

D. K.T. E. Society's
Textile and Engineering Institute,
Ichalkaranji
(An Autonomous Institute)



AN AUTONOMOUS INSTITUTE

NAAC ACCREDITED WITH 'A +' GRADE

Syllabus
for
Final Year B.Tech.
of
Artificial Intelligence and Data Science
(With effect from 2024-25)

DKTE Society's Textile and Engineering Institute, Ichalkaranji

(An Autonomous Institute)

Teaching and evaluation Scheme for year 2024-25

Final Year B. Tech. (Semester – VII) In AI and Data Science

Sr. No.	Course Code	Course Title	Course Category	Teaching scheme				Course Credits	Evaluation scheme					
				L	T	P	Contact Hrs/wk		Theory			Practical		TOTAL
									CIE		SEE	CIE	SEE	
									MSE	ISE				
1	ADL401	Computer Vision	PCC	3		-	3	3	30	20	50	-	-	100
2	ADL402	Data Warehouse and Business Intelligence	PCC	3	-	-	3	3	30	20	50	-	-	100
3	ADLEL3	Elective-III	PEC	3		-	3	3	30	20	50	-	-	100
4	ADLEL4	Elective-IV	PEC	3	-	-	3	3	30	20	50	-	-	100
5	ADP409	Deep Learning Lab	PCC	2	-	2	4	3	-	-	-	50	50	100
6	ADP410	Data Visualizations Lab	PCC	-	-	2	2	1	-	-	-	50	50	100
7	ADPEL4	Elective-IV Lab	PEC	-	-	2	2	1	-	-	-	50	-	50
8	ADD414	Project-I	PST	-	-	4	4	4	-	-	-	50	50	100
		Total		14	0	10	24	21	100	60	240	200	150	750

AILEL3 Elective-III	AILEL4 Elective-IV	AIPEL4 Elective-IV Lab
ADL403 Digital Marketing Analytics	ADL406 UI AND UX DESIGN	ADP411 UI AND UX DESIGN Lab
ADL404 Social Network Analysis	ADL407 Augmented Reality and Virtual reality	ADP412 Augmented Reality and Virtual reality Lab
ADL405 Time series analysis and Forecasting	ADL408 Software Testing and Quality Assurance	ADP413 Software Testing and Quality Assurance Lab

L- Lecture

T-Tutorial

P-Practical

MSE: Mid Semester Examination CIE – Continuous In Semester Evaluation

ISE: In Semester Evaluation

SEE- Semester End Examination

Course Category	HSMC (Hum. & Social Sc., Mgt)	BSC (Basic Sc.)	ESC Engg. Sc.)	PCC (Prof. Core Courses)	PEC (Prof. Elect. Courses)	OEC (Open Elct. Courses)	MC (Mandatory Courses)	PST (Project / Seminar / Ind. Training)
Credits	--	--	--	10	07	—	--	04
Cumulative Sum	03	20	20	74	06	03	--	05

Progressive Total Credits: 131 + 21 = 152

DKTE Society's Textile and Engineering Institute, Ichalkaranji

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Teaching and evaluation Scheme for year 2024-25

Final Year B. Tech. (Semester–VIII) In AI and Data Science

Sr. No.	Course Code	Course Title	Course Category	Teaching scheme				Course Credits	Evaluation scheme					
				L	T	P	Contact Hrs/wk		Theory			Practical		TOTAL
									CIE		SEE	CIE	SEE	
									MSE	ISE				
1	ADL415	Natural Language Processing	PCC	3	-	-	3	3	30	20	50	-	-	100
2	ADL416	Software Project Management	HSMC	3	-	-	3	3	30	20	50	-	-	100
3	ADLEL5	Elective-V	PEC	3	-	-	3	3	30	20	50	-	-	100
4	ADLEL6	Elective-VI	PEC	3	-	-	3	3	30	20	50	-	-	100
5	ADP423	Full Stack Development	PCC	2	-	2	4	3	-	-	-	50	50	100
6	ADP424	DevOps Lab	PCC			2	2	1				50	50	100
7	ADPEL6	Elective-VI Lab	PEC	-	-	2	2	1	-	-	-	50	-	50
8	ADD428	Project-II	PST	-	-	8	8	8	-	-	-	50	50	100
		Total		14	0	8	22	25	100	60	240	200	150	750

ADLEL5 Elective-V	ADLEL6 Elective-VI	ADPEL6 Elective-VI Lab
ADL417 Cyber Security	ADL420 Web Mining	ADP425 Web Mining Lab
ADL418 Software Design Pattern	ADL421 Big Data Analytics	ADP426 Big Data Analytics Lab
ADL419 BlockChain Technology	ADL422 Text Mining	ADP427 Text Mining Lab

L- Lecture

T-Tutorial

P-Practical

MSE : Mid Semester Examination

ISE : In Semester Evaluation

CIE – Continuous In Semester Evaluation

SEE- Semester End Examination

Course Category	HSMC (Hum. & Social Sc., Mgt)	BSC (Basic Sc.)	ESC Engg. Sc.)	PCC (Prof. Core Courses)	PEC (Prof. Elect. Courses)	OEC (Open Elct. Courses)	MC (Mandatory Courses)	PST (Project / Seminar / Ind. Training)
Credits	03	--	--	07	07	-	--	08
Cumulative Sum	03	20	20	84	13	03	--	09

Progressive Total Credits:152 + 25 = 177

DKTES Textile and Engineering Institute, Ichalkaranji. Final Year B. Tech. (Semester – VII) Artificial Intelligence & Data Science ADL401: Computer Vision		
Teaching Scheme: Lectures: 03 Hrs. /Week Tutorials: 00 Hrs./Week Practical: 00 Hrs./Week	Credits 03	Evaluation Scheme: MSE: 30 Marks ISE: 20 Marks SEE: 50 Marks
Course Outcomes: On completion of the course, Students will be able to – <ol style="list-style-type: none"> 1. Explain concepts applied in computer vision. 2. Apply spatial and geometric transformation on image. 3. Design solution for the given computer vision problem 		
Course Contents		
Unit I	Introduction to Computer Vision fundamentals	07 Hours
Introduction to Computer Vision, Computer Vision Applications, Digital image Representation, , Image Model, Image sampling and Quantization, grayscale resolution, pixel relationship, Basic grey level transformations, image negation, log transformations, power law transformations, piece-wise linear transformations, histogram processing, Image enhancement using arithmetic and logical operations, neighborhood operations, Color Image Models.		
Unit II	Image Analysis and Computer Vision	07 Hours
Spatial feature Extraction, transform feature, Edge detection, Boundary Representation, Region Representation and Moment Representation, Structure-Shape Features, Texture, Scene Matching and Detection-Image Segmentation		
Unit III	Restoration and Compression	06 Hours
Image restoration, Degradation Model, Discrete Formulation, Restoration in the Presence of Noise Only - Spatial Filtering. Compression Fundamentals – Compression Models – Error Free Compression – Lossy Compression		
Unit IV	Transformation and Feature Detection	07 Hours
Geometric transformations (rotation, scaling, etc.), Image warping and homography, Interest point detection (Harris corner detector, FAST, etc.), Feature descriptors		
Unit V	Object Recognition	06 Hours
Patterns and Pattern Classes, Recognition Based on Decision-Theoretic Methods, Matching, Optimum Statistical Classifiers, Structural Methods, Matching Shape Numbers, String Matching. machine learning-based methods.		
Unit VI	Applications of Computer Vision and Sensing 3D shape	06 Hours
Recognition of characters, Fingerprints and faces, image classification -Image databases, How the 3rd dimension changes the problem. Stereo 3D description, 3D model.		
Text Books: <ol style="list-style-type: none"> 1. Fundamentals of Digital Image Processing- A.K.Jain (PHI) 2. Image Processing and Machine vision-Milan Sonka, Vaclav Hlavac, Roger Boyle Cengage Learning India Pvt Ltd (2008) 3. R. C. Gonzalez, R. E. Woods, Digital Image Processing, 4th Edition. 2018, PHI 		
References Books:		

1. Boyle R & Thomas R, Computer Vision – A First Course, 2nd Edition, McGraw Hill, 1990.
2. Computer Vision: A Modern Approach" by David A. Forsyth and Jean Ponce
3. Computer Vision: Algorithms and Applications" by Richard Szeliski

Useful Links: --

1. <https://machinelearningmastery.com/what-is-computer-vision/>

DKTES Textile and Engineering Institute, Ichalkaranji. Final Year B. Tech. (Semester – VII) Artificial Intelligence & Data Science ADL402: Datawarehouse and Business Intelligence		
Teaching Scheme: Lectures: 03 Hrs /Week Tutorials: 00Hrs/Week Practicals: 00 Hrs/Week	Credits 03	Evaluation Scheme: ISE: 20 Marks MSE: 30 Marks SEE: 50 Marks
Course Outcomes: On completion of the course, student should be able to– <ol style="list-style-type: none"> 1. Describe components and working of Datawarehouse and Business Intelligence systems 2. Explain dimensional modelling using fact table and dimension table 3. Explain various components and working of ETL Systems 4. Explain analytical tools and reporting tools for Business Data Analysis 		
Course Contents		
Unit I	Introducing the Technical Architecture:	08 Hours
Introduction: - The value of architecture, Technical Architecture overview, Back room Architecture, Presentation Server Architecture, Front room Architecture, Infrastructure, Metadata, Security.		
Unit II	Introducing Dimensional Modelling:	07 Hours
Making the Case for Dimensional Modelling, Dimensional Modelling primer, Enterprise Data Warehouse Bus Architecture, More on Dimensions & Facts.		
Unit III	Designing the Dimensional Modelling:	06 Hours
Modelling Process overview, Getting Organized, Four Step Modelling Process, Design the Dimensional Model.		
Unit IV	Introducing Extract, Transformation & Load	06 Hours
Round up the requirements, the 34subsystems of ETL, Extracting Data, Cleaning & Conforming data, Delivering Data for Presentation		
Unit V	Introducing Business Intelligence Applications	07 Hours
Importance of B.I. Applications, Analytical cycle for B.I, Types of B.I. Applications, Navigating Applications via the B.I portal		
Unit VI	Designing & Developing B.I Applications	05 Hours
B.I. Application resource planning, B.I. Application Specification, B.I. Application Development, B.I. Application maintenance		
Text Books:		

1. Ralph Kimball, "The Data Warehouse Lifecycle toolkit', 2nd edition, Wiley India

References Books:

1. Data Warehousing: Fundamentals for IT Professionals by Paulraj Ponniah; 2nd Edn.
Publisher: Wiley, John & Sons, Incorporated

2. Star Schema: The Complete Reference by Christopher Adamson, Mc-Graw Hill Osborne
Media

3. The Data Warehouse Toolkit: The Complete Guide to Dimensional Modeling by Ralph
Kimball

4. Data Warehousing in the Real World – Anahory & Murray, Pearson

Useful Links:

1. <https://nptel.ac.in/courses/106105174>

DKTES Textile and Engineering Institute, Ichalkaranji.**Final Year B. Tech. (Semester – VII)****Artificial Intelligence & Data Science****ADL403: Digital Marketing Analytics**

Teaching Scheme: Lectures: 03 Hrs. /Week Tutorials: 00 Hrs./Week Practical: 00 Hrs./Week	Credits 03	Evaluation Scheme: MSE: 30 Marks ISE: 20 Marks SEE: 50 Marks
Course Outcomes: On completion of the course, student will be able to– <ol style="list-style-type: none">1. Understand Digital Marketing Concepts, Data Collection and Analysis, Consumer Insights and Behavior Analysis2. Work on Optimize Campaigns: Measure, test, and improve marketing campaign performance. Create Reports3. Explain and Make Data-Driven Decisions Use insights to inform and adjust marketing strategies.4. Explore and Use Analytical Tools: Become proficient with tools such as Google Analytics5. Measure ROI, Segment and Target Audiences, Apply Predictive Analytics, Ethics and Privacy, Gain hands-on experience through projects, case studies		
Course Contents		
Unit I	Introduction to Digital Marketing Analytics	07 Hours
Overview of Digital Marketing Analytics- Introduction to digital marketing and its evolution, Importance and benefits of analytics in digital marketing, Current trends and future outlook. Digital Marketing Channels and Metrics - Overview of key digital marketing channels (SEO, SEM, Social Media, Email, Content Marketing), Understanding key metrics (CTR, CPC, CPA, ROI, LTV). Analytics Frameworks and Models- Introduction to analytics frameworks (AIDA, RACE, See-Think-Do-Care), Setting SMART goals for campaigns, Understanding and using attribution models		
Unit II	Web Analytics	07 Hours
Introduction to Web Analytics and its Importance, Overview of major web analytics tools (Google Analytics, Adobe Analytics). Google Analytics Deep Dive- Setting up and configuring Google Analytics, Understanding and using key features (goals, funnels, events, e-commerce tracking). Data Collection and Reporting- Types of data collected (behavioral, demographic, geographic), Creating custom reports and dashboards, Interpreting data for actionable insights		
Unit III	Social Media Analytics	06 Hours
Introduction to Social Media Analytics, and its Importance, Tools for social media analytics (Facebook Insights, Twitter Analytics, LinkedIn Analytics, etc.). Measuring Social Media Performance- Key metrics: engagement, reach, impressions, share of voice, Analyzing audience demographics and behavior. Campaign Analysis and Optimization- Tracking and measuring social media campaigns, Conducting sentiment analysis, Using social listening tools for brand monitoring.		
Unit IV	SEO and SEM Analytics	07 Hours
SEO Analytics- Introduction to SEO and its importance, Tools for SEO analysis (Google Search Console, SEMrush, Ahrefs), Analyzing keyword performance, backlinks, and on-page SEO. SEM and PPC Analytics- Introduction to SEM and PPC, Tools for SEM analysis (Google Ads, Bing Ads), Analyzing ad performance, quality score, and ROI. Optimizing SEO and SEM Campaigns- Best practices for improving SEO performance, Techniques for optimizing PPC campaigns (A/B testing, bid adjustments)		
Unit V	Email Marketing Analytics	06 Hours

Introduction to Email Marketing Analytics and its Importance, Tools for email marketing (Mailchimp, HubSpot, Marketo). Key Metrics and Reporting- Open rates, click-through rates, conversion rates, Bounce rates and list growth rates. Optimizing Email Campaigns- Techniques for segmenting email lists, Personalization and automation strategies, A/B testing for email campaigns

Unit VI

Advanced Analytics and Data Visualization

06 Hours

Customer Journey and Attribution Analysis- Mapping the customer journey, Understanding multi-touch attribution models (linear, time decay, position-based). Predictive Analytics and Machine Learning- Introduction to predictive analytics in marketing, Applying machine learning techniques for customer segmentation and targeting. Data Visualization and Reporting- Importance of data visualization in analytics, Tools for data visualization (Tableau, Power BI, Google Data Studio), Creating compelling reports and dashboards. Hands-on Projects and Case Studies- Real-world projects using actual data, Analyzing successful digital marketing campaigns, Case studies from various industries (e-commerce, B2B, B2C)

Text Books:

1. "Digital Marketing Analytics: Making Sense of Consumer Data in a Digital World" by Chuck Hemann and Ken Burbary - This book provides a comprehensive guide to understanding and utilizing digital marketing data

References Books:

1. "Google Analytics Breakthrough: From Zero to Business Impact" by Feras Alhlou, Shiraz Asif, and Eric Fettman
2. "Lean Analytics: Use Data to Build a Better Startup Faster" by Alistair Croll and Benjamin Yoskovitz
3. "Social Media Analytics: Effective Tools for Building, Interpreting, and Using Metrics" by Marshall Sponder
4. "Web Analytics 2.0: The Art of Online Accountability & Science of Customer Centricity" by Avinash Kaushik

Useful Links: --

1. <https://analytics.google.com/analytics/academy/>
2. <https://www.thinkwithgoogle.com/>
3. <https://academy.hubspot.com/>
4. <https://www.emarketer.com/>
5. <https://martech.org/>

<p align="center">DKTES Textile and Engineering Institute, Ichalkaranji. Final Year B. Tech. (Semester – VII) Artificial Intelligence & Data Science ADL404: Social Network Analysis</p>		
<p>Teaching Scheme: Lectures: 03 Hrs. /Week Tutorials: 00 Hrs./Week Practical: 00 Hrs./Week</p>	<p>Credits 03</p>	<p>Evaluation Scheme: MSE: 30 Marks ISE: 20 Marks SEE: 50 Marks</p>
<p>Course Outcomes: On completion of the course, student will be able to–</p> <ol style="list-style-type: none"> 1. Describe the levels of SNA and network measures 2. Illustrate different community structures and link prediction models. 3. Explain cascade behavior in network. 		
<p align="center">Course Contents</p>		
Unit I	Introduction To Social Network Analysis	06 Hours
<p>Introduction, Applications, preliminaries, three levels of SNA, historical development, graph visualization tools, network measures, network basics, node centrality, assortative, transitive and reciprocity, similarity, degeneracy.</p>		
Unit II	Network Growth Model	06 Hours
<p>Properties of real-world networks, random network model, Ring lattice network model, Watts Strogatz model, preferential attachment models, Price's model, local world network growth model. Link analysis, applications, signed networks, strong and weak ties, link analysis and algorithms, page rank, personalized page rank, Divrank, Simrank, Pathsim.</p>		
Unit III	Community Structure in Network	07 Hours
<p>Applications, types of communities, community detection methods, disjoint community detection, overlapping community detection, local community detection, community detection vs community search, evaluations, link prediction, applications, temporal changes in the network, problem definition, evaluating link prediction network, heuristic models, probabilistic models, supervised random walk, information theoretic model.</p>		
Unit IV	Cascade behavior and network effect	06 Hours
<p>Preliminaries, cascade model, case study, probabilistic cascade, epidemic model, independent cascade model, cascade prediction, outlier vs network-based anomalies, challenges, anomaly detection in static and dynamic network.</p>		
Unit V	Graph representation learning	06 Hours
<p>Machine learning pipelines, intuition behind representation learning, benefits, criteria of GRL, GRL pipeline, representation learning methods.</p>		
Unit VI	Applications and case studies	05 Hours
<p>Malicious activities on OSNs, Sockpuppets in OSNs, Modelling the spread of COVID19, recommendation system</p>		
<p>Text Books:</p> <ol style="list-style-type: none"> 1. Social Network Analysis, Tanmoy Chakraborty, Wiley, 2021. 		
<p>References Books:</p> <ol style="list-style-type: none"> 1. Network Science, Albert-Lazzlo Barabasi 2. Social Network Analysis, Methods and Applications, Stanley Wasserman, Katherine Faus 		

Useful Links: --

1. https://onlinecourses.nptel.ac.in/noc23_cs106/preview

<p align="center">DKTES Textile and Engineering Institute, Ichalkaranji. Final Year B. Tech. (Semester – VII) Artificial Intelligence & Data Science ADL405: TIME SERIES ANALYSIS AND FORECASTING</p>		
<p>Teaching Scheme: Lectures: 03 Hrs. /Week Tutorials: 00 Hrs./Week Practical: 00 Hrs./Week</p>	<p>Credits 03</p>	<p>Evaluation Scheme: MSE: 30 Marks ISE: 20 Marks SEE: 50 Marks</p>
<p>Course Outcomes: On completion of the course, student will be able to–</p> <ol style="list-style-type: none"> 1. Explain the fundamentals of time series analysis and forecasting methods 2. Illustrate the regression analysis and forecasting in time series analysis 3. Explain the exponential smoothing methods and ARIMA models 4. Describe the transfer functions and intervention models 		
<p align="center">Course Contents</p>		
Unit I	INTRODUCTION TO FORECASTING	07 Hours
<p>Introduction To Forecasting: The Nature and Uses of Forecasts, Some Examples of Time Series, The Forecasting Process, Data for Forecasting- The Data Warehouse, Data Cleaning, Imputation. Resources for Forecasting. Statistics Background For Forecasting: Introduction, Graphical Displays, Numerical Description of Time Series Data, Use of Data Transformations and Adjustments, General Approach to Time Series Modelling and Forecasting, Evaluating and Monitoring Forecasting Model Performance, R Commands.</p>		
Unit II	REGRESSION ANALYSIS AND FORECASTING	07 Hours
<p>Introduction, Least Squares Estimation in Linear Regression Models, Statistical Inference in Linear Regression, Prediction of New Observations, Model Adequacy Checking, Variable Selection Methods in Regression, Generalized and Weighted Least Squares, Regression Models for General Time Series Data, Econometric Models, R Commands.</p>		
Unit III	EXPONENTIAL SMOOTHING METHODS	06 Hours
<p>Introduction, First-Order Exponential Smoothing, Modelling Time Series, Second-Order Exponential Smoothing, Higher-Order Exponential, Forecasting, Exponential Smoothing for Seasonal Data, Exponential Smoothing of Bio-surveillance, Exponential Smoothers and Arima Models, R Commands</p>		
Unit IV	AUTOREGRESSIVE INTEGRATED MOVING AVERAGE (ARIMA) MODELS	07 Hours
<p>Introduction, Linear Models for Stationary Time Series, Finite Order Moving Average Processes, Finite Order Autoregressive Processes, Mixed Autoregressive–Moving Average Processes, Nonstationary Processes, Time Series Model Building, Forecasting Arima Processes, Seasonal Processes , Modeling of Bio-surveillance Data , Final Comments, R Commands</p>		
Unit V	TRANSFER FUNCTIONS AND INTERVENTION MODELS	06 Hours
<p>Introduction, Transfer Function , Transfer Function–Noise Models , Cross-Correlation , Model Specification , Forecasting with Transfer Function–Noise Models, Intervention Analysis, R Commands</p>		
Unit VI	SURVEY OF OTHER FORECASTING METHODS	06 Hours
<p>Multivariate Time Series Models and Forecasting, State Space , Arch and Garch , Direct Forecasting of Percentiles , Combining Forecasts to Improve Prediction, Performance , Aggregation and Disaggregation of Forecasts , Neural Networks and Forecasting , Spectral Analysis , Bayesian Methods in , Some Comments on Practical Implementation and Use of Statistical Forecasting , R Commands</p>		
<p>Text Books:</p>		

1. Douglas C. Montgomery, Cheryl L. Jennings, Murat Kulahci, "Introduction To Time Series Analysis And Forecasting", WILEY, Second Edition (2015)

References Books:

1. Jacqueline Kazil & Katharine Jarmul," Data Wrangling with Python", O'Reilly Media, Inc,2016
2. Dr. Tirthajyoti Sarkar, Shubhadeep," Data Wrangling with Python: Creating actionable data from raw sources", Packt Publishing Ltd,2019.
3. Stefanie Molin," Hands-On Data Analysis with Pandas", Packt Publishing Ltd,2019
4. Allan Visochek," Practical Data Wrangling", Packt Publishing Ltd,2017
5. Tye Rattenbury, Joseph M. Hellerstein, Jeffrey Heer, Sean Kandel, Connor Carreras," Principles of Data Wrangling: Practical Techniques for Data Preparation", O'Reilly Media, Inc,2017

Useful Links: --

1. <https://www.springboard.com/blog/data-science/data-wrangling/>
2. [https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0130944147561103361808 shared/overview](https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0130944147561103361808_shared/overview)

DKTES Textile and Engineering Institute, Ichalkaranji.

Final Year B. Tech. (Semester – VII)

Artificial Intelligence & Data Science

ADL408 UI and UX Design

Teaching Scheme: Lectures: 03 Hrs./Week Tutorials: 00 Hrs./Week Practical: 00 Hrs./Week	Credits 03	Evaluation Scheme: ISE: 20 Marks MSE: 30 Marks SEE: 50 Marks
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Course Outcomes:

On completion of the course, the students will be able to:

1. Build UI for user Applications
2. Evaluate UX design of any product or application
3. Demonstrate UX Skills in product development
4. Implement Sketching principles
5. Create Wireframe and Prototype

Course Contents

Unit I	FOUNDATIONS OF DESIGN	07 Hours
UI vs. UX Design - Core Stages of Design Thinking - Divergent and Convergent Thinking - Brainstorming and Game storming - Observational Empathy		
Unit II	FOUNDATIONS OF UI DESIGN	07 Hours
Visual and UI Principles - UI Elements and Patterns - Interaction Behaviors and Principles – Branding - Style Guides		
Unit III	FOUNDATIONS OF UX DESIGN	06 Hours
Introduction to User Experience - Why You Should Care about User Experience - Understanding User Experience - Defining the UX Design Process and its Methodology - Research in User Experience Design - Tools and Method used for Research - User Needs and its Goals - Know about Business Goals		
Unit IV	WIREFRAMING AND PROTOTYPING	07 Hours
Sketching Principles - Sketching Red Routes - Responsive Design – Wireframing - Creating Wireflows - Building a Prototype - Building High-Fidelity Mockups - Designing Efficiently with Tools - Interaction Patterns		
Unit V	USABILITY TESTING	06 Hours
Conducting Usability Tests - Other Evaluative User Research Methods - Synthesizing Test Findings - Prototype Iteration		
Unit VI	RESEARCH, DESIGNING, IDEATING, & INFORMATION ARCHITECTURE	06 Hours
Identifying and Writing Problem Statements - Identifying Appropriate Research Methods - Creating Personas - Solution Ideation - Creating User Stories - Creating Scenarios - Flow Diagrams - Flow Mapping - Information Architecture		

Text Books:

1. Joel Marsh, “UX for Beginners”, O’Reilly , 2022
2. Jon Yablonski, “Laws of UX using Psychology to Design Better Product & Services” O’Reilly 2021

References Books:

1. Jenifer Tidwell, Charles Brewer, Aynne Valencia, “Designing Interface” 3 rd Edition , O’Reilly 2020
2. Steve Schoger, Adam Wathan “Refactoring UI”, 2018
3. Steve Krug, “Don't Make Me Think, Revisited: A Commonsense Approach to Web & Mobile”, Third Edition, 2015

Useful Links: --

1. <https://www.nngroup.com/articles/>
2. <https://www.interaction-design.org/literature>.

DKTES Textile and Engineering Institute, Ichalkaranji.**Final Year B. Tech. (Semester – VII)****Artificial Intelligence & Data Science****ADL407: Augmented Reality And Virtual Reality**

Teaching Scheme: Lectures: 03 Hrs /Week Tutorials: 00 Hrs /Week Practicals: 00 Hrs/Week	Credits 03	Evaluation Scheme: SE-I: 30 Marks SE-II: 20 Marks SEE: 50 Marks
Course Outcomes: On completion of the course, student should be able to– <ol style="list-style-type: none">1. Define and differentiate between Augmented Reality (AR) and Virtual Reality (VR).2. Identify the core components of AR/VR systems, including hardware and software3. Explore human perception and interaction principles relevant to AR/VR design.4. Analyze the different types of AR/VR experiences (marker-based, markerless, spatial) and their applications.5. Evaluate the potential of AR/VR for various industries6. Discuss the ethical considerations surrounding AR/VR development and use.		
Course Contents		
Unit I	Introduction to AR-VR	04 Hours
Overview of Augmented Reality (AR) and Virtual Reality (VR) Historical development and evolution of AR and VR technologies Distinctions between AR and VR Applications and use cases of AR and VR in various industries		
Unit II	Understanding Immersion and AR and VR Environment	05 Hours
Understanding immersion and presence in AR and VR environments Human-computer interaction principles in AR and VR Analyze how humans perceive and interact within AR/VR environments. Factors influencing user experience in AR and VR systems Design considerations for creating immersive AR and VR experiences		
Unit III	Technology Foundations	04 Hours
Hardware components of AR and VR systems (e.g., displays, sensors, input devices) Software frameworks and platforms for AR and VR development Comparison of different AR and VR devices (e.g., headsets, smartphones, smart glasses) Emerging technologies and trends in AR and VR hardware and software(e.g. CAVE)		
Unit IV	Spatial Computing and Tracking	05 Hours
Introduction to spatial computing and spatial mapping Techniques for spatial tracking in AR and VR environments Challenges and solutions in real-time object tracking and scene recognition Applications of spatial computing in AR and VR Indoor navigation and 3D mapping		
Unit V	Content Creation and Development	06 Hours
Overview of content creation tools and workflows for AR and VR Principles of 3D modeling, animation, and simulation Programming languages and frameworks for AR and VR development (e.g., Unity, Unreal Engine)		

Best practices for designing and optimizing content for AR and VR experiences		
Unit VI	Ethical and Social Implications	04 Hours
Ethical considerations in AR and VR design and deployment Impact of AR and VR on society, culture, and human behavior Privacy and security concerns in AR and VR applications Regulatory frameworks and guidelines for responsible AR and VR development and usage		
Text Books:		
1. "Introduction to Augmented Reality" by Dieter Schmalstieg and Tobias Hollerer 2. "Virtual Reality: Concepts and Technologies" by William R. Sherman and Alan B. Craig		
References Books:		
1. "Unity Virtual Reality Projects" by Jonathan Linowes		
2. "Unreal Engine VR Cookbook: Developing Virtual Reality with UE4" by Mitch McCaffrey		
3. "3D Game Development with Unity 5.x" by Sue Blackman		

DKTES Textile and Engineering Institute, Ichalkaranji.

Final Year B. Tech. (Semester – VII)

Artificial Intelligence & Data Science

ADL408: Software Testing and Quality Assurance

Teaching Scheme: Lectures: 03 Hrs. /Week Tutorials: 00 Hrs./Week Practical: 00 Hrs./Week	Credits 03	Evaluation Scheme: MSE: 30 Marks ISE: 20 Marks SEE: 50 Marks
Course Outcomes: On completion of the course, student will be able to– <ol style="list-style-type: none">1. Explain the basic concepts, objectives, and importance of software testing within the software development lifecycle (SDLC).2. Develop comprehensive test plans, manage test cases, and execute testing activities efficiently.3. Design, implement, and execute automated tests using industry-standard tools (Selenium).4. Plan and execute performance tests to assess system performance under various conditions.5. Integrate testing into agile and DevOps environments to ensure continuous quality.6. Implement industry-standard QA processes, metrics, and reporting practices to ensure high-quality software delivery.		
Course Contents		
Unit I	Fundamentals of Software Testing and Quality Assurance	07 Hours
Introduction to Software Testing- Definition, Importance, and Objectives of Testing, Quality Assurance vs. Quality Control vs. Testing. Software Development Life Cycle (SDLC) vs. Software Testing Life Cycle (STLC), Overview of SDLC models (waterfall, agile, V-model), Role of testing in each phase of SDLC, Testing Principles, The Psychology of Testing, Entry and exit criteria, Roles and Responsibilities of a Tester. Types of Testing- Manual Testing vs. Automated Testing (ex: Selenium, QTP, Junit), Static Testing vs. Dynamic Testing, Functional Testing vs. Non-Functional Testing. Testing Levels- Unit Testing, Integration Testing, System Testing, Acceptance Testing, Regression Testing, Smoke and Sanity Testing, Alpha and Beta Testing.		
Unit II	Testing Techniques and Strategies	06 Hours
Introduction to Test scenarios, Test case design. Test Design Techniques - Black Box Testing Techniques: Boundary Value Analysis, Equivalence Partitioning, Decision Table Testing. White Box Testing Techniques: Statement Coverage, Decision Coverage, Condition Coverage. Grey Box Testing. Static Testing Techniques:- Reviews, Walkthroughs, Inspections. Dynamic Testing Techniques: Exploratory Testing, Ad Hoc Testing.		
Unit III	Test Management and Planning	06 Hours
Test Planning- Creating a test plan, Test strategy and approach, Test Estimation- Techniques, Factors affecting test estimation, Entry and Exit Criteria. Test Metrics and Reporting-Types of test metrics, Reporting and tracking defects, Test Management Tools- Test Case Management Tools (e.g., TestRail, QTest, Zephyr, HPQC). Defect Management Tools (e.g., JIRA, Bugzilla). Test Documentation- Test Plan, Test Case, Test Script, Test Log, Defect Report.		
Unit IV	Test Automation Tools and Frameworks	07 Hours
Introduction to Automation Testing- Benefits and Challenges, Types of Automated Testing. Automation Tools Overview- Selenium, QTP/UFT, LoadRunner, JMeter. Creating and Executing Test Scripts- Scripting Basics, Test Script Design, Handling web elements, Running and Analyzing Test Scripts. Introduction to JUnit/TestNG- Writing test cases, Test suites, Annotations in JUnit/TestNG. Introduction to Continuous Integration (CI) Tools- Jenkins/Bamboo, Integrating tests with CI tools.		

Unit V	Performance and Security Testing	07 Hours
<p>Introduction to Performance Testing, Objectives and Importance, Types of Performance Testing: Load, Stress, Volume, and Scalability Testing. Performance Testing Tools- JMeter, LoadRunner, Gatling. Conducting Performance Tests- Test Environment Setup, Test Execution, Result Analysis. Overview of Security Testing- Importance of Security Testing, Common Security Threats and Vulnerabilities. Security Testing Techniques- Penetration Testing, Vulnerability Scanning, Security Audits. Security Testing Tools- OWASP ZAP, Burp Suite, Nessus</p>		
Unit VI	Agile and DevOps Testing	06 Hours
<p>Agile Testing- Agile methodology, Role of testers in Agile, Agile Testing Quadrants, Test-Driven Development (TDD), Behavior-Driven Development (BDD), Writing BDD test cases using Cucumber. DevOps and Continuous Testing- DevOps Principles, CI/CD, Tools for Continuous Testing (e.g., Jenkins, Bamboo), Overview on Mobile Apps Testing. Quality Assurance Best Practices- ISO Standards, CMMI, Test Metrics, Reporting and Dashboard Tools.</p>		

Text Books:

1. "Foundations of Software Testing: ISTQB Certification" by Dorothy Graham, Erik van Veenendaal, Isabel Evans, and Rex Black

References Books:

1. "Software Testing: Principles and Practices" by Srinivasan Desikan and Gopalaswamy Ramesh
2. "The Art of Software Testing" by Glenford J. Myers, Corey Sandler, and Tom Badgett
3. "Agile Testing: A Practical Guide for Testers and Agile Teams" by Lisa Crispin and Janet Gregory
4. "Software Quality Assurance: Principles and Practice" by Nina S. Godbole

Useful Links: --

1. <https://www.guru99.com/software-testing.html>
2. <https://www.udemy.com/courses/development/software-testing/>
3. <https://www.istqb.org/>
4. <https://www.selenium.dev/>
5. <https://www.atlassian.com/software/jira>
6. <https://www.testrail.com/>

DKTES Textile and Engineering Institute, Ichalkaranji.**Final Year B. Tech. (Semester – VII)****Artificial Intelligence & Data Science****ADP409: Deep Learning Lab**

Teaching Scheme: Lectures: 02 Hrs /Week Tutorials: 00Hrs/Week Practicals: 02 Hrs/Week	Credits 03	Evaluation Scheme: CIE: 50 Marks SEE: 50 Marks
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Course Outcomes:

On completion of the course, student should be able to–

1. Explain basic concepts of deep neural network.
2. Construct deep learning networks for given task.
3. Compare different deep learning networks on various evaluation parameters.

Course Contents

Unit I	Introduction to Tensorflow and Keras	07 Hours
Relation between artificial intelligence, machine learning, deep learning, Introduction to neural network, Data representations for neural networks, Tensor Operations, Gradient based optimization, Tensorflow, Keras, Brief history of Tensorflow and Keras, Setting up deep learning workspace, Working with Tensorflow, Understanding core Keras API, Examples: Classification of movie review, Classification of newswires, House price prediction systems.		
Unit II	Developing Models	06 Hours
Different ways to develop Keras model: Sequential model, Functional API, Subclassing, Using built-in training and evaluation loops, developing own training and evaluation loop.		
Unit III	Deep learning for Computer Vision	06 Hours
Introduction to ConvNet, Training convnet from scratch on a small dataset, Leveraging pre-trained model, Three essential computer vision tasks, Image segmentation, Modern convnet architecture patterns, Interpreting what convnets learn.		
Unit IV	Deep learning for time-series data	06 Hours
Different kinds of time series data, A temperature forecasting example, Recurrent neural network, Advanced use of recurrent neural networks		
Unit V	Deep learning for Text	07 Hours
Natural language processing, Pre-paring text data, Two approaches: sets and sequence, Transformer architecture, Sequence to sequence learning		
Unit VI	Best practices for real word	07 Hours
Hyper-parameter optimization, model ensemble, Speed up training on GPU with mixed precision,		

Multi-GPU training, TPU training.

Text Books:

1. The design of Unix Operating System - Maurice J. Bach (PHI)

References Books:

1. Linux System Programming - Robert Love, Publisher - SPD, O' REILLY
2. Unix concepts and administration – 3rd Edition – Sumitabha Das (TMGH).

Important Links

1. <https://github.com/fchollet/deep-learning-with-python-notebooks>

Experiment List

1. Installing and working with Tensorflow and Keras with Anaconda or Miniconda
2. Introduction and working with Google Colab for using GPUs and TPUs for large projects
3. Design and develop a model for predicting house prices.
4. Design and develop shallow neural network for classifying hand written digit recognition.
5. Design and develop deep neural network for classifying hand written digit recognition.
6. Design and develop CNN for classifying images.
7. Develop a CNN model with transfer learning for classifying images.
8. Develop a CNN model to perform image segmentation.
9. Develop a CNN model with residual block.
10. Design and develop Xception-like model.
11. Visualizing convnet filters.
12. Identify sentiment of given text using unigram / bigram with TF-IDF encoding
13. Design and develop RNN model for temperature forecasting
14. Design and develop GRU/LSTM model for sentiment analysis.
15. Hyper-parameters tuning for getting better result
16. Design and develop a deep learning model for handling multiple input and multiple output
17. Handling callbacks of deep neural network.
18. Monitoring and visualization of model with tensorboard
19. Design and develop a transformer based model for text classification.
20. Design and develop a model for transferring source language to destination language.

DKTES Textile and Engineering Institute, Ichalkaranji.

Final Year B. Tech. (Semester – VII)

Artificial Intelligence & Data Science

ADP410: Data Visualization Lab

Teaching Scheme:

Lectures: 00 Hrs /Week

Tutorials: 00 Hrs/Week

Practical: 02 Hrs/Week

Credits 01

Evaluation Scheme:

CIE: 50 Marks

SEE: 50 Marks

Course Outcomes:

On completion of the course, student should be able to–

1. Use Power BI /Tableau's visualization tools to conduct data analysis, especially exploration of an unfamiliar dataset.
2. Analyze data using exploratory visualization.
3. Create compelling, interactive dashboards to combine several visualizations into a cohesive and functional whole.

Course Contents

List of Experiments

Students should perform at least 10 experiments from below list using Power BI or Tableau tool.

1

Customer Churn Analysis

Customer Churn Analysis reveals regional customers' product sales and profits. Analytical users can use it to analyze regional business growth across geographies to gain valuable insights and distribute profits among customers. They can receive extensive data by using the right visualizations and data structure. The project includes regional cash inflows and product-specific customer churn over time. For this beginner-friendly project, use the customer segmentation dataset available on Kaggle. In the analysis overview page, you could use Combo Charts, Cards, Bar Charts, Tables, or Line Charts; for the customer segmentation page, you could employ Column Charts, Bubble Charts, Point Maps, Tables, etc.

2

Global Energy Trade Analysis

It addresses several topics, such as the expansion of wind energy, energy consumption as a different basis for comparing national economies, etc. For this unique project idea, use the international energy statistics dataset from Kaggle. The resulting dashboard could display total energy statistics on production, exchange, and usage of primary and secondary energy, conventional and non-conventional energy sources, and new and renewable energy sources. For the dashboard, you can use Power BI visualization types such as Bar Charts, Flow Maps, Cards for the overview page, Ribbon Charts, Treemaps, Bar Charts for the energy production and exchange pages, etc.

3

Movie Sales Visualization

Use the dataset that shows movie sales over time and turn it into an interactive visual experience. You can use the IMDb dataset for 2006 to 2016, available on both IMDb and Kaggle. The dataset includes a list of movies having an IMDb score of 6 or higher and the parameters Budget, Gross, Genre, and Scores. You can create a custom Radial Bar Chart and use Slicers to pick Genre, Country, and score range to be integrated directly into PowerBI. This would display parameters such as Average Score and Gross Collections for the selected set.

		Plotting a Histogram on the score variable using year and genre as slicers will show the frequency distribution of the IMDb scores. A KDE plot can provide a density graph and insights into the average rating for a specific genre and distribution for a given timeframe.
	4	Customer Behavior Analysis Objective: To understand customer preferences, buying patterns, and loyalty, which can inform targeted marketing strategies and product development.
	5	Supply Chain Management Objective: To monitor and optimize the supply chain process from procurement to delivery.
	6	Human Resources Analytics Objective: To analyze and optimize human resource processes and workforce management.
	7	Healthcare Patient Monitoring Objective: To enhance patient care through better data analysis and resource management.
	8	Environmental Impact Analysis Objective: To track and reduce the environmental impact of business operations.
	9	Global Health Expenditure Analysis Use the current health expenditure dataset from the WHO Global Health Expenditure database. From 2000 to 2018, the dataset includes health expenditure as a percentage of national GDP for over 200 nations. Also, you could use the K-Means clustering algorithm for the clustering analysis. Visualize the cluster labels in Power BI Dashboard to gain insights after you have loaded the dataset in Power BI Desktop and trained your clustering model in Power BI. For the summary page dashboard, you might choose visualization chart types such as Filled Maps, Bar Charts, etc., while for the detailed visualization, you can use Point Maps.
	10	OTT Media Dashboard This unique Power BI project entails visualizing various information related to multiple OTT platforms such as Netflix, Hotstar, Amazon Prime, etc. You can access this project's entire OTT media platform dataset from Github. Use the Query Editor in Power BI for data cleaning and preparation. Once your data is ready for visualization, you can display the visuals using various plots, graphs, cards, etc.
	11	Life Expectancy Data Analysis The Life Expectancy Data Analysis project is about understanding what affects life expectancy. It looks at things like vaccinations, deaths, money, social aspects, and other health-related factors. This helps a country figure out what leads to lower life expectancy. It also helps them decide where to focus efforts to increase how long people live. To do this, you can use the life expectancy dataset from the World Health Organization (WHO) on Kaggle. Power BI offers visuals like Gauge Charts, Pie Charts, Line Charts, and Point Maps to give an overview. For country-specific details, you can use Tornado Charts, Doughnut Charts, and Treemaps. This project teaches you how Power BI can provide valuable insights into life expectancy and health-related issues.
	12	Movie Recommendation System This project aims to develop a movie recommendation system using Power BI that suggests movies to users based on their preferences and viewing history.

DKTES Textile and Engineering Institute, Ichalkaranji.

Final Year B. Tech. (Semester – VII)

Artificial Intelligence & Data Science

ADP411 UI AND UX DESIGN Lab

Teaching Scheme: Lectures: 00 Hrs /Week Tutorials: 00 Hrs/Week Practicals: 02 Hrs/Week	Credits 01	Evaluation Scheme: CIE: 50 Marks SEE: 00 Marks
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Course Outcomes:

On completion of the course, the students will be able to:

1. Build UI for user Applications
2. Evaluate UX design of any product or application
3. Demonstrate UX Skills in product development
4. Implement Sketching principles
5. Create Wireframe and Prototype.

Course Contents

List of Experiments

(It should consist of 10-12 experiments based on the following topics.)

1	Designing a Responsive layout for an societal application
2	Exploring various UI Interaction Patterns
3	Developing an interface with proper UI Style Guides
4	Developing Wireflow diagram for application using open source software
5	Exploring various open source collaborative interface Platform
6	Hands on Design Thinking Process for a new product
7	Brainstorming feature for proposed product
8	Defining the Look and Feel of the new Project
9	Create a Sample Pattern Library for that product (Mood board, Fonts, Colors based on UI principles)
10	Identify a customer problem to solve
11	Conduct end-to-end user research - User research, creating personas, Ideation process (User stories, Scenarios), Flow diagrams, Flow Mapping
12	. Sketch, design with popular tool and build a prototype and perform usability testing and identify improvements

<p align="center">DKTES Textile and Engineering Institute, Ichalkaranji.</p> <p align="center">Final Year B. Tech. (Semester – VII)</p> <p align="center">Artificial Intelligence & Data Science</p> <p align="center">ADP412 : Augmented Reality and Virtual Reality Lab</p>		
<p>Teaching Scheme:</p> <p>Lectures: 00 Hrs /Week</p> <p>Tutorials: 00 Hrs/Week</p> <p>Practicals: 02 Hrs/Week</p>	<p>Credits 01</p>	<p>Evaluation Scheme:</p> <p>CIE: 50 Marks</p> <p>SEE: -- Marks</p>
<p>Course Outcomes: On completion of the course, student should be able to–</p> <ol style="list-style-type: none"> 1. Explain the basic concepts of augmented reality (AR) and virtual reality (VR). 2. Demonstrate the use of AR and VR. 3. Develop the applications using AR and VR. 		
<p align="center">Course Contents</p>		
<p>List of Experiments:</p> <p>(It should consist of 10-12 experiments based on the following topics.)</p>		
1	<p><input type="checkbox"/> Understanding Immersion and AR/VR Environment Implement a simple VR application using Unity or Unreal Engine to demonstrate principles of immersion and user interaction.</p>	
2	<p><input type="checkbox"/> Human-Computer Interaction Principles Write a program in Unity or a similar framework to evaluate and compare the effectiveness of different input devices (e.g., hand gestures, controllers) in a VR environment.</p>	
3	<p><input type="checkbox"/> Spatial Computing and Tracking Develop an AR application using ARCore or ARKit that utilizes spatial tracking for indoor navigation and 3D mapping.</p>	
4	<p><input type="checkbox"/> Ethical Considerations in AR and VR Develop a VR simulation using Unity to explore and present ethical implications of AR/VR technologies in a specific scenario (e.g., medical simulations, virtual classrooms).</p>	
5	<p><input type="checkbox"/> AR Puzzle Game Design an AR puzzle game for smartphones where users solve puzzles overlaid on their surroundings, such as finding hidden objects or solving riddles using AR interactions.</p>	
6	<p><input type="checkbox"/> VR Environment Interaction Create a VR environment in Unity where users can interact with virtual objects by picking them up, throwing them, or triggering actions (e.g., opening doors, turning on lights).</p>	
7	<p><input type="checkbox"/> Marker-based Augmented Reality Application Develop a mobile application using ARCore or ARKit that overlays information about nearby landmarks when the user points the device camera at them.</p>	
8	<p><input type="checkbox"/> Virtual Reality Simulation of Historical Environment Create a VR simulation using Unity or Unreal Engine that allows users to explore a historically accurate environment, such as ancient Rome or medieval Europe.</p>	
9	<p><input type="checkbox"/> Interactive Virtual Museum Tour Build a VR experience in Unity where users can navigate and interact with exhibits in a virtual museum, complete with audio guides and information panels.</p>	
10	<p><input type="checkbox"/> Augmented Reality Educational Tool Develop an AR application for smartphones that enhances classroom learning by overlaying 3D models and explanations on textbook pages or classroom objects</p>	
11	<p><input type="checkbox"/> Virtual Reality Training Simulation Create a VR training simulation using Unreal Engine that simulates a hazardous</p>	

	environment (e.g., firefighting, surgical procedure) and provides interactive training scenarios.
12	<input type="checkbox"/> AR-based Navigation System Design an AR navigation system for indoor environments using ARKit or similar technology, providing turn-by-turn directions overlaid on real-time camera feed.

DKTES Textile and Engineering Institute, Ichalkaranji.

Final Year B. Tech. (Semester – VII)

Artificial Intelligence & Data Science

ADP413: Software Testing and Quality Assurance Lab

Lab Scheme: Practical: 02 Hrs./Week	Credits 01	Evaluation Scheme: CIE: 50 Marks
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Course Outcomes:

On completion of the course, student will be able to–

1. Utilize appropriate test design techniques and strategies to create effective test cases
2. Develop comprehensive test plans, manage test cases, and execute testing activities efficiently.
3. Design, implement, and execute automated tests using industry-standard tools (Selenium).
4. Plan and execute performance tests to assess system performance under various conditions.
5. Identify and mitigate security vulnerabilities through effective security testing practices.
6. Integrate testing into Agile and DevOps environments to ensure continuous quality.

List of Experiments

It should consist of 10-12 experiments based on the following topics

1	Test Case Development: <ul style="list-style-type: none">● Create test cases for a given software application (Ecommerce, Airline, Hotel)● Execute test cases and report defects Tools: Spreadsheet or test management tool (e.g., TestRail, Zephyr, HPQC).
2	Apply Black Box Testing Techniques such as Boundary Value Analysis and Equivalence Partitioning. Tasks: <ul style="list-style-type: none">● Identify test scenarios for a sample application.● Design test cases using Boundary Value Analysis and Equivalence Partitioning.● Execute test cases and analyze results. Tools: Test case management tool.
3	Perform White Box Testing using statement coverage and decision coverage. Tasks: <ul style="list-style-type: none">● Analyze a small code module.● Create and execute test cases to achieve statement and decision coverage.● Generate and interpret code coverage reports. Tools: Code coverage tool (e.g., JaCoCo, Cobertura).
4	Conduct Static Testing through reviews, walkthroughs, and inspections. Tasks: <ul style="list-style-type: none">● Perform a code review or document review.● Conduct a walkthrough session with peers.● Document findings and provide feedback. Tools: Review checklist, code review tool (e.g., GitHub code review).
5	Execute Exploratory testing on a sample application. Tasks: <ul style="list-style-type: none">● Define exploratory testing charters.● Perform exploratory testing sessions.● Document test findings and report defects. Tools: Test management tool.
6	Execute Usability Testing (UI/UX) on a sample application Tasks: <ul style="list-style-type: none">● Conduct usability testing on a software application

	<ul style="list-style-type: none"> ● Identify usability issues and provide feedback Tools: Test management tool.	
7	Defect/Bug/Issue Reporting: Tasks: <ul style="list-style-type: none"> ● Identify and report defects in a given software application ● Use a defect tracking tool like JIRA or Trello 	
8	Create and execute Automated Test scripts using Selenium Tasks: <ul style="list-style-type: none"> ● Set up the Selenium environment. ● Write and execute automated test scripts for web applications. ● Analyze test results and debug failures. Tools: Selenium WebDriver, Eclipse or IntelliJ IDEA.	
9	Conduct Performance Testing using Apache JMeter. Tasks: <ul style="list-style-type: none"> ● Design a performance test plan for a web application. ● Create and configure test scripts in JMeter. ● Execute performance tests and analyze results. Tools: Apache JMeter.	
10	Perform Security Testing using OWASP ZAP. Tasks: <ul style="list-style-type: none"> ● Set up OWASP ZAP. ● Conduct vulnerability scanning on a web application. ● Analyze and report security vulnerabilities. Tools: OWASP ZAP.	
11	Implement Test-Driven Development (TDD) in a development environment. Tasks: <ul style="list-style-type: none"> ● Write unit tests before code implementation. ● Implement code to pass unit tests. ● Refactor code and ensure tests continue to pass. Tools: JUnit, Eclipse or IntelliJ IDEA.	
12	Demonstrate Project Management Tool: JIRA Tasks: <ul style="list-style-type: none"> ● Create a Project as per your expertise ● Create an Epic, Task, Subtask ● Write a Test cases w.r.t Test scenarios ● Write a defect report and link with one of the Task ● Integrate Zephyr with JIRA to ensure Test Traceability Metrics 	

DKTES Textile and Engineering Institute, Ichalkaranji.

Final Year B. Tech. (Semester – VII)

Artificial Intelligence & Data Science

ADD414 Project - I

Teaching Scheme: Lectures: 00 Hrs. /Week Tutorials: 00 Hrs./Week Practical: 04 Hrs./Week	Credits 04	Evaluation Scheme: CIE: 50 Marks SEE: 50 Marks
<p>Course Outcomes:</p> <p>On completion of the course, student will be able to–</p> <ol style="list-style-type: none">1. Explain the need of a software project for the society2. Identify requirement analysis like functional and technical requirements for the project3. Come up with design documents for the project consisting of Architecture, Dataflow diagram, class diagram, Algorithmic descriptions of various modules, collaboration diagram, ER Diagrams, Database Design Documents, Sequence Diagram, Use Case Diagram4. Able to demonstrate analysis and design of project5. Prepare the technical report consisting of Requirement specification, Analysis and Design of Project		
Course Content		
	<p>The project work is to be carried out in two semesters of Final Year Information Technology. The project should be undertaken preferably by group of 4-5 students who will jointly work and implement the project in the two semesters.</p> <p>In Semester VII, the group will select a project with the approval of the Guide (staff member) and submit the name of the project with a synopsis of the proposed work of not more than 02 to 08 pages before second week of August in the academic year. The group is expected to complete detailed system design, analysis, data flow design, procurement of hardware and/or software, implementation of a few modules of the proposed work at the end of semester –VIII as a part of the term work submission in the form of a joint report.</p> <p>The term work assessment will be done jointly by teachers appointed by Head of the Institution. The oral examination will be conducted by an internal and external examiner as appointed by the COE.</p>	
	Note :	
	<ol style="list-style-type: none">1. Project work should be continually evaluated based on the contributions of the group members, originality of the work, innovations brought in, research and developmental efforts, depth and applicability, etc.2. Two mid-term evaluations should be done, which includes presentations and demos of the work done.3. Care should be taken to avoid copying and outsourcing of the project work.	
	<p>The Continuous internal evaluation (CIE) is to be done as follows.</p> <ol style="list-style-type: none">1. Mid-term assessment – 10 marks.2. End term assessment – 10 marks.3. Final performance evaluation to be done by guide – 30 marks. <p>Semester End Exam :</p> <p>The semester end exam will be conducted by examiners appointed by exam coordinator.</p>	

DKTES Textile and Engineering Institute, Ichalkaranji. Final Year B. Tech. (Semester – VIII) Artificial Intelligence & Data Science ADL415 : Natural Language Processing		
Teaching Scheme: Lectures: 03 Hrs./Week Tutorials: 00Hrs./Week Practicals: 00 Hrs./Week	Credits 03	Evaluation Scheme: MSE: 30 Marks ISE: 20 Marks SEE: 50 Marks
Pre-requisite: Deep Learning		
Course Outcomes: On completion of the course, student should be able to– <ol style="list-style-type: none"> 1. Explain the concepts of natural language processing 2. Describe an deep learning architectures of natural language processing task. 3. Compare different deep learning models used for natural language processing task. 		
Course Contents		
Unit I	Vector Semantics and Embeddings	03 Hours
Lexical Semantics, Vector Semantics, Words and Vectors, Cosine for measuring similarity, TF-IDF: Weighing terms in the vector, Pointwise Mutual Information (PMI), Applications of the tf-idf or PPMI vector models, Word2vec, Visualizing Embeddings, Semantic properties of embeddings, Bias and Embeddings, Evaluating Vector Models		
Unit II	Neural Networks and Neural Language Models	03 Hours
Units, The XOR problem, Feedforward Neural Networks, Feedforward networks for NLP: Classification, Training Neural Nets, Feedforward Neural Language Modeling, Training the neural language model		
Unit III	Sequence Labeling for Parts of Speech and Named Entities	06 Hours
English Word Classes, Part-of-Speech Tagging, Named Entities and Named Entity Tagging, HMM Part-of-Speech Tagging, Conditional Random Fields (CRFs), Evaluation of Named Entity Recognition		
Unit IV	RNNs and LSTMs	06 Hours
Recurrent Neural Networks, RNNs as Language Models, RNNs for other NLP tasks, Stacked and Bidirectional RNN architectures, The LSTM, The Encoder-Decoder Model with RNNs, Attention		
Unit V	Transformers and Large Language Models	04 Hours
The Transformer: A Self-Attention Network, Multihead Attention, Transformer Blocks, The Residual Stream view of the Transformer Block, The input: embeddings for token and position, The Language Modeling Head, Large Language Models with Transformers, Large Language Models: Generation by Sampling, Large Language Models: Training Transformers, Potential Harms from Language Models		
Unit VI	Fine-Tuning and Masked Language Models	02 Hours
Bidirectional Transformer Encoders, Training Bidirectional Encoders		

, Contextual Embeddings, Fine-Tuning Language Models, Advanced: Span-based Masking

Text Books:

1. Dan Jurafsky and James H. Martin, "Speech and Language Processing", 2024

Web Links

1. <https://web.stanford.edu/~jurafsky/slp3/>

DKTES Textile and Engineering Institute, Ichalkaranji. Final Year B. Tech. (Semester – VIII) Artificial Intelligence & Data Science ADL416: Software Project Management		
Teaching Scheme: Lectures: 03 Hrs /Week Tutorials: 00Hrs/Week Practical: 00 Hrs/Week	Credits 03	Evaluation Scheme: MSE: 30 Marks ISE: 20 Marks SEE: 50 Marks
Pre-requisite: Software Engineering		
Course Outcomes : On completion of the course, students will be able to <ol style="list-style-type: none"> 1. Describe project management methodology and documents used in project management at each stage of the project life cycle. 2. Develop the scope of work, Work Breakdown structure, a Gantt chart, and milestones etc. of the project management. 3. Appreciate the elements of quality, human resources, and risk in project management. 4. Acquaint themselves with project cost and cost management concepts. 		
Course Contents		
Unit I	Introduction to S/W Project Management	07 Hours
Project and Project Management (PM), Role of Project Manager, System view of PM, Organization, Stakeholders, Project phases and lifecycle, Context of IT projects, process groups, mapping groups to Knowledge area.		
Unit II	Project Integration Management	06 Hours
Strategic planning and project selection, Developing a Project Management Plan, Directing and Managing Project Work, Monitoring and Controlling Project Work, Performing Integrated Change Control, and Closing Projects or Phases.		
Unit III	Project Scope, Time and Cost Management	06 Hours
Planning Scope Management, Collecting Requirements, Defining Scope, Creating the Work Breakdown Structure, Validating Scope, Controlling Scope, Planning Schedule Management, Defining Activities, Sequencing and Estimating Activity, Resources & Duration, Developing & Controlling Schedule Basic Principles of Cost Management, Planning Cost Management, Estimating Costs, Determining the Budget, Controlling Costs.		
Unit IV	Quality Management	06 Hours
Importance, Planning Quality Management, Performing Quality Assurance, Controlling Quality, Tools and Techniques for Quality Control,		
Unit V	Human Resource Management	06 Hours
Human Resource Management: Importance, keys to managing people, human resource planning, acquiring, developing, and managing the project team.		

Unit VI	Risk management	08 Hours
Importance, risk management planning, sources of risk, risk identification, qualitative and quantitative risk analysis, risk response planning, risk monitoring and control.		
Text Books:		
1. Information Technology Project Management, Kathy Schwalbe, Cengage Learning 7E		
References Books:		
1. Project Management Core Textbook – Mantel Jr., Meredith, Shafer, Sutton with Gopalan (Wiley India Edition)		
Useful links: 1) https://intropm2.com/ 2) https://www.projectmanager.com/guides/project-management		

DKTES Textile and Engineering Institute, Ichalkaranji. Final Year B. Tech. (Semester – VIII) Artificial Intelligence & Data Science ADL417 Cyber Security		
Teaching Scheme: Lectures: 03 Hrs. /Week Tutorials: 00 Hrs./Week Practical: 00 Hrs./Week	Credits 03	Evaluation Scheme: ISE: 20 Marks MSE: 30 Marks SEE: 50 Marks
Course Outcomes: On completion of the course, student will be able to– <ol style="list-style-type: none"> 1. Explain the cyber security concepts. 2. Describe the cyber security vulnerabilities and prevention techniques. 3. Explain the different rules and regulations under I.T. ACT. 4. Explain the concepts of digital forensics & incident management 		
Course Contents		
Unit I	COMPUTER and NETWORK SECURITY	07 Hours
Introduction to Computer Security - Introduction, How Seriously Should You Take Threats to Network Security? Identifying Types of Threats, Basic Security Terminology, Concepts and Approaches, Online Security Resources. Networks and the Internet : Introduction, Network Basics, How the Internet Works, Basic Network Utilities , Advanced Network Communications Topics.		
Unit II	CYBER FAUDS, DoS, VIRUSES	06 Hours
Cyber Stalking, Fraud, and Abuse: Introduction, How Internet Fraud Works, Identity Theft, Cyber Stalking, Protecting Yourself Against Cyber Crime. Denial of Service Attacks: Introduction, DoS, Illustrating an Attack, Malware: Introduction, Viruses, Trojan Horses, The Buffer-Overflow Attack. The Sasser Virus/Buffer Overflow, Spyware, Other Forms of Malware, Detecting and Eliminating Viruses and Spyware		
Unit III	TECHNIQUES USED BY HACKERS	05 Hours
Introduction, Basic Terminology, The Reconnaissance Phase, Actual Attacks, Malware Creation, Penetration Testing		
Unit IV	COMPUTER SECURITY TECHNOLOGY	07 Hours
Introduction, Virus Scanners, Firewalls, Antispyware, IDS, Digital Certificates, SSL/TLS, Virtual Private Networks, Wi-Fi Security		
Unit V	I.T. ACT	06 Hours
Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, I.T. Act		
Unit VI	INTRODUCTION TO FORENSICS	05 Hours
Introduction, General Guidelines, Finding Evidence on the PC, Finding Evidence in System Logs, Getting Back Deleted Files, Operating System Utilities, Operating System Utilities. Mobile Forensics: Cell Phone Concepts.		
Text Books:		

1. Computer Security Fundamentals - Chuck Easttom , Pearson ,third edition.

References Books:

1. Jason Luttgens, Matthew Pepe, Kevin Mandia, Incident Response & Computer Forensics, McGraw Hill Osborne Media, 3 rd edition , 2014.
2. Keith J. Jones, Richard Bejtlich, Curtis W. Rose, Real Digital Forensics: Computer Security and Incident Response, Paperback – Import, 2005.
3. John Sammons, The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics Paperback, February 24, 2012.
4. Hacking Exposed: Network Security Secrets & Solutions, Stuart McClure, Joel Scambray and George Kurtz, McGraw-Hill, 2005.
5. Network intrusion alert: an ethical hacking guide to intrusion detection, Ankit Fadia, Manu Zacharia, Thomson Course Technology PTR, 2007.
6. Ethical Hacking, Thomas Mathew, OSB Publisher, 2003.
7. Hacking Exposed: Network Security Secrets & Solutions, Stuart McClure, Joel Scambray and George Kurtz, McGraw-Hill, 2005.
8. Dave Shackleford, Virtualization Security: Protecting Virtualized Environments, John Wiley & Sons, 2012.
9. BRAGG, Network Security: The Complete Reference, McGraw Hill Professional, 2012

Useful Links: --

1. https://onlinecourses.swayam2.ac.in/nou19_cs08/preview
2. https://onlinecourses.nptel.ac.in/noc23_cs44/preview
3. https://onlinecourses.nptel.ac.in/noc23_cs127/preview
4. https://onlinecourses.swayam2.ac.in/cec20_cs15/preview

DKTES Textile and Engineering Institute, Ichalkaranji. Final Year B. Tech. (Semester – VIII) Artificial Intelligence & Data Science ADL418 Software Design Pattern		
Teaching Scheme: Lectures: 03 Hrs. /Week Tutorials: 00 Hrs./ Week Practical: 00 Hrs./Week	Credits 03	Evaluation Scheme: MSE: 30 Marks ISE: 20 Marks SEE: 50 Marks
Course Outcomes: On completion of the course, student will be able to– <ol style="list-style-type: none"> 1. Explain the fundamental concepts and significance of software design patterns. 2. Classify various design patterns and describe their applicability and usage. 3. Apply appropriate design patterns to solve specific software design problems. 4. Create software designs incorporating suitable design patterns. 		
Course Contents		
Unit I	INTRODUCTION TO DESIGN PATTERNS	05 Hours
What is a Pattern & Design Pattern, Advantages of Adopting Design Patterns, Challenges and Solutions in Applying Design Patterns, Overview of the GOF (Gang of Four) patterns, Describing Design Patterns, Pattern Categories & Relationships between Patterns, Organizing the Catalogue.		
Unit II	CREATIONAL PATTERNS	07 Hours
Introduction to creational patterns, Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.		
Unit III	STRUCTURAL PATTERNS	07 Hours
Introduction to Structural Patterns, Adapter, Bridge, Composite, Decorator, Façade, Flyweight, Proxy, Discussion of Structural Patterns.		
Unit IV	BEHAVIORAL PATTERNS	08 Hours
Introduction to Behavioral Patterns, Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template Method, Visitor, Discussion of Behavioral Patterns.		
Unit V	APPLYING DESIGN PATTERNS	05 Hours
Refactoring with design patterns, Anti-patterns and how to avoid them, Combining design patterns, Best practices for selecting and implementing design patterns		
Unit VI	A CASE STUDY: DESIGNING A DOCUMENT EDITOR	04 Hours
Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations, Spelling Checking and Hyphenation		
Text Books: <ol style="list-style-type: none"> 1. "Design Patterns: Elements of Reusable Object-Oriented Software" by Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides (The "Gang of Four") 2. "Head First Design Patterns" by Eric Freeman, Elisabeth Freeman, Kathy Sierra, and Bert Bates 		
References Books:		

1. "Pattern-Oriented Software Architecture Volume 1: A System of Patterns" by Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, and Michael Stal
2. "Refactoring: Improving the Design of Existing Code" by Martin Fowler
3. "Refactoring to Patterns" by Joshua Kerievsky
4. "Design Patterns Explained: A New Perspective on Object-Oriented Design" by Alan Shalloway and James R. Trott
5. "Agile Software Development, Principles, Patterns, and Practices" by Robert C. Martin
6. "AntiPatterns: Refactoring Software, Architectures, and Projects in Crisis" by William J. Brown, Raphael C. Malveau, Hays W. "Skip" McCormick III, and Thomas J. Mowbray
7. "Pattern Hatching: Design Patterns Applied" by John Vlissides

Useful Links: --

1. <https://www.geeksforgeeks.org/software-design-patterns/>
2. https://sourcemaking.com/design_patterns

DKTES Textile and Engineering Institute, Ichalkaranji.**Final Year B. Tech. (Semester – VIII)****Artificial Intelligence & Data Science****ADL419 Block Chain Technology**

Teaching Scheme: Lectures: 03 Hrs. /Week Tutorials: 00 Hrs./Week Practical: 00 Hrs./Week	Credits 03	Evaluation Scheme: MSE: 30 Marks ISE: 20 Marks SEE: 50 Marks
Course Outcomes: On completion of the course, student will be able to– <ol style="list-style-type: none">1. Describe the basic concepts and technology used for blockchain.2. Describe cryptography related to blockchain.3. Illustrate the concepts of Bitcoin and their usage.4. Implement Ethereum block chain contract.5. Apply security features in blockchain technologies.6. Use smart contract in real world applications.		
Course Contents		
Unit I	Fundamentals of Blockchain	07 Hours
Introduction, Origin of Blockchain, Blockchain Solution, Components of Blockchain, Block in a Blockchain, The Technology and the Future, Decentralization and Distribution, Types of Blockchain, Consensus Protocol		
Unit II	Cryptocurrency – Bitcoin, Altcoin and Token	05 Hours
Bitcoin and the Cryptocurrency, Cryptocurrency Basics, Types of Cryptocurrency Cryptocurrency Usage		
Unit III	Blockchain System- Private and Public	08 Hours
Key Characteristics of Private Blockchain, Why We Need Private Blockchain, Private Blockchain Examples, Private Blockchain and Open Source, E-commerce Site Example, Smart Contract in Private Environment, State Machine, Different Algorithms of Permissioned Blockchain, Byzantine Fault, Multichain, Public Blockchain, Popular Public Blockchains, The Bitcoin Blockchain, Ethereum Blockchain		
Unit IV	Initial Coin Offering	05 Hours
Blockchain Fundraising Methods, Launching an ICO, Investing in an ICO, Pros and Cons of Initial Coin Offering, Successful Initial Coin Offerings, Evolution of ICO, ICO Platforms		
Unit V	Security in Blockchain	07 Hours
Security Aspects in Bitcoin, Security and Privacy Challenges of Blockchain in General, Performance and Scalability, Identity Management and Authentication, Regulatory Compliance and Assurance, Safeguarding Blockchain Smart Contract (DApp), Security Aspects in Hyperledger Fabric		
Unit VI	Application of Blockchain	06 Hours
Blockchain in Banking and Finance, Blockchain in Education, Blockchain in Energy, Blockchain in Healthcare, Blockchain in Real-estate, Blockchain in Supply Chain, The Blockchain and IoT		

Text Books:

Blockchain Technology by Chandramouli Subramanian, Asha A George, Abhilash K A and Meena Karthikeyan University Press Pvt Ltd publication

References Books:

1. Blockchain for Beginners by blockchain council
2. Mark Gates, “Block chain: Ultimate guide to understanding block chain, bit coin, crypto currencies, smart contracts and the future of money”, Wise Fox Publishing and Mark Gates 2017.
3. Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O'Dowd, Venkatraman Ramakrishna, “Hands-On Block chain with Hyper ledger: Building decentralized applications with Hyperledger Fabric and Composer”, 2018.
4. Bahga, Vijay Madisetti, “Block chain Applications: A Hands-On Approach”, Arshdeep Bahga, Vijay Madisetti publishers 2017.

Useful Links: --

1. NPTEL & MOOC courses titled blockchain technology
2. blockgeeks.comguide/what-is-block-chain-technology <https://nptel.ac.in/courses/106105184/>

DKTES Textile and Engineering Institute, Ichalkaranji.

Final Year B. Tech. (Semester – VIII)

Artificial Intelligence & Data Science

ADL420 Web Mining

Teaching Scheme: Lectures: 03 Hrs. /Week Tutorials: 00 Hrs./Week Practical: 00 Hrs./Week	Credits 03	Evaluation Scheme: MSE: 30 Marks ISE: 20 Marks SEE: 50 Marks
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Course Outcomes:

On completion of the course, student will be able to–

1. Describe the basic concepts and applications of web mining.
2. Differentiate between web content mining, web structure mining, and web usage mining.
3. Apply appropriate web mining techniques to extract information from web data.
4. Analyze web mining algorithms and their applicability in different scenarios.
5. Evaluate the performance of various web mining methods.

Course Contents

Unit I	INTRODUCTION TO WEB MINING	06 Hours
Overview of web mining, Importance and applications of web mining, Challenges in web mining, Types of web data: web content, web structure, and web usage data, Web mining tasks and processes		
Unit II	WEB CONTENT MINING	06 Hours
Introduction to web content mining, Information retrieval and extraction techniques, Text mining and natural language processing (NLP), Sentiment analysis and opinion mining, Tools and algorithms for web content mining.		
Unit III	WEB STRUCTURE MINING	06 Hours
Introduction to web structure mining, Link analysis: PageRank; HITS, Web graph representation and algorithms, Community detection in web graphs, Applications of web structure mining.		
Unit IV	WEB USAGE MINING	05 Hours
Introduction to web usage mining, Data preprocessing: cleaning; integration; and transformation, Web log analysis, User behavior modeling and pattern discovery, Applications of web usage mining: personalization, recommendation systems.		
Unit V	ADVANCED WEB MINING TECHNIQUES	06 Hours
Clustering and classification techniques in web mining, Association rule mining and frequent pattern analysis, Semantic web mining, Web mining and social networks, Emerging trends and future directions in web mining.		
Unit VI	TOOLS AND CASE STUDIES IN WEB MINING	05 Hours
Overview of web mining tools and frameworks, Practical implementation of web mining techniques, Case studies: web mining in e-commerce; social media; and search engines, Ethical considerations in web mining, Project and research opportunities in web mining.		

Text Books:

1. “Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data” by Bing Liu

2. “Mining the Web: Discovering Knowledge from Hypertext Data” by Soumen Chakrabarti

References Books:

1. “Data Mining: Concepts and Techniques” by Jiawei Han, Micheline Kamber, and Jian Pei
2. “Introduction to Information Retrieval” by Christopher D. Manning, Prabhakar Raghavan, and Hinrich Schütze
3. “Web Mining: Applications and Techniques” by Anthony Scime
4. “Web Mining: Information and Pattern Discovery on the World Wide Web” by Janusz S. Kowalik, Horst Bunke, and Marian Bubak

DKTES Textile and Engineering Institute, Ichalkaranji.**Final Year B. Tech. (Semester – VIII)****Artificial Intelligence & Data Science****ADL421 Big Data Analytics**

Teaching Scheme: Lectures: 03 Hrs. /Week Tutorials: 00 Hrs./Week Practical: 00 Hrs./Week	Credits 03	Evaluation Scheme: MSE: 30 Marks ISE: 20 Marks SEE: 50 Marks
Course Outcomes: On completion of the course, student will be able to– <ol style="list-style-type: none">1. Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.2. Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NO SQL in big data analytics. Interpret business models and scientific computing paradigms and apply software tools for big data analytics.3. Evaluate and apply appropriate principles, techniques and theories to large-scale data science problems using various databases with analytics and visualizations.		
Course Contents		
Unit I	INTRODUCTION TO BIG DATA ANALYTICS	07 Hours
Big Data Characteristics, Types of BigData, Traditional Versus Big Data Approach, Technologies Availablefor Big Data, Infrastructure for Big Data, Use of Data Analytics, Big Data Challenges. Data Collection, Sampling and Preprocessing Types of Data Sources Sampling, Types of Data Elements ,Visual Data Exploration and Exploratory Statistical Analysis, Missing Values, Outlier Detection and Treatment, Standardizing Data, Categorization, Weights of Evidence Coding, Variable Selection, Segmentation		
Unit II	WORKING WITH DIFFERENT ANALYTICALS	07 Hours
a. Predictive Analytics: Target Definition, Linear Regression, Logistic Regression, Decision Trees, Neural Networks, Support Vector Machines, Ensemble Methods, Multiclass Classification Techniques, Evaluating Predictive Models b. Descriptive Analytics: Association Rules, Sequence Rules, Segmentation Survival Analysis: Survival Analysis Measurements, Kaplan Meier Analysis, Parametric c. Survival Analysis, Proportional Hazards Regression, Extensions of Survival Analysis Models, Evaluating Survival Analysis Models		
Unit III	INTRODUCTION TO HADOOP	06 Hours
Big Data – Apache Hadoop & Hadoop EcoSystem, Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce -, Data Serialization		
Unit IV	HDFS, HIVE AND HIVEQL, HBASE	07 Hours
HDFS-Overview, Installation and Shell, Java API; Hive Architecture and Installation, Comparison with Traditional Database, HiveQL Querying Data, Sorting And Aggregating, Map Reduce Scripts, Joins & Sub queries, HBase concepts, Advanced Usage, Schema Design, Advance Indexing, PIG, Zookeeper , how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper		

Unit V	DATA ANALYSIS with Spark, Apache Spark, MongoDB	06 Hours
a. Installing Spark and Getting Started, Programming with RDD, Spark SQL, Spark Streaming. b. Introduction to MongoDB key features, Core Server tools, MongoDB through the JavaScript's Shell, Creating and Querying through Indexes, Document-Oriented, principles of schema design, Constructing queries on Databases, collections and Documents , MongoDB Query Language		
Unit VI	GRAPH ANYALYSIS AND DATA VISUALIZATION	06 Hours
Property Graph, Graph Operator, SubGraph, Triplet, Neo4j: Modeling data with Neo4j, Cypher Query Language: General clauses, Read and Write clauses. Big Data Visualization with D3.js, Kibana and Grafana, Apache Spark GraphX		
Text Books:		
1. Bart Baesens , Analytics in a Big Data World: The Essential Guide to DataScience and its Applications, ,Wiley, 2014		
References Books:		
1. Xyz Dirk Deroos et al., Hadoop for Dummies, Dreamtech Press, 2014. 2. Chuck Lam, Hadoop in Action, December, 2010. 3. Leskovec, Rajaraman, Ullman, Mining of Massive Datasets, CambridgeUniversity Press. 4. I.H. Witten and E. Frank, Data Mining: Practical Machine learning tools andtechniques.		
Useful Links: --		
1. https://cognitiveclass.ai/ 2. https://codelabs.developers.google.com/		

DKTES Textile and Engineering Institute, Ichalkaranji. Final Year B. Tech. (Semester – VIII) Artificial Intelligence & Data Science ADL422 Text mining		
Teaching Scheme: Lectures: 03 Hrs./Week Tutorials: 00 Hrs./Week Practical: 00 Hrs./Week	Credits 03	Evaluation Scheme: MSE: 30 Marks ISE: 20 Marks SEE: 50 Marks
Course Outcomes: On completion of the course, student will be able to– <ol style="list-style-type: none"> 1. Understand how text is handled in Python 2. Apply basic natural language processing methods 3. Write code that groups documents by topic 4. Describe the NLTK framework for manipulating text 		
Course Contents		
Unit I	INTRODUCTION	07 Hours
Origin of Text Mining - Understanding Text – Applications – Information Visualization Architecture for Text Mining .Applications. Handling Text in Python, Regular Expressions Demonstration: Regex with Pandas and Named Groups, Internationalization and Issues with Non-ASCII Characters.		
Unit II	Basic Natural Language Processing	06 Hours
Basic Natural Language Processing, Basic NLP tasks with NLTK, Advanced NLP tasks with NLTK		
Unit III	Classification of Text	06 Hours
Text 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		
Unit IV	Classification of Text	06 Hours
Text Classification, Identifying Features from Text, Naive Bayes Classifiers, Naive Bayes Variations, Support Vector Machines, Learning Text Classifiers in Python, Demonstration: Case Study - Sentiment Analysis		
Unit V	Text Summarization and Information Extraction	06 Hours
Important Concepts: Documents ,Text Normalization,Feature Extraction ,Feature Matrix , Singular Value Decomposition, Text Normalization, Feature Extraction ,Keyphrase Extraction ,Collocations Weighted Tag–Based Phrase Extraction,Topic Modeling : Latent Semantic Indexing, Latent Dirichlet Allocation, Non-negative Matrix Factorization ,Extracting Topics from Product Reviews ,Automated Document Summarization Latent Semantic Analysis Summarizing a Product Description		
Unit VI	Text Similarity and Clustering	07Hours
Important Concepts: Information Retrieval (IR),Feature Engineering Similarity Measures,Unsupervised Machine Learning Algorithms , Text Normalization, Feature Extraction, Text Similarity:Analyzing Term Similarity,Hamming Distance ,Manhattan Distance, Euclidean Distance ,Levenshtein Edit Distance, Cosine Distance and Similarity,Analyzing Document Similarity:Cosine Similarity Hellinger-Bhattacharya Distance, Okapi BM25 Ranking, Document Clustering: Clustering Greatest Movies of All TimeK-means Clustering Affinity Propagation ,Ward’s Agglomerative Hierarchical Clustering		

Text Books:

1. Manu Konchady “Text Mining Application Programming”, Cengage Learning, Fourth Indian Reprint, 2009
2. The Text mining Handbook : Advanced approaches in analyzing unstructured data by Ronen Feldman & James Sanger

References Books:

1. Thomas W. Miller, Prentice Hall, “Data and Text Mining-A Business Applications Approach”, Second impression, 2011
2. Text Analytics with Python A Practical Real-World Approach to Gaining Actionable Insights from Your Data — Dipanjan Sarkar

Important Links: Text Mining and Analytics offered by Illinois, Coursera

LIST OF EXPERIMENTS:

(It should consist of 10-12 experiments based on the following topics.)

- 1 Write a Python program to demonstrate Pattern matching in Python with Regex.
- 2 Write a Python program to demonstrate use of regular expression methods match(), search(), findall().
- 3 Write a Python program to Validate phone numbers, email address and social security number.
- 4 Write a Python program to parse HTML document and find all hyperlinks.
- 5 Write a Python program to discover abstract "topics" that occur in a collection of documents.
- 6 Write a Python program to classify document in specified category.
- 7 Write a Python program to determine Similarity between Documents.
- 8 Write a Python program to predict if a message is spam or not.
- 9 Write a Python program to demonstrate Basic NLP Tasks with NLTK
- 10 Write a Python program to cluster documents using clustering algorithms.
- 11 Write a Python program to identify Named Entities (NE) from document corpus.
- 12 Write a Python for spelling recommender function that uses nltk to find words similar to the misspelling.
- 13 Write a Python program to generate word embedding for documents corpus using Word2vec algorithm.
- 14 Write a Python program to identify sentiment of given text.

DKTES Textile and Engineering Institute, Ichalkaranji. Final Year B. Tech. (Semester – VIII) Artificial Intelligence & Data Science ADP423: Full Stack Development		
Teaching Scheme: Lectures: 02 Hrs./Week Tutorials: 00Hrs./Week Practicals: 02 Hrs./Week	Credits 03	Evaluation Scheme: CIE: 50 Marks SEE: 50 Marks
Pre-requisite: Computer Network, Web Technologies		
Course Outcomes: On completion of the course, student should be able to– <ol style="list-style-type: none"> 1. Explain the concepts of full stack web development. 2. Devise an architecture for solving the given problem. 3. Develop a web application using Angular and other back end technologies. 		
Course Contents		
Unit I	Introduction to Typescript	03 Hours
Overview, Environment Setup, Basic syntax, Type, Variables, Operators, Decision Making, Function, Loops, Function, Numbers, String, Array, Tuples, Union, Interfaces, Classes, Objects, Namespaces, Modules, Ambients.		
Unit II	Fundamentals of Angular	03 Hours
App, Routing, Managing Data, Form, Deployment, Environment Setup, Architectural Overview, Introduction to modules, Introduction to components, Introduction to services and DI		
Unit III	Working with Angular- Part-I	06 Hours
Displaying data, Template syntax, User Inputs, Lifecycle hooks, Component interaction, component style, Angular element, Dynamic components, Attribute Directives and structural directives, Pipes.		
Unit IV	Working with Angular- Part-II	06 Hours
Introduction, Reactive forms, Template Driven Forms, Form Validation, Dynamic Forms, Bootstrapping, NgModules introduction, JSModules vs NgModules, Frequently used NgModules, Types of feature modules, Entry component, Feature Modules, Providers, Singaltone Services, Sharing NgModule, NgModule API, HTTP Client, Routing and navigation.		
Unit V	NodeJS and ExpressJs	04 Hours
NodeJs architecture ,Modules: Built-in and custom, Event loop, Asynchronous application , Testing node application, Introduction to ExpressJs, Routing, Template engines, Middleware, Web Application components, Error handling, Testing application Express application		
Unit VI	Mongodb	02 Hours
Relational vs NoSQL DB, MongoDB fundamentals, Data modeling , Aggregation pipeline, Grid FS,		

Performance optimization

Text Books:

1. MEAN Web Development by Amos Haviv, Packt publishing
2. Full Stack JavaScript Development with MEAN By Colin J. Ihrig, Sitepoint publishing
3. Getting MEAN with Mongo, Express, Angular, and Node by Simon Holmes, Manning Publishing

Web Links

1. <https://www.tutorialspoint.com/typescript/>
2. <https://www.w3schools.com/angular/default.asp>
3. <https://angular.io/>
4. <https://www.w3schools.com/nodejs/default.asp>
5. <https://expressjs.com/>
6. <https://www.mongodb.com/>

DKTES Textile and Engineering Institute, Ichalkaranji.

Final Year B. Tech. (Semester – VIII)

Artificial Intelligence & Data Science

ADP424 DevOps Lab

Teaching Scheme: Lectures: 00 Hrs. /Week Tutorials: 00 Hrs./Week Practical: 02 Hrs./Week	Credits 01	Evaluation Scheme: CIE: 50 Marks SEE: 50 Marks
<p>Course Outcomes: On completion of the course, student will be able to–</p> <ol style="list-style-type: none">1. Explain different DevOps Tools.2. Build CI/CD pipeline for a web application.3. Develop an application and deploy on Docker hub.4. Build a web application and integrating DevOps tools.		
<p>List of Experiments (It should consist of 10-12 experiments based on the following topics.)</p>		
1	<p>Based on what you have learnt in the class, do the following steps:</p> <ol style="list-style-type: none">1. Based on what you have learnt in the class, do the following steps:2. Put the following files in the folder<ul style="list-style-type: none">● Code.txt● Log.txt● Output.txt3. Stage the Code.txt and Output.txt files4. Commit them5. And finally push them to GitHub	
2	<p>Consider the Scenario</p> <ul style="list-style-type: none">● Feature1 branch to be a public branch<ul style="list-style-type: none">● Feature2 branch to be a private branch. The company relies on a monolithic architecture and for now all the code resides in one file. The respective features have been added in the feature branches for file. Meanwhile, a security patch was made to the master branch, and now feature1 and feature2 branches are behind from master by 1 commit. Tasks To Be Performed: 1. Update Feature1 and Feature2 branch with the Security Patch. 2. Apply changes of Feature1 and Feature2 branches on master. 3. Finally push all the branches to GitHub. For solving this, please fork the repository to your GitHub account and then work. As a solution, please submit your GitHub's repository link.	
3	<p>Create the following scenario. Working Ubuntu Linux account with Git, JDK 11, Jenkins and maven installed. Working user on GitHub. Jenkins service to be up and running. Clone from the GitHub account. Push the Project in GitHub Account. Create the Jenkins Freestyle Job. Update the Git Repo Link. Build the Job & Run.</p>	
4	<p>Installation of Docker & implementation of Docker commands. Create a Docker image of your Application and Deploy into Docker Hub</p>	
5	<p>Perform Containerization of using Docker and study of Docker Orchestration tools- Kubernetes, Docker Swarm etc</p>	

	Perform Containerization of using Docker and study of Docker Orchestration tools- Kubernetes, Docker Swarm etc
6	Implement the following Task for implementation of Kubernetes. 1. Deploy a Kubernetes cluster for 3 nodes 2. Create a NGINX deployment of 3 replicas 3. Use the previous deployment. 4. Create a service of type Node Port for NGINX deployment. 5. Check the NodePort service on a browser to verify.
7	Implement the following Task for implementation of Kubernetes. 1. Use the previous deployment 2. Change the replicas to 5 for the deployment 3. Change the service type to Cluster IP 4. Deploy an NGINX deployment of 3 replicas 5. Create a NGINX service of type Cluster IP
8	Create a Web based Application as a Calculator with Kubernetes and deployment
9	Install Terraform & Perform basic Terraform Operations
10	Deploy End-to –End Architecture of Terraform on AWS
11	Study & Implementation of AWS- DevOps tools- AWS Code Pipeline, AWS Code Build, AWS Code Deploy, AWS Code Star and Aws Lambda.
12	Capstone Course Project with AWS & DevOps

Text Books:

1. "DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations" by Gene Kim, Jez Humble, Patrick Debois, and John Willis

References Books:

1. "The Phoenix Project: A Novel About IT, DevOps, and Helping Your Business Win" by Gene Kim, Kevin Behr, and George Spafford
2. "Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation" by Jez Humble and David Farley

DKTES Textile and Engineering Institute, Ichalkaranji.

Final Year B. Tech. (Semester – VIII)

Artificial Intelligence & Data Science

ADP425 Web Mining Lab

Teaching Scheme: Lectures: 00 Hrs. /Week Tutorials: 00 Hrs./Week Practical: 02 Hrs./Week	Credit 01	Evaluation Scheme: CIE: 50 Marks SEE: 00 Marks
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Course Outcomes:

On completion of the course, student will be able to–

1. Describe the basic concepts and applications of web mining.
2. Differentiate between web content mining, web structure mining, and web usage mining.
3. Apply appropriate web mining techniques to extract information from web data.
4. Analyze web mining algorithms and their applicability in different scenarios.
5. Evaluate the performance of various web mining methods.

Course Contents

List of Experiments

1.	Introduction to Web Data Extraction: Write a Python script using BeautifulSoup or Scrapy to extract and preprocess web content data such as headings, paragraphs, and links.
2.	Text Mining and NLP: Use NLTK or SpaCy to process and analyze web page text data, performing tasks like tokenization, stop-word removal, and sentiment analysis.
3.	Web Structure Mining using PageRank: Create a web graph and implement the PageRank algorithm to analyze the rank of each web page based on its structure.
4.	Web Usage Mining and Log Analysis: Preprocess web log data, analyze it using tools like AWStats or custom scripts, and identify user behavior patterns.
5.	Clustering Web Data: Extract textual content from web pages and apply clustering algorithms like K-Means to group similar pages, visualizing the results.
6.	Classification of Web Pages: Create a labeled dataset and implement classification algorithms (e.g., Naive Bayes, SVM) to categorize web pages, evaluating the classifiers' performance.
7.	Association Rule Mining: Preprocess web usage data and use the Apriori or FP-Growth algorithm to generate and interpret frequent itemsets and association rules.
8.	Semantic Web Mining: Extract and analyze RDF data from a semantic web source using SPARQL, integrating it with traditional web mining techniques.
9.	Sentiment Analysis of Social Media Data: Extract social media data using APIs and apply sentiment analysis techniques (e.g., TextBlob, Vader) to visualize sentiment trends over time.
10.	Case Study on Web Mining Application:

	Apply a combination of web content, structure, and usage mining techniques to solve a real-world problem in a specific domain, presenting the findings in a report.
Text Books:	
<ol style="list-style-type: none"> 1. “Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data” by Bing Liu 2. “Mining the Web: Discovering Knowledge from Hypertext Data” by Soumen Chakrabarti 	
References Books:	
<ol style="list-style-type: none"> 1. “Data Mining: Concepts and Techniques” by Jiawei Han, Micheline Kamber, and Jian Pei 2. “Introduction to Information Retrieval” by Christopher D. Manning, Prabhakar Raghavan, and Hinrich Schütze 3. “Web Mining: Applications and Techniques” by Anthony Scime 4. “Web Mining: Information and Pattern Discovery on the World Wide Web” by Janusz S. Kowalik, Horst Bunke, and Marian Bubak 	

DKTES Textile and Engineering Institute, Ichalkaranji.

Final Year B. Tech. (Semester – VIII)

Artificial Intelligence & Data Science

ADP426 Big Data Analytics Lab

Teaching Scheme: Lectures: 00 Hrs /Week Tutorials: 00 Hrs/Week Practicals: 02 Hrs/Week	Credits 01	Evaluation Scheme: CIE: 50 Marks SEE: 00 Marks
Course Outcomes: On completion of the course, student should be able to– <ol style="list-style-type: none">1. Explain the concept of Big Data Analytics .2. Implement HADOOP AND HDLC.3. Perform various operations on database .4. Visual and analyze data in charts.		
Course Contents		
List of Experiments (It should consist of 10-12 experiments based on the following topics.)		
1	Installation and Shell, Java API Apache Hadoop java	
2	Installation of Hive Architecture	
3	Develop a MapReduce program to calculate the frequency of a given word in a given file	
4	Create HIVE Database and Descriptive analytics-basic statistics, visualization using Hive/PIG/R Develop a MapReduce program to find the maximum temperature in each year.	
5	Implementing Bloom Filter using Map-Reduce	
6	Hive: Introduction Creation of Database and Table, Hive Partition, Hive Built in Function and Operators, Hive View and Index..	
7	Mongo DB Installation and Creation of database and Collection CRUD Document: Insert, Query, Update and Delete Document.	
8	Pig: Pig Latin Basic Pig Shell, Pig Data Types, Creating a Pig Data Model, Reading and Storing Data, Pig Operations	
9	Spark: RDD, Actions and Transformation on RDD , Ways to Create -file, data in memory, other RDD. Lazy Execution, Persist RDD	
10	Visualization: Connect to data, Build Charts and Analyze Data, Create Dashboard, Create Stories using Tableau	

DKTES Textile and Engineering Institute, Ichalkaranji.
Final Year B. Tech. (Semester – VIII)
Artificial Intelligence & Data Science
ADP427 Text Mining Lab

Teaching Scheme: Lectures: 00 Hrs. /Week
Tutorials: 00 Hrs./Week
Practical: 02 Hrs./Week

Credits 01

Evaluation Scheme:
CIE: 50 Marks

Course Outcomes: On completion of the course, student will be able to

1. Understand how text is handled in Python
2. Apply basic natural language processing methods
3. Write code that groups documents by topic
4. Describe the NLTK framework for manipulating text

Course Contents

LIST OF EXPERIMENTS:

(It should consist of 10-12 experiments based on the following topics.)

- 1 Write a Python program to demonstrate Pattern matching in Python with Regex.
- 2 Write a Python program to demonstrate use of regular expression methods match(), search(), findall().
- 3 Write a Python program to Validate phone numbers, email address and social security number.
- 4 Write a Python program to parse HTML document and find all hyperlinks.
- 5 Write a Python program to discover abstract "topics" that occur in a collection of documents.
- 6 Write a Python program to classify document in specified category.
- 7 Write a Python program to determine Similarity between Documents.
- 8 Write a Python program to predict if a message is spam or not.
- 9 Write a Python program to demonstrate Basic NLP Tasks with NLTK
- 10 Write a Python program to cluster documents using clustering algorithms.
- 11 Write a Python program to identify Named Entities (NE) from document corpus.
- 12 Write a Python for spelling recommender function that uses nltk to find words similar to the misspelling.
- 13 Write a Python program to generate word embedding for documents corpus using Word2vec algorithm.
- 14 Write a Python program to identify sentiment of given text.

Text Books:

1. Manu Konchady “Text Mining Application Programming”, Cengage Learning, Fourth Indian Reprint, 2009

2. The Text mining Handbook : Advanced approaches in analyzing unstructured data by Ronen Feldman & James Sanger

References Books:

1. Thomas W. Miller, Prentice Hall, “Data and Text Mining-A Business Applications Approach”, Second impression, 2011
2. Text Analytics with Python A Practical Real-World Approach to Gaining Actionable Insights from Your Data — Dipanjan Sarkar

Important Links: Text Mining and Analytics offered by Illinois, Coursera

DKTES Textile and Engineering Institute, Ichalkaranji.

Final Year B. Tech. (Semester – VIII)

Artificial Intelligence & Data Science

ADD428 Project - II

Teaching Scheme: Lectures: 00 Hrs. /Week Tutorials: 00 Hrs./Week Practical: 08 Hrs./Week	Credits 08	Evaluation Scheme: CIE: 50 Marks SEE: 50 Marks
<p>Course Outcomes: On completion of the course, student will be able to–</p> <ol style="list-style-type: none">1. Design and develop usable User Interface2. Analyze and apply emerging technologies in development of a project3. Test the modules in Project4. Demonstrate working of project		
Course Content		
	<p>The group will continue to work on the project selected during the semester VII and submit the completed project work to the department at the end of semester VIII as mentioned below.</p> <ol style="list-style-type: none">1. The workable project.2. The project report in the bound journal complete in all respect with the following :-<ol style="list-style-type: none">i. Problem specificationsii. System definition – requirement analysis.iii. System design – dataflow diagrams, database designiv. System implementation – algorithm, code documentationv. Test results and test report.vi. In case of object oriented approach – appropriate process be followed. <p>CIE will be jointly assessed by a panel of teachers appointed by head of the Institution. SEE examination will be conducted by internal and external examiners as appointed by the COE.</p>	
	Note :	
	<ol style="list-style-type: none">1. Project work should be continually evaluated based on the contributions of the group members, originality of the work, innovations brought in, research and developmental efforts, depth and applicability, etc.2. Two mid-term evaluations should be done, which includes presentations and demos of the work done.3. Care should be taken to avoid copying and outsourcing of the project work.	
	<p>The Continuous internal evaluation (CIE) is to be done as follows.</p> <ol style="list-style-type: none">1. Mid-term assessment – 10 marks.2. End term assessment – 10 marks.3. Final performance evaluation to be done by guide – 30 marks. <p>Semester End Exam : The semester end exam will be conducted by examiners appointed by exam coordinator.</p>	