



M. C. E. Society's

Abeda Inamdar Senior College

Of Arts, Science and Commerce, Camp, Pune-1

(Autonomous) Affiliated to Savitribai Phule Pune University

NAAC accredited 'A' Grade

Title of the Course: M.Sc. (Computer Science)

Objectives of Course:

Sr. No.	Objective
1.	To provide advanced and in-depth knowledge of computer science and its applications.
2.	To prepare Post Graduates who will achieve peer-recognition; as an individual or in a team; through demonstration of good analytical, design and implementation skills.
3.	To enable students pursue a professional career in Information and Communication Technology in related industry, business and research.
4.	To impart professional knowledge and practical skills to the students.

Program specific Outcome

Sr. No.	Objective
1.	Provides technology-oriented students with the knowledge and ability to develop creative solutions
2.	Develop skills to learn new technology.
3.	Apply computer science theory and software development concepts to construct computing-based solutions.
4.	Design and develop computer programs/computer-based systems in the areas related to algorithms, networking, web design, cloud computing, Artificial Intelligence, Mobile applications.
5.	An understanding of professional, ethical, legal, security, and social issues and responsibilities for the computing profession.



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M. Sc. Computer Science-II (CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Software Architecture and Design Patterns
Course Code	21SMCS231
Semester	III
No. of Credits	4

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To introduce students to the basic concepts and techniques of SADP.
2.	To write java programs using Design Pattern and Frameworks to create reusable and flexible software systems.
3.	To understand Use of patterns and architectures for solving practical problems.
4.	To understand about design pattern.
5.	To understand about the process of deploying web apps using specific Frameworks

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Students will recognize the characteristics of patterns that make it useful to solve real-world problems.
2.	Students will process available data using python libraries and predict outcomes using Machine Learning algorithms to solve given problem.
3.	Student will Able to use specific frameworks as per applications need.
4	Students can design java application using design pattern techniques.

Syllabus

Unit No	Title with Contents	No. of Lectures
Unit I	Introduction	2
	1. UML The Notation	
	2. Process Unified Process / Rational Unified Process inception, elaboration, construction, transition	1
	3. How various components fit in the life cycle	
	4. The artifacts at end of each process / discipline	1
Unit II	Software Architecture	4
	1. What Software Architecture is and what it isn't.	1
	2. Why is architecture important?	1
	3. Architectural structures and views	2
Unit III	Architectural Styles	6
	1. Architectural Styles	
	2. Pipes and Filters	1
	3. Data Abstraction and Object – Oriented Organization	
	4. Event-Based, Implicit Invocation	1
	5. Layered Systems	1
	6. Repositories	
	7. Interpreters	1
	8. Other familiar Architectures	2
	9. Heterogeneous Architectures.	2
Unit IV	Introduction to Patterns	4
	1. What is a Pattern & Design Pattern	
	2. What makes a Pattern (GOF)	1
	3. Describing Design Patterns.	
	4. Pattern Categories & Relationships between Patterns. 4.5 Organizing the Catalogue.	1
	5. Patterns and Software Architecture.	1
Unit V	Study of Design Patterns	12
	1. Creational Patterns-singleton, factory method, abstract factory	3
	2. Structural Patterns-adapter, decorator, facade	3
	3. Behavioural Patterns-	
	i. Iterator	6
	ii. Observer	
	iii. Strategy	
	iv. command and state (study of intent, applicability, participants, structure, collaboration , Java Example code, Implementation and consequences)	

Unit VI	GRASP(General Responsibility Assignment Software Patterns)	10
	1. Expert, Creator, High Cohesion, Low Coupling	4
	2. Controller, Polymorphism, Pure Fabrication, Indirection	4
	3. Don't Talk to Strangers	2
Unit VII	Study of Frameworks	12
	1. Frameworks as reusable chunks of architecture	1
	2. The framework lifecycle, development using frameworks	1
	3. Spring Core Framework	1
	4. Spring Boot Framework	1
	5. Microservices with Spring	1
	6. Web Architectures:	1
	i. Google Web Tool Kit	2
	ii. Spring	2
	iii. Hibernate etc.	2
	7. Selection of proper framework	1
	8. Comparing Frameworks	1
	9. Advantages of Spring	1
	10. Web based Case Study	1
Unit VIII	Case Study (any one of the web Architecture)	10
	1. Take a Framework and find Patterns in the Frame work.	4
	2. Benefits of Patterns in the chosen Framework	3
	3. How Pattern interact in the selected Framework	3

References:

1. Design Patterns – Elements of Reusable Object-oriented Software By E. Gamma, Richard Helm, Ralph Johnson , John Vlissides (GoF)
2. Pattern – Oriented Software Architecture (POSA) Volume 1. By : Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal.
3. Software Architecture in Practice. By Len Bass, Paul Clements, Rick Kazman
4. Applying UML and Patterns By Craig Larman.
5. Software Architecture- Perspectives on an emerging discipline by Mary shaw and David Garlan
6. Head First Design Pattern by Kathy Sierra, Bert Bates, Elisabeth Robson, Eric Freeman Publisher: O'Reilly Media, Inc.
7. Building Microservices-Designing Fine-Grained Systems By Sam Newman Publisher: O'Reilly Media
8. Design patterns in Java by Douglas Schmidt Publisher O'Reilly
9. Professional Java Development with the Spring Framework 1st Edition by Rod Johnson, Alef Arendsen, Thomas Risberg, Colin Sampaleanu ; WROX publication
10. Mastering Spring 5: An effective guide to build enterprise applications using Java Spring and Spring Boot framework, 2nd Edition by Ranga Rao Karanam ; PACKT publishing

Course/ Paper Title	Machine Learning
Course Code	21SMCS232
Semester	III
No. of Credits	4

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To introduce students to the basic concepts and techniques of Machine Learning.
2.	To write python programs using machine learning algorithms for solving practical problems.
3.	To understand about Machine Learning Library and use cases.
4.	To understand about the process of deploying ML model.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Students will able to recognize the characteristics of machine learning that make it useful to real-world problems.
2.	Students will process available data using python libraries and predict outcomes using Machine Learning algorithms to solve given problem.
3.	Students will able to estimate Machine Learning models efficiency using suitable metrics.
4.	Students will able to design application using machine learning techniques.

Syllabus

Unit No	Title with Contents	No. of Lectures
Unit I	Introduction to Machine Learning	10
	1. Data Science, Artificial Intelligence and Machine Learning	1
	2. Why Learn and What is Learning	3
	i. What is Machine Learning	
	ii. Traditional Programming Vs. Machine Learning	
	iii. Machine Learning Process	
	iv. Types of Data	
	v. Key Elements of Machine Learning (Representation, Evaluation and Optimization)	

	<ul style="list-style-type: none"> vi. Dimensionality Reduction (Feature Reduction) <p>3. Descriptive and Inferential Statistics:</p> <ul style="list-style-type: none"> i. Probability Distribution ii. Distance Measures (Euclidean and Manhattan) iii. Correlation and Regression iv. Hypothesis Testing v. Creating our own dataset vi. Importing the dataset, Handling <p>4. Missing Data, Splitting the dataset into the Training set and Test set, Feature Scaling</p>	<p>3</p> <p>3</p>
Unit II	Machine Learning Models	8
	<ul style="list-style-type: none"> 1. Type of Learning- <ul style="list-style-type: none"> i. Supervised ii. Unsupervised iii. Semi Supervised Learning 2. Components of Generalization Error (Bias, Variance, underfitting, overfitting) 3. A Learning System Cycle 4. Metrics for evaluation : <ul style="list-style-type: none"> i. Accuracy ii. Scalability iii. squared error iv. precision and recall v. likelihood 5. Classification Accuracy and Performance 	<p>2</p> <p>1</p> <p>1</p> <p>2</p> <p>2</p>
Unit III	Regression Models	12
	<ul style="list-style-type: none"> 1. Linear Regression <ul style="list-style-type: none"> i. Simple ii. Multiple iii. Polynomial 2. Non-linear Regression <ul style="list-style-type: none"> i. Decision Tree ii. Support Vector iii. Random Forest 	<p>6</p> <p>6</p>
Unit IV	Classification Models	16
	<ul style="list-style-type: none"> 1. K – Nearest Neighbors (KNN) 2. Logistic Regression 3. Naive Bayes Theorem 4. Support Vector Machine 5. Decision Forest Classification 6. Random Tree Classification 7. Dimensionality Reduction Algorithms 8. Gradient Boosting algorithms <ul style="list-style-type: none"> i. GBM ii. XGBoost iii. LightGBM iv. CatGBM 	<p>2</p> <p>1</p> <p>2</p> <p>1</p> <p>1</p> <p>2</p> <p>2</p> <p>5</p>
Unit V	Clustering Models	8
	<ul style="list-style-type: none"> 1. K-means 2. Hierarchical Clustering (Agglomerative, Divisive), Dendrogram 3. Selecting optimal number of clusters: Within Clusters Sum 	<p>2</p> <p>3</p>

	of Squares (WCSS) by Elbow Method	3
Unit VI	Association Rules	6
	1. Key Terms: Support, Confidence and Lift	3
	2. Apriori Algorithm	3

References:

1. Mitchell, Tom M. "Machine learning. WCB." (1997).
2. Rogers, Simon, and Mark Girolami. A first course in machine learning. CRC Press, 2015.
3. Friedman, Jerome, Trevor Hastie, and Robert Tibshirani. The elements of statistical learning. Vol.1. Springer, Berlin: Springer series in statistics, 2001.
4. Witten, Ian H., and Eibe Frank. Data Mining: Practical machine learning tools and techniques. Morgan Kaufmann, 2005.
5. Machine learning course material by Andrew Ng, Stanford University
6. Sutton, Richard S., and Andrew G. Barto. Reinforcement learning: An introduction. Vol. 1. No. 1. Cambridge: MIT press, 1998.
7. Iba, Takashi, et al. "Learning patterns: A pattern language for active learners." Conference on Pattern Languages of Programs (PLoP). 2009

Course/ Paper Title	Business Intelligence
Course Code	21SMCS233
Semester	III
No. of Credits	4

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To understand the role of BI in enterprise performance management and decision support.
2.	To understand the applications of data mining and intelligent systems in managerial work.
3.	To understand data warehousing and online analytical processing (OLAP) concepts, including dimensional modeling, star and snowflake schemas, attribute hierarchies, metrics, and cubes.
4.	To learn data analysis and reporting using an available BI software.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Student will able to identify role of BI and use it for decision making.
2.	Student will able to do analysis of provided data using BI software.

Syllabus

Unit No	Title with Contents	No. of Lectures
Unit I	Introduction to Business intelligence	10
	1. Definition and History of BI	2
	2. Transaction processing versus analytical processing	2
	3. BI implementation	3
	4. Major tools and techniques of BI	3
Unit II	Data warehousing	14
	1. Definition and concepts,	1
	2. Data warehouse architecture,	3
	3. ETL process, data warehouse development,	2
	4. Top down vs. Bottom up,	2
	5. Data Mart vs. EDW,	2
	6. Implementation issues,	2
	7. Real-time data warehousing	2
Unit III	Business performance management	14
	1. Key performance indicators and operational metrics	3
	2. Balanced scorecard	4
	3. Six Sigma	3
	4. Dashboards and scorecards	4
Unit IV	Data Mining for Business Intelligence	12
	1. Data mining process	4
	2. Data mining methods	4
	3. ANN for Data Mining	4
Unit V	Text, and Web mining for Business intelligence	10
	1. Text mining Applications	2
	2. Process and Tools	3
		2

	3. Web content 4. Structure and usage mining	3
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References:

1. Business Intelligence: A Managerial Approach, 2nd Edition, PEARSON 2012 Authors: EfraimTurban, Ramesh Sharda, Dursun Delen, and David King ISBN-10: 0-13-610066-X ISBN-13: 978-0-13-610066-9
2. Oracle Business Intelligence Applications, McGraw Hill Education 2013 Authors : Simon Miller, William Hutchinson ISBN-10: 93-5134-153-4 ISBN-13: 978-93-5134-153-6

Course/ Paper Title	Big Data
Course Code	21SMCS234A
Semester	III
No. of Credits	2

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To understand the Big Data challenges & opportunities, its applications
2.	Understanding of concepts of map and reduce and functional programming
3.	Gain conceptual understanding of Hadoop Distributed File System.
4.	To solve the case studies related to real life situations
5.	To bridge the gap between academics and industry needs.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Student will able to recognize the characteristics, applications of big data that make it useful to real-world problems.
2.	Student will process available data using big data tools Hadoop file

	system and predict outcomes to solve given problem.
3.	Student will able to design various case studies using big data tools/commands and analyze it.

Syllabus

Unit No	Title with Contents	No. of Lectures
Unit I	Introduction to Big data	5
	<ol style="list-style-type: none"> 1. Big Data :Definition & taxonomy 2. Sources of Big Data 3. 3V's of Big Data (need for Hadoop) 4. Varying data structures 5. Characteristics of Big Data 6. Applications of Big Data 7. Challenges in Big Data 8. Big Data Implications for Industries Big Data Analytics for Telecom/Banking/Retail/HealthCare/IT/Operations 	 1 1 1 1 1 1
Unit II	Emerging Database Landscape	3
	<ol style="list-style-type: none"> 1. Scale-Out Architecture, RDBMS Vs. Non-Relational Database 2. Database Workload & its Characteristics 3. Implication of Big Data Scale on Data Processing 	 1 1 1
Unit III	Application Architecture & Data Modeling For Big Data And Analytics	5
	<ol style="list-style-type: none"> 1. Big Data Warehouse & Analytics 2. Big data Warehouse System requirements & Hybrid Architectures 3. Enterprise Data Platform Ecosystem 4. Big Data and Master Data Management 5. Understanding data integration Pattern 6. Big Data Workload Design Approaches 7. Map-Reduce patterns ,Algorithms and Use Cases 	 1 1 1 1 1 1
Unit IV	The Hadoop Ecosystem	8

	1. Introduction to Hadoop	1
	2. Hadoop Architecture	2
	3. History of Hadoop- Facebook,Dynamo,Yahoo,Google	1
	4. Hadoop Components	2
	i. HDFS	
	ii. Map reduce	
	5. Introduction to Pig, Hive ,HBase ,Mahout	1
	6. Installation of single node cluster-installation of java Hadoop configuration	1
Unit V	Extracting Value From Big Data	4
	1. Real Time Analytics	1
	2. In-Memory Data Grid for real Time Analysis	1
	3. Map reduce & Real Time Processing ,Use Cases	2
Unit VI	Big Data Analytics Methodology	5
	1. Big Data Analytics Methodology-Analyze & evaluate business cases	2
	2. Develop Business Hypothesis :	3
	i. Analyze outcomes	
	ii. Build & Prepare Data Sets	
	iii. Select & Build Analytical Model	
	iv. Design for Big Data scale	
	v. Build production ready system	
	vi. Setting up the Big Data Analytics system	
	vii. Gathering data	
	viii. Measure & Monitor	

References:

1. Madhu Jagdeesh,Soumendra Mohanty,Harsha Srivatsa,"Big Data Imperatives: Enterprise Big Data Warehouse,BI Implementations and Analytics",1st Edition, Apress(2013)
2. Frank J.Ohlhorst,"Big Data Analytics:Turning Big Data into Big Money",Wiley Publishers(2012)
3. Cristian Molaro,Surekha Parekh,Terry Purcell,"DB2 11:The Database for Big Data & Analytics", MC Press,(2013)
4. Tom White, "Hadoop-The Definitive Guide, Storage and analysis at internet scale",SPD, O'Really.
5. DT Editorial Services,"Big Data, Black Book-Covers Hadoop2, Map Reduce, Hive, YARN, Pig, R and Data Visualization" Dreamtech Press,(2015).
6. Big Data Case Study by Bernard Marr –Willey Publications

Course/ Paper Title	Big Data Practical
Course Code	21SMCS235A
Semester	III
No. of Credits	2

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To learn Hadoop environment.
2.	To understand HDFS.
3.	To understand concept of map Reduce.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Student will able to work in Hadoop environment
2.	Student will able to handle Hadoop tools/utilities
3.	Students can develop map Reduce Programs.

Syllabus

Unit No	Title with Contents	No. of Sessions
	Assignments	
Unit I	1. Assignment 1: Case study on Facebook	
	2. Assignment 2: Case Study on IoT Sensors	
	3. Assignment 3: Case Study on Telecom Industry	
	4. Assignment 4: Case Study on Banking	
	5. Assignment 5: Case study on Amazon	

	6. Assignment 6: Case Study on General Electric –By TCS	15
	7. Assignment 7 : Case Study on Uber	
	8. Assignment 8: Case Study on Netflix	
	9. Assignment 9: CDC(Corona Virus and other Pandemics)	
Unit II	Practicals	
	1. Navigating in Hadoop environment [Operational commands in Hadoop environment like moving, copying files. creating directories etc.	
	2. Understand HDFS	
	3. Using Unix tools	
	4. Development in Hadoop environment , using various Hadoop tools/utilities	
	5. Develop mapReduce programs [Assignments] - Develop mapReduce functions either in Java or Python	

Course/ Paper Title	Web Analytics
Course Code	21SMCS234B
Semester	III
No. of Credits	2

Aims & Objectives of the Course

Sr. No.	Objectives
1.	Understand social media, web and social media analytics, and their potential impact.
2.	Determine how to Leverage social media for better services and Understand usability metrics, web and social media metrics.
3.	Use various data sources and collect data relating to the metrics and key performance indicators.
4.	Identify key performance indicators for a given goal, identify data relating to the metrics and key performance indicators.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Student will able to analyze Social media data.
2.	Student can collect data from various sources.
3.	Student can identify data metrics and performance indicators.

Syllabus

Unit No	Title with Contents	No. of Lectures
Unit I	Introduction	2
	<ol style="list-style-type: none"> 1. What is web Analytics 2. Importance of web Analytics 3. Web Analytics process 4. Types of web analytics 5. Web analytics technical requirements 6. Web analytics 2.0 framework 7. Use of Cookies in web Analytics 	1
		1
Unit II	Qualitative Analysis	4
	<ol style="list-style-type: none"> 1. Heuristic evaluations: <ol style="list-style-type: none"> i. Conducting a heuristic evaluation ii. Benefits of heuristic evaluations 2. Site Visits: <ol style="list-style-type: none"> i. Conducting a site visit ii. Benefits of site visits 3. Surveys: <ol style="list-style-type: none"> i. Website surveys ii. Post-visit surveys iii. Creating and running a survey iv. Benefits of surveys. 	1
		1
		2
Unit III	Web Metrics	10
	<ol style="list-style-type: none"> 1. Key metrics 2. Dashboard <ol style="list-style-type: none"> i. Implementation ii. Metrics 	1

	<ul style="list-style-type: none"> iii. Types of metrics 	1
	<ul style="list-style-type: none"> 3. Conversion <ul style="list-style-type: none"> i. goals ii. funnels 	2
	<ul style="list-style-type: none"> 4. Data sources <ul style="list-style-type: none"> i. server log ii. visitors data iii. search engine statistics and conversion funnels 	2
	<ul style="list-style-type: none"> 5. Data segmentation 	1
	<ul style="list-style-type: none"> 6. Analysis 	1
	<ul style="list-style-type: none"> 7. Emerging analytics <ul style="list-style-type: none"> i. e commerce ii. mobile analytics iii. A/B testing 	1
	<ul style="list-style-type: none"> 8. Social Media Analytics <ul style="list-style-type: none"> i. Sentimental Analysis ii. Text Analysis 	1
	<ul style="list-style-type: none"> 9. Annotation and Reporting <ul style="list-style-type: none"> i. Automated ii. Actionable 	1
Unit IV	Web Analytics 2.0	7
	<ul style="list-style-type: none"> 1. Introduction to analytic 2.0 	1
	<ul style="list-style-type: none"> 2. Competitive intelligence analysis 	1
	<ul style="list-style-type: none"> 3. CI data sources: <ul style="list-style-type: none"> i. Toolbar data ii. Panel data iii. ISP data iv. Search engine data v. Hybrid data 	3
	<ul style="list-style-type: none"> 4. Website traffic analysis: <ul style="list-style-type: none"> i. Comparing long term traffic trends ii. Analyzing competitive site overlap and opportunities. 	2
Unit V	Google Analytics	7
	<ul style="list-style-type: none"> 1. Audience analysis 	1
	<ul style="list-style-type: none"> 2. Acquisition analysis 	1
	<ul style="list-style-type: none"> 3. Behaviour analysis 	1
	<ul style="list-style-type: none"> 4. Conversion analysis 	1
	<ul style="list-style-type: none"> 5. Google website optimizer 	1
	<ul style="list-style-type: none"> 6. Implementation technology 	1
	<ul style="list-style-type: none"> 7. Privacy issues 	1

References:

1. Clifton B., Advanced Web Metrics with Google Analytics, Wiley Publishing, Inc.2nd ed.

2. Kaushik A., Web Analytics 2.0, The Art of Online Accountability and Science of Customer Centricity, Wiley Publishing, Inc. 1st ed.
3. Kaushik A., Web Analytics: An Hour a Day, 1st ed.
4. Sterne J., Web Metrics: Proven methods for measuring web site success, John Wiley and Sons

Course/ Paper Title	Web Analytics Practical
Course Code	21SMCS235B
Semester	III
No. of Credits	2

Aims & Objectives of the Course

Sr. No.	Objectives
1.	Understand social media, web and social media analytics, and their potential impact.
2.	Determine how to analyze social media for better
3.	Determine how to mine data from various sources

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Student will understand social media, web and their impact.
2.	Student will be able to analyze data from various sources.
3.	Student will be able to apply various web mining operations.

Syllabus

Unit No	Title with Contents	No. of Practical Sessions
Unit I	1. Mining Twitter: Exploring Trending Topics, Discovering What People Are Talking About, and More Why Is Twitter All the Rage?, Exploring Twitter's API, Fundamental Twitter Terminology, Creating a Twitter API Connection, Exploring Trending Topics, Searching for Tweets, Analysing the 140 Character, Extracting Tweet Entities, Analysing Tweets and Tweet Entities with Frequency Analysis, Computing the Lexical Diversity of Tweets, Examining Patterns in Retweets, Visualizing Frequency Data with Histograms	15
	2. Mining Facebook: Analysing Fan Pages, Examining Friendships, and More Overview, Exploring Facebook's Social Graph API, Understanding the Social Graph API, Understanding the Open Graph Protocol, Analysing Social Graph Connections, Analysing Facebook Pages, Examining Friendships	
	3. Mobile Analytic: Analyse the your site on mobile device In last 30 days, how many new users come from mobile, What was the bounce rate of visitors on mobile device, What was the average session duration?	
	4. Segment traffic: Which social channel is sending the most engaged new users, Which page of your Website have been shared most, Which URL has the best engagement matrix.	
	5. Use Google Analytics to measure the various metrics for E-commerce site amazon. On-site – It measures the users' behaviour once it is on the website. For example, measurement of your website performance. Off-site – It is the measurement and analysis irrespective of whether you own or maintain a website. For example, measurement of visibility, comments, potential audience, etc.	
	6. Use Google Analytics to measure the various metrics for E-commerce site flipkart Count It is most basic metric of measurement. It is represented as a whole number or a fraction. For example, Number of visitors = 12999, Number of likes = 3060, etc. Total sales of merchandise = \$54,396.18. Ratio It is typically a count divided by some other count. For example, Page views per visit. Key Performance Indicator (KPI) It depends upon the business type and strategy. KPI varies from one business to another.	
	7. Visitors loyalty: Analyse the person who visit site again and again is loyal to company because they can become customer	

	<p>8. Consider the any E-Commerce site and to measure the web analytics. Content It gives you insight about website's content section. You can see how each page is doing, website loading speed, etc. Page Load Time More is the load time, the more is bounce rate. Tracking page load time is equally important. Engagement Rate It shows how long a person stays on your web page. What all pages he surf. To make your web pages more engaging, include informative content, visuals, fonts and bullets.</p>	
	<p>9. Text Analytics: Interpreting Twitter Data From college students Tweets. Extracting Tweet Entities, Analysing Tweets and Tweet Entities with Frequency Analysis, Computing the Lexical Diversity of Tweets, Examining Patterns in Retweets, Visualizing Frequency Data with Histograms</p>	
	<p>10. Consider the any E-Commerce site and to measure the web analytics. Bounce Rate If a person leaves your website within a span of 30 sec, it is considered as a bounce. The rate at which users spin back is called the bounce rate. To minimize bounce rate include related posts, clear call-to-action and backlinks in your webpages. Behavior Behavior lets you know page views and time spent on website. You can find out how customer behaves once he is on your website.</p>	

Course/ Paper Title	Project
Course Code	21SMCS234C
Semester	III
No. of Credits	2

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To allow students to demonstrate the personal abilities and skills required to produce and present an extended piece of work
2.	To allow students to engage in personal inquiry, action and reflection on specific topics and issues.
3.	To allow students to focus on, and demonstrate an understanding of, the areas of interaction.

4.	To allow students to reflect on learning and share knowledge, views and opinions.
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Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Students will have abilities and skills skills required to produce and present an extended piece of work in corporate sectors.
2.	Students will know how to interact with team members while working on project.
3.	Students will able to share their knowledge and views.

Syllabus

Unit No	Title with Contents	No. of Sessions
Unit I	<p>Guidelines:</p> <ul style="list-style-type: none"> • Students should work in a team of minimum 2 and maximum 3 students. • Students can choose a project topic without any restriction on technology or domain. • The student group will work independently throughout the project work including: problem identification, information searching, literature study, design and analysis, implementation, testing, and the final reporting. • Project guide must conduct project presentations (minimum 2) to monitor the progress of the project groups. • At the end of the project, the group should prepare a report which should conform to international academic standards. The report should follow the style in academic journals and books, with clear elements such as: abstract, background, aim, design and implementation, testing, conclusion and full references, Tables and figures should be numbered and referenced to in the report. The final project presentation with demonstration (UE) will be evaluated by the project guide (appointed by the college) 	15

	and one external examiner (appointed by the University).	
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Course/ Paper Title	Project Related Assignments
Course Code	21SMCS235C
Semester	III
No. of Credits	2

Aims & Objectives of the Course

Sr. No.	Objectives
1.	The project assignments are a compulsory part of the project course and should be carried out by each project group.
2.	Project assignments are to be given by the guide for continuous internal evaluation.
3.	The project assignments are to be allotted to each group separately by the project guide on the basis of the implementation technology.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Student will able to understand the flow of system development
2.	Student will able to form the content of documentation
3.	Student will able to understand documentation of testing of a project

Syllabus

Unit No	Title with Contents	No. of Practical Sessions
Unit-I	Project Time management: plan (schedule table), Gantt chart, Roles and responsibilities, data collection, Implementation	15
	Simple assignments to evaluate choice of technology	
	Assignments on UI elements in chosen technology	
	Assignments on User interfaces in the project	
	Assignments on event handling in chosen technology	
	Assignments on Data handling in chosen technology	
	Online and offline connectivity	
	Report generation	
	Deployment considerations	
	Test cases	

Course/ Paper Title	Practical on Software Architecture and Design Pattern, Machine Learning
Course Code	21SMCS236
Semester	III
No. of Credits	4

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To write java programs using Design Pattern and Frameworks to create reusable and flexible software systems.
2.	To understand about the process of deploying web apps using specific Frameworks.

3.	To write python programs using machine learning algorithms for solving practical problems.
4.	To understand about the process of deploying ML model.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Able to use specific frameworks as per applications need.
2.	Design java application using design pattern techniques.
3.	Process available data using python libraries and predict outcomes using Machine Learning algorithms to solve given problem.
4.	Able to estimate Machine Learning models efficiency using suitable metrics.

Syllabus

Unit No	Title with Contents	No. of Lectures
	Software Architecture & Design Pattern List of Assignments	
UNIT I	Write a JAVA Program to implement built-in support (java.util.Observable) Weather station with members temperature, humidity, pressure and methods mesurmentsChanged(), setMesurment(), getTemperature(), getHumidity(), getPressure()	15
	Write a Java Program to implement I/O Decorator for converting uppercase letters to lower case letters.	
	Write a Java Program to implement Factory method for Pizza Store with createPizza(), oredorderPizza(), prepare(), Bake(), cut(), box(). Use this to create variety of pizza's like NyStyleCheesePizza, ChicagoStyleCheesePizza etc.	
	Write a Java Program to implement Singleton pattern for multithreading.	
	Write a Java Program to implement command pattern to test Remote Control.	

	Write a Java Program to implement undo command to test Ceiling fan	
	Write a Java Program to implement Adapter pattern for Enumeration iterator.	
	Write a Java Program to implement Iterator Pattern for Designing Menu like Breakfast, Lunch or Dinner Menu.	
	Write a Java Program to implement State Pattern for Gumball Machine. Create instance variable that holds current state from there, we just need to handle all actions, behaviors and state transition that can happen. For actions we need to implement methods to insert a quarter, remove a quarter, turning the crank and display gumball.	
	Write a java program to implement Adapter pattern to design Heart Model to Beat Model.	
UNIT II	Write a python program to Prepare Scatter Plot (Use Iris Dataset)	15
	Write a python program to find all null values in a given data set and remove them.	
	Write a python program the Categorical values in numeric format for a given dataset.	
	Write a python program to implement simple Linear Regression for predicting house price	
	Write a python program to implement multiple Linear Regression for a given dataset.	
	Write a python program to implement Polynomial Regression for given dataset.	
	Write a python program to Implement Naïve Bayes.	
	Write a python program to Implement Decision Tree whether or not to play tennis.	
	Write a python program to implement linear SVM.	
	Write a python program to transform data with Principal Component Analysis (PCA)	

	Write a python program to implement k-nearest Neighbors ML algorithm to build prediction model (Use Forge/Iris/housing Dataset)	
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Course/ Paper Title	Industrial Training /Institutional project
Course Code	21SMCS241
Semester	IV
No. of Credits	20

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To provide to students the feel of the actual working environment.
2.	To gain practical knowledge and skills, which in turn will motivate, develop and build their confidence
3.	To provide the students the basis to identify their key operational area of interest.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	Students will able to communicate efficiently.
2.	Student can acquire Industrial experiences and at the same time familiarize themselves with the real working environment at the Industrial training site.
3.	Student will take a hold on profession ethical values as basis to venture into professional career in the future.

Syllabus

Unit No	Title with Contents	No. of Sessions
Unit I	<p>Guidelines:</p> <ul style="list-style-type: none"> • Each student must individually complete minimum 5 months full time Industrial training / Institutional project in the 4th semester. • College should assign a student mentor to every student. The mentor will monitor the progress of the student throughout the semester for continuous assessment. • Student should submit a valid offer letter and synopsis within two weeks of starting the internship. • There will be continuous assessment of the work done by the student during the internship period. • Continuous assessment guidelines: <ol style="list-style-type: none"> 1. Student should submit a weekly report in the college to the mentor. 2. The report should contain the following details: Name of student, project title, company name, company mentor, daily activities and results/output, proposed work for next week. 3. The weekly report should be duly signed by the student and company mentor/ institute guide (CM). 4. Student Mentor should maintain weekly attendance record for every student. 5. Two presentations should be conducted for each student (first presentation after first month and second presentation after 3rd month) 6. Student Mentor should take feedback from the Company mentor regarding overall performance of the student. • At the end of the internship period, each student should prepare a report which should conform to international academic standards. • The report should follow the style in academic journals and books, with contents such as: abstract, background, aim, design and implementation, testing, conclusion and full references, Tables and figures should be numbered and referenced to in the report. 	45