.A. Juggle,Forrest Carr and Suzanne Huffman McGraw-Hill, 2011
4. Writing Machines –Katherine Hayles 2002.
5. Writing For The Media ; Author, Sunny Thomas ; Publisher, Vision Books, 1997 ; ISBN, 8170942993, 9788170942993
6. The Language of New Media –Lev Manovich (MIT Press, 2001)
7. How to start Vlogging: A complete Beginner’s Guide –Derrick Hayes 2019
8. Twitter for success: Achieve writing success 25 words at a time –Angela Booth 2nd edition (22 December 2011);
9. Blogging for beginners: Learn how to start and maintain a successful blog the simple way –Terence Lawfield 2015.
10. Writing New Media: Theory and Applications for Expanding the Teaching of Composition. January 2004. Authors: Anne Frances Wysocki

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Comprehend how to write with clarity, purpose and precision	1 Remembering 2. Understanding 3 Applying
CLO2	Understand how to modify writing styles based on the media employed	2 Understanding 3 Applying
CLO3	Use these skills to pursue higher education in other allied fields	3 Applying 4 Analyze
CLO4	Could use the knowledge to take up freelance writing assignments/projects and other related employment.	3 Applying 4 Analyze 5 Evaluate

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
CLO1	L	L			H											H
CLO2	M	M			H											H
CLO3	L	M			H											M
CLO4	M	M			H											M

H: High, M: Medium, L: Low