

**Progressive Education Society's
 Modern College of Arts, Science and Commerce (Autonomous),
 Ganeshkhind, Pune 411016**

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Two Year Degree Program in Computer Science

MSc

(Faculty of Science & Technology)

Syllabi for M.Sc. (Computer Science) Part-II

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 Dr. Prof. [unclear]

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Choice Based Credit System Syllabus

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To be implemented from Academic Year 2023-2024



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

Preamble: This syllabus is credit-based system to be implemented from the academic year 2022-2023. It is believed that the proposed changes as part of the credit-based system will bring a qualitative change in the way M.Sc. (Computer Science) is taught, which will offer a more enriched learning experience. It aims to provide technology-oriented students with the knowledge and ability to develop creative solutions, and better understand the effects of future developments of computer systems and technology on people and society. The syllabus is about developing skills to learn new technology, grasping the concepts and issues behind its use and the use of computers.

Duration: 2 years**Eligibility:**

- Bachelor of Computer science (B.C.S) with 50% marks for Unreserved category and 45% marks for Reserved Category
- BSc (Computer Science) with 50% marks
- Bachelor of Engineering in Computer Science/ Information Technology/Electronics/ Telecommunication with 50% marks
- BSc. In IT or BSC in entire Computer science with 50% marks
- B. Voc in software Development/Information Technology with 50% marks
- BSc. Degree with Computer Science as Principal subject or Computer Science as one of the subject at T.Y.BSc. Level for student with general BSC with 50%

Course Structure:

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year II Semester III								
Year/ Sem	Course Type	Course Code	Course Name	Credit	% of Assessment			
					IA	CE	Total	
I Year Sem-I	Core Compulsory Theory Paper	23-CSUT231	Software Architecture and Design Patterns	4	30	70	100	
		23-CSUT232	Machine Learning	4	30	70	100	
		23-CSUT233	Web Frameworks	4	30	70	100	
	Choice Based Optional Paper	23-CSUT234 A	Big Data Analytic	2	15	35	50	
		23-CSUT234 A	Big Data Analytics Practical	2	15	35	50	
		OR						
		23-CSDT234B	Web Analytics	2	15	35	50	
		23-CSDT234B	Web Analytics Practical	2	15	35	50	
		OR						
		23-CSDT234C	Project	2	15	35	50	
		23-CSDT234C	Project related Assignments	2	15	35	50	
			23-CSDT234C	Introduction to Data Science	2	15	35	50
		23-CSDT234C	Practical on Data Science	2	15	35	50	
Code Compulsory Practical Paper	23-CSUP235	Practical on CSUT231, CSUT232 and CSUT233	4	30	70	100		

Extra Credit (Mandatory)			
Course Type	Course Code	Course Name	Credit
Extra Credit Theory Paper	23-392	Introduction to Cyber Security/ Information security-III	1
	23-394	Skill Development-I	2
	23-395	Introduction to Constitution	2

IA :- Internal Assessment, CE :- College Examination

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year I Semester II							
Year/ Sem	Course Type	Course Code	Course Name	Credit	% of Assessment		
					IA	CE	Total
II Year Sem-IV	Core	23-CSUT121	Industrial Training /Institutional project	20	150	350	500

Extra Credit (Mandatory)			
Course Type	Course Code	Course Name	Credit
Extra Credit Theory Paper	23-492	Introduction to Cyber Security/ Information security-IV	1
	23-494	Skill Development-II	2

IA :- Internal Assessment, CE :- College Examination

Practical paper implementation strategy:

Subject	Platform
PPL	Linux
Database Technologies	Linux / Windows
AI	Linux
Web Services	Linux / Windows
Cloud Computing	Linux/ Windows/ AWS

Note : Any version of Linux (Fedora/ Redhat/ Ubuntu etc.) can be used as per your comfort

Detailed Syllabus:

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year- II Semester- III			
Course Code: 23-CSUT231	Course Name: Software Architecture and Design Patterns	Total Lectures (48 Hours)	
Teaching Scheme: 4 hrs/week	Examination Scheme: IA: 30 Marks CE: 70 Marks	No. of Credits: 4	
Course Prerequisites:	Student should have basic knowledge of: <ul style="list-style-type: none"> ● Familiarity with UML and OOPs Concepts ● Programming in Java 		
Course Objectives:	<ul style="list-style-type: none"> ● To introduce students to the basic concepts and techniques of SADP. ● To write java programs using Design Pattern and Frameworks to create reusable and flexible software systems. ● Use of patterns and architectures for solving practical problems. ● To understand about design pattern. ● To understand about the process of deploying web apps using specific Frameworks. 		
Course Outcomes:	After successfully completing this course, students will be able to: <ul style="list-style-type: none"> ● Recognize the characteristics of patterns that make it useful to solve real-world problems. ● Process available data using python libraries and predict outcomes using Machine Learning algorithms to solve given problem. ● Able to use specific frameworks as per applications need. ● Design java application using design pattern techniques. 		
Chapter	Course Contents	No. of Lectures	Weightage
1	Introduction <ul style="list-style-type: none"> ● UML The Notation ● Process Unified Process / Rational Unified Process inception, elaboration, construction, transition ● How various components fit in the life cycle The artifacts at end of each process / discipline 	2	5

2	Software Architecture <ul style="list-style-type: none"> ● What Software Architecture is and what it isn't. ● Why is architecture important? ● Architectural structures and views ● Architectural styles 	5	7
3	Architectural Styles <ul style="list-style-type: none"> ● Pipes and Filters ● Data Abstraction and Object – Oriented organization Event based-implicit invocation Layered Systems ● Repositories ● Interpreters ● Goals of Design Chapter 6 Introduction to Design Patterns Chapter 6 Notes (edurev.in) 	5	7
4	Introduction to Patterns <ul style="list-style-type: none"> ● What is a Pattern & Design Pattern ● Characteristics of Design Patterns ● What makes a Pattern (GOF) ● Describing Design Patterns. ● Pattern Categories & Relationships between Patterns. ● Organizing the Catalog. ● Patterns and Software Architecture. 	8	11
5	Study of Design Patterns <ul style="list-style-type: none"> ● Creational Patterns-singleton, factory method, abstract factory ● Structural Patterns-adapter, decorator, facade ● Behavioral Patterns-iterator, observer, strategy, command and state (study of intent, applicability, participants, structure, collaboration , Java Example code , Implementation and consequences) 	6	8
6	GRASP (General Responsibility Assignment Software Patterns) <ul style="list-style-type: none"> ● Expert, Creator, High Cohesion, Low Coupling ● Controller, Polymorphism, Pure Fabrication, Indirection ● Don't Talk to Strangers 	8	11
7	Study of Frameworks <ul style="list-style-type: none"> ● Frameworks as reusable chunks of architecture ● The framework lifecycle, development using frameworks ● Spring Core Framework ● Spring Boot Framework ● Microservices with Spring ● Web Architectures: Google Web Tool Kit, Spring , Hibernate etc. ● Selection of proper framework ● Comparing Frameworks 	5	7

	<ul style="list-style-type: none"> Advantages of Spring 		
8	Case Study (any one of the web Architecture) Take a Framework and find Patterns in the Framework.	9	14

References:

Sr. No.	Title of the Book	Author/s	Publication
1	Head First Design Publisher:	Pattern Kathy Sierra, Bert Bates, Elisabeth Robson, Eric Freeman	O'Reilly Media, Inc
2	Software Architecture- Perspectives on an emerging discipline	Mary shaw and David Garlan	Pearson
3	Design Patterns – Elements of Reusable Object-oriented Software	E. Gamma, Richard Helm, Ralph Johnson , John Vlissides (GoF)	Addison-Wesley Professional
4	Pattern – Oriented Software Architecture (POSA) Volume 1	Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal.	Wiley
5	Software Architecture in Practice	Len Bass, Paul Clements, Rick Kazman	Pearson Addison-Wesley Professiona
6	Applying UML and Patterns	Craig Larman.	PHI

**Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016
M.Sc. (Computer Science) Year -II Semester- III**

Course Code: 23-CSUT232	Course Name: Machine Learning	Total Lectures (48 Hours)	
Teaching Scheme: 4 hrs/week	Examination Scheme: IA: 30 Marks CE: 70 Marks	No. of Credits: 4	
Course Prerequisites:	<ul style="list-style-type: none"> ● Familiarity with Probability Theory, Multivariable Calculus, Linear Algebra ● Programming in Python (NumPy, SciPy, Pandas, Matplotlib, Seaborn, SciKit-Learn, Stats Model) 		
Course Objectives:	<ul style="list-style-type: none"> ● To introduce students to the basic concepts and techniques of Machine Learning. ● To write python programs using machine learning algorithms for solving practical problems. ● To understand about Machine Learning Library and use cases. ● To understand the process of deploying ML model. 		
Course Outcomes:	<p>After successful completion of course students will be able to:</p> <ul style="list-style-type: none"> ● Recognize the characteristics of machine learning that make it useful to real-world problems. ● Process available data using python libraries and predict outcomes using Machine Learning algorithms to solve given problems. ● Able to estimate Machine Learning models efficiency using suitable metrics. ● Design application using machine learning techniques. 		
Chapter	Course Contents	No. of Lectures	Weightage
1	<p>Introduction to Machine Learning</p> <ul style="list-style-type: none"> ● Data Science, Artificial Intelligence and Machine Learning ● Why Learn and What is Learning, What is Machine Learning Traditional Programming Vs. Machine Learning, Machine Learning Process, Types of Data, Key Elements of Machine Learning (Representation, Evaluation and Optimization), Dimensionality Reduction (Feature Reduction) ● Descriptive and Inferential Statistics: Probability, Distribution, Distance Measures (Euclidean and Manhattan), Correlation and Regression, Hypothesis Testing. ● Introduction to Numpy, Pandas and scikit library ● Creating our own dataset, Importing the dataset, Handling 	8	11

	<p>Missing Data, Splitting the dataset into the Training set and Test set, Feature Scaling</p> <ul style="list-style-type: none"> ● Relations of ML with other fields (Data Mining, Data Warehousing, Artificial Intelligence, Statistics) 		
2	<p>Machine Learning Models</p> <ul style="list-style-type: none"> ● Type of Learning- Supervised, Unsupervised and Semi-Supervised Learning ● Components of Generalization Error (Bias, Variance, underfitting, overfitting) ● A Learning System Cycle and Design Cycle ● Metrics for evaluation viz. accuracy, scalability, squared error, precision and recall, likelihood, posterior probability ● Classification Accuracy and Performance 	6	7
3	<p>Regression Models</p> <ul style="list-style-type: none"> ● Linear Regression - Simple , Multiple, Polynomial ● Non-linear Regression – Decision Tree, Support Vector, Random Forest 	8	11
4	<p>Classification Models</p> <ul style="list-style-type: none"> ● K – Nearest Neighbors (KNN) ● Logistic Regression ● Naive Bayes Theorem ● Support Vector Machine ● Decision Forest Classification ● Random Tree Classification 	10	12
5	<p>Clustering Models</p> <ul style="list-style-type: none"> ● K-means ● Hierarchical Clustering (Agglomerative,Divisive),Dendrogram ● Selecting optimal number of clusters: Within Clusters Sum of Squares (WCSS) by Elbow Method 	6	7
6	<p>Association Rules</p> <ul style="list-style-type: none"> ● Key Terms: Support, Confidence and Lift ● Apriori Algorithm ● FP Tree Algorithm 	5	6
7	<p>Reinforcement Learning</p> <ul style="list-style-type: none"> ● Upper Confidence Bound ● Thompson Sampling ● Q-Learning 	5	6
8	<p>Deep Learning</p> <ul style="list-style-type: none"> ● Artificial Neural Network ● Convolution Neural Network ● Recurrent neural network 	8	10

References:

Sr. No.	Title of the Book	Author/s	Publication
1	Machine learning	WCB Mitchell, Tom M	McGraw Hill Education
2	A first course in machine learning	Rogers, Simon, and Mark Girolami	CRC Press, 2015
3	The elements of statistical learning. Vol 1	Friedman, Jerome, Trevor Hastie, and Robert Tibshirani	Springer, Berlin: Springer series in statistics, 2001
4	Machine learning course material	Andrew Ng	Stanford university

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -II Semester- III			
Course Code: 23-CSUT233	Course Name: Web Frameworks	Total Lectures: (48 Hours)	
Teaching Scheme: 4 hrs/week	Examination Scheme: IA: 30 Marks CE: 70 Marks	No. of Credits: 4	
Course Prerequisites:	<ul style="list-style-type: none"> ● Basic knowledge of Java Script. ● Basics of web application development. ● Knowledge of what is Client and Server side programming. 		
Course Objectives:	<ul style="list-style-type: none"> ● To introduce students for modern web technologies. ● To learn and use server side programming using Node.js ● To understand asynchronous programming. ● To learn and understand web application in Django a Python Web Framework. 		
Course Outcomes:	After successful completion of course students will be able to: <ul style="list-style-type: none"> ● Students will be ready with the technology which is used widely in Industry as a part of full stack developer. ● Students will know the powerful way to develop the web application in Python. ● Students will understand what really the asynchronous programming. ● Build and deploy robust Django Web App. ● Integrate with Restful web services. 		
Chapter	Course Contents	No. of Lectures	Weightage
1	Java Script Basics <ul style="list-style-type: none"> ● Java Script data types ● Variables, Functions, Events, Regular Expressions ● Array and Objects in Java Script 	4	5

	<ul style="list-style-type: none"> ● Java Script HTML DOM ● Promises and Callbacks 		
2	Introduction to Node JS & Modules <ul style="list-style-type: none"> ● Introduction ● What is Node JS and its advantages ● Traditional Web Server Model ● Node JS Process model ● Installation of Node JS ● Node JS event Loop ● Functions ● Buffer ● Module and Module Types ● Core Module, Local Module ● Directories as module ● Module.exports 	8	10
3	Node Package Manager <ul style="list-style-type: none"> ● What is NPM? ● Installing package locally ● Adding dependencies in package.json ● Installing packages globally ● Updating packages ● Managing Dependencies 	4	5
4	Web Server <ul style="list-style-type: none"> ● Creating Web Server ● Handling HTTP requests ● Sending Requests ● HTTP Streaming 	3	4
5	File System <ul style="list-style-type: none"> ● FS Model ● Files and Directories ● Streams ● Reading and Writing Files ● Reading and Writing Directories ● Other File Operations 	4	5

6	Events <ul style="list-style-type: none"> ● Asynchronous JS ● Asynchronous control flow with callbacks ● Promises ● EventEmitter Class ● ASync/Await ● Returning Event Emitter ● Inheriting Events 	6	7
7	Working with Databases <ul style="list-style-type: none"> ● Connection String ● Configuring ● Working with Select command ● Various database operations ● MongoDB ● Mongoose ODM ● Mongoose Schema ● Mongoose Model ● Querying with Mongoose 	6	7
8	Express JS <ul style="list-style-type: none"> ● REST ● Introduction to Express JS ● Routing, Responding ● Configuration ● Views ● Receiving Data ● Error Handling 	7	8
9	Introduction to Django <ul style="list-style-type: none"> ● What is Django ● Django and Python ● Django MVT ● How to get and install Django ● About 3 core files : model.py, urls.py, views.py ● Setting up database connections (MySQL/SQLServer) ● Managing Users & Django admin tools ● Installing and using 'Out of the Box' Django features 	9	10
10	Django URL Patterns and Views & forms <ul style="list-style-type: none"> ● Designing a good URL Schema ● Generic Views ● Form Classes ● Validations ● Authentication ● Advanced Form Processing Techniques ● Django REST Framework 	9	9

	<ul style="list-style-type: none"> • Django Piston 		
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References:

Sr. No.	Title of the Book	Author/s	Publication
1	Node.js complete	reference guid , velentin Bojinov, David Herron, Dioge Resende	PACKT Publishing Ltd
2	Mastering Nod.js	Sandro Pasquali	PACKT Publishing
3	Smashing Node.js, Java Script Everywhere	Guillermo Rauch, John wiley & Sons	Wiley publishing
4	Two Scoops of Django 1.11 : Best Practices for the Django web Framework Book	Danial Roy Greenfeld and Audrey Roy Greenfeld	Two Scoops Press
5	Django for Beginners : Build websites with Python and Django	William S Vincent	Kindle Edition
6	Web Development with Django CookBook, second edition	Aidas Bendoraitis Second Edition	PACKT Publishing

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -II Semester- III		
Course Code: 23-CSDT234A	Course Name: Big Data Analytics	Total Lectures: (30 Hours)
Teaching Scheme: 4 hrs/week	Examination Scheme: IA: 15 Marks CE: 35 Marks	No. of Credits: 2
Course Prerequisites:	<ul style="list-style-type: none"> ● Basic knowledge of Linux working and its commands. ● One must be able to install and uninstall its packages. ● Programming Languages - Programming Languages like Python, Scala, Java is required because it helps to understand Hadoop programming. 	
Course Objectives:	<ul style="list-style-type: none"> ● To understand the Big Data challenges & opportunities, its applications ● Understanding of concepts of map and reduce and functional programming ● Gain conceptual understanding of Hadoop Distributed File System. ● To solve the case studies related to real life situations ● To bridge the gap between academics and industry needs. 	
Course Outcomes:	At the end of the course, the student should be able to: <ul style="list-style-type: none"> ● Recognize the characteristics, applications of big data that make it useful to real- 	

	<p>world problems.</p> <ul style="list-style-type: none"> ● Process available data using big data tools hadoop file system and predict outcomes to solve given problem. ● Study & Design various case studies using big data tools/commands and analyse it. 		
Chapter	Course Contents	No. of Lectures	Weightage
1	<p>Introduction to Big data</p> <ul style="list-style-type: none"> ● Big Data :Definition & taxonomy ● Sources of Big Data ● 3V's of Big Data (need for Hadoop) ● Varying data structures ● Characteristics of Big Data ● Applications of Big Data ● Challenges in Big Data ● Big Data Implications for Industries ● Big Data Analytics for Telecom/Banking/Retail/HealthCare/IT/Operations 	5	6
2	<p>Emerging Database Landscape</p> <ul style="list-style-type: none"> ● Scale-Out Architecture, RDBMS Vs Non-Relational Database ● Database Workload & its Characteristics ● Implication of Big Data Scale on Data Processing 	3	4
3	<p>Application Architecture & Data Modeling For Big Data And Analytics</p> <ul style="list-style-type: none"> ● Big Data Warehouse & Analytics ● Big data Warehouse System requirements & Hybrid Architectures ● Enterprise Data Platform Ecosystem ● Big Data and Master Data Management ● Understanding data integration Pattern ● Big Data Workload Design Approaches ● Map-Reduce patterns ,Algorithms and Use Cases 	5	6
4	<p>The Hadoop Ecosystem</p> <ul style="list-style-type: none"> ● Introduction to Hadoop ● Hadoop Architecture ● History of Hadoop-Facebook,Dynamo,Yahoo,Google ● Hadoop Components :HDFS, Mapreduce ● Introduction to Pig,Hive ,HBase ,Mahout ● Installation of single node cluster-installation of java Hadoop configuration 	8	9

5	Extracting Value From Big Data <ul style="list-style-type: none"> ● Real Time Analytics ● In-Memory Data Grid for real Time Analysis ● Map reduce & Real Time Processing ,Use Cases 	4	5
6	Big Data Analytics Methodology <ul style="list-style-type: none"> ● Big Data Analytics Methodology-Analyze & evaluate business cases ● Develop Business Hypothesis –Analyze outcomes, Build & Prepare Data Sets ,Select & Build Analytical Model ,Design for Big Data scale .Build production ready system ,setting up the Big Data Analytics system ,Gathering data ,measure & monitor 	5	5

References:

Sr. No.	Title of the Book	Author/s	Publication
1	"Big Data Imperatives: Enterprise Big Data Warehouse,BI Implementations and Analytics",1 st Edition	Madhu Jagdeesh,Soumendra Mohanty,Harsha Srivatsa	Apress(2013)
2	"Big Data Analytics:Turning Big Data into Big Money"	Frank J.Ohlhorst	Wiley Publishers(2012)
3	DB2 11:The Database for Big Data & Analytics"	Cristian Molaro,Surekha Parekh Terry Purcell	MC Press,(2013)
4	"Hadoop-The Definitive Guide,Storage and analysis at internet scale"	Tom White	SPD, O'Really.
5	Big Data Case Study	Bernard Marr	Willey Publications

**Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016
M.Sc. (Computer Science) Year -II Semester- III**

Course Code: 23-CSDP234A	Course Name: Big Data Analytics Practical	Total Practical's: 10
Teaching Scheme: 2 hrs/week	Examination Scheme: IA: 15 Marks CE: 35 Marks	No. of Credits: 2
It is expected to form teams and ask students to solve these case studies, discuss and work on solutions. (Refer Book No 6 for solving case studies. In- detail explanation for case studies below is given in the said book)		
Assignment Number	Assignment Name	Number of Sessions

1	Case study on Facebook	2
2	Case Study on IoT Sensors	1
3	Case Study on Telecom Industry	1
4	Case Study on Banking	1
5	Case study on Amazon	1
6	Case Study on General Electric –By TCS	1
7	Case Study on Uber	1
8	Case Study on Netflix	1
9	CDC(Corona Virus and other Pandemics)	1

Practical's

Note: Slips should be designed on the basis of following topics at college level. The practical's should be taken on the basis of above case studies.

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

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -II Semester- III		
Course Code: 23-CSDT234B	Course Name: Web Analytics	Total Lectures: (30 Hours)
Teaching Scheme : 4 hrs/week	Examination Scheme: IA: 15 Marks CE: 35 Marks	No. of Credits : 2
Course Prerequisites:	<ul style="list-style-type: none"> ● Concepts of HTML, PHP programming languages ● Strong data analytics skills. 	

Course Objectives:	<ul style="list-style-type: none"> ● Understand social media, web and social media analytics, and their potential impact. ● Determine how to Leverage social media for better services and Understand usability metrics, web and social media metrics. ● Use various data sources and collect data relating to the metrics and key performance indicators. ● Identify key performance indicators for a given goal, identify data relating to the metrics and key performance indicators. 		
Course Outcomes:	After successful completion of course students will be able to: <ul style="list-style-type: none"> ● Learn the web analytics. ● Learn different web metrics. ● Learn google analytics 		
Chapter	Course Contents	No. of Lectures	weightage
1	Introduction <ul style="list-style-type: none"> ● What is web Analytics ● Importance of web Analytics ● Web Analytics process ● Types of web analytics ● Web analytics technical requirements ● Web analytics 2.0 framework 	2	3
2	Qualitative Analysis <ul style="list-style-type: none"> ● Heuristic evaluations: <ul style="list-style-type: none"> ○ Conducting a heuristic evaluation ○ Benefits of heuristic evaluations ● Site Visits: <ul style="list-style-type: none"> ○ Conducting a site visit, ○ Benefits of site visits ● Surveys: <ul style="list-style-type: none"> ○ Website surveys ○ Post-visit surveys ○ creating and running a survey ○ Benefits of surveys. 	4	5
3	Web Metrics <ul style="list-style-type: none"> ● Key metrics ● Dashboard <ul style="list-style-type: none"> ○ Implementation ○ metrics ○ Types of metrics ● Conversion <ul style="list-style-type: none"> ○ goals ○ funnels ● Data sources <ul style="list-style-type: none"> ○ server log 	10	11

	<ul style="list-style-type: none"> ○ visitors data ○ search engine statistics and conversion funnels ● Data segmentation ● Analysis ● Emerging analytics ○ e commerce ○ mobile analytics ○ A/B testing ● Social Media Analytics ○ Sentimental Analysis ○ Text Analysis ● Annotation and Reporting ○ Automated ○ Actionable 		
4	Web analytics <ul style="list-style-type: none"> ● Introduction to analytics ● Competitive intelligence analysis ● CI data sources ○ Toolbar data ○ Panel data ○ ISP data ○ Search engine data ○ Hybrid data 	7	8
5	<ul style="list-style-type: none"> ● Website traffic analysis: ○ Comparing long term traffic trends ○ Analyzing competitive site overlap and opportunities. 		
6	<ul style="list-style-type: none"> ● Google Analytics: ○ Audience analysis ○ Acquisition analysis ○ Behavior analysis ○ Conversion analysis ○ Google website optimizer ○ Implementation technology ○ Privacy issues 	7	8

References:

Sr. No.	Title of the Book	Author/s	Publication
1	Advanced Web Metrics with Google Analytics, , Inc.2nd ed.	Clifton B	Wiley Publishing
2	Web Analytics 2.0, The Art of Online	Kaushik A	Wiley Publishing

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

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -II Semester- III		
Course Code: 23-CSDP234B	Course Name: Web Analytics Practical	Total Practical's: 10
Teaching Scheme : 4 hrs/week	Examination Scheme: IA: 15 Marks CE: 35 Marks	No. of Credits : 2
Assignment NO.	Assignment Particulars	
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	

2	<p>Mining Facebook: Analyzing 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</p>
3	<p>Mobile Analytic: Analyze 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?</p>
4	<p>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</p>
5	<p>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</p>
6	<p>Use Google Analytics to measure the various metrics for E-commerce site flipkart</p> <p>Count</p> <p>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.</p> <p>Ratio</p> <p>It is typically a count divided by some other count. For example, Page views per visit.</p> <p>Key Performance Indicator (KPI)</p> <p>It depends upon the business type and strategy. KPI varies from one business to another.</p>
7	<p>Visitors loyalty: Analyse the person who visit site again and again is loyal to company because they can become customer</p>
8	<p>Consider the any E-Commerce site and to measure the web analytics.</p> <p>Content</p> <p>It gives you insight about website's content section. You can see how each page is doing, website loading speed, etc.</p> <p>Page Load Time</p> <p>More is the load time, the more is bounce rate. Tracking page load time is equally important.</p> <p>Engagement Rate</p> <p>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>
9	<p>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>
10	<p>Consider the any E-Commerce site and to measure the web analytics.</p> <p>Bounce Rate</p> <p>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.</p> <p>To minimize bounce rate include related posts, clear call-to-action and backlinks in your webpages.</p>

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

**Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016
M.Sc. (Computer Science) Year -II Semester- III**

Course Code: 23-CSDT234C	Course Name: Project	
Teaching Scheme: Project: 2 hours/week Batch Size: 5 students		No. of Credits: 2
Workload : <ul style="list-style-type: none">● One project guide to be assigned to 5 students.● 2 hours /week to be allotted for 5 students		

Guidelines:

- 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) and one external examiner (appointed by the University).

Evaluation guidelines:

IA (15 marks)			UE (35 marks)		
First presentation	Second presentation	Documentation	Project Logic/Presentation	Documentation	Viva
5	5	5	20	5	10

Recommended Documentation contents:

Abstract

Introduction

- motivation
- problem statement
- purpose/objective and goals
- literature survey
- project scope and limitations
- System analysis
 - Existing systems
 - scope and limitations of existing systems
 - project perspective, features
 - stakeholders
 - Requirement analysis - Functional requirements, performance requirements, security requirements etc.

System Design

- Design constraints
- System Model: UML diagrams
- Data Model
- User interfaces

Implementation details

- Software/hardware specifications

Outputs and Reports Testing

- Test Plan, Black Box Testing or Data Validation Test Cases, White Box Testing or Functional Validation Test cases and results

Conclusion and Recommendations Future

Scope

Bibliography and References

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016
M.Sc. (Computer Science) Year -II Semester- III

Course Code: 23-CSDP234C	Course Name: Project Related Assignments	Total Lectures: (30 Hours)
Teaching Scheme <ul style="list-style-type: none">• 2 lectures/week		No. of Credits : 2
Workload : <ul style="list-style-type: none">• 2 lectures/week		

Guidelines:

- The project assignments are a compulsory part of the project course and should be carried out by each project group.
 - Project assignments are to be given by the guide for continuous internal evaluation.
 - The project assignments are to be allotted to each group separately by the project guide on the basis of the implementation technology. A suggested list of assignments is given below.
2. Project Time management: plan (schedule table), Gantt chart, Roles and responsibilities, data collection, Implementation
 3. Simple assignments to evaluate choice of technology
 4. Assignments on UI elements in chosen technology
 5. Assignments on User interfaces in the project
 6. Assignments on event handling in chosen technology
 7. Assignments on Data handling in chosen technology
 8. Online and offline connectivity
 9. Report generation
 10. Deployment considerations
 11. Test cases

Each student within the group must work actively and contribute to the assignments, project work and report writing.

Evaluation guidelines:

IA (15 marks)		UE (35 marks)	
Attendance	Assignments	Assignments	Viva
5	10	25	10

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016
M.Sc. (Computer Science) Year -II Semester- III

Course Code: 23- CSDP234C	Course Name: Introduction to Data Science	Total Lectures: (48 Hours)
Teaching Scheme: 4 hrs/week	Examination Scheme: IA: 30 Marks CE: 70 Marks	No. of Credits: 4
Course Prerequisites	<ul style="list-style-type: none"> ● Problem solving using computers ● Basic mathematics and statistics ● Knowledge of Databases 	
Course Objectives:	<ul style="list-style-type: none"> ● Provide students with knowledge and skills for data-intensive problem solving and scientific discovery ● Be prepared with a varied range of expertise in different aspects of data science such as data collection, visualization, processing and modeling of large data sets. ● Acquire good understanding of both the theory and application of applied statistics and computer science based existing data science models to analyze huge data sets originating from diversified application areas. ● Be better trained professionals to cater the growing demand for data scientists in industry 	
Course Outcomes:	After successful completion of course students will be able to: <ul style="list-style-type: none"> ● Perform Exploratory Data Analysis ● Obtain, clean/process, and transform data. ● Detect and diagnose common data issues, such as missing values, special values, 	

	<p>outliers, inconsistencies, and localization.</p> <ul style="list-style-type: none"> • Demonstrate proficiency with statistical analysis of data. • Present results using data visualization techniques. • Prepare data for use with a variety of statistical methods and models and recognize how the quality of the data and the means of data collection may affect conclusions. 		
Chapter	Course Contents	No. of Lectures	Weightage
1	<p>Introduction & What is Data Science?</p> <ul style="list-style-type: none"> • Historical Overview of data analysis • Data Scientist vs. Data Engineer vs. Business Analyst, • Career in Data Science • Why Data Science • Applications for data science, Data Scientists Roles and Responsibility 	5	5
2	<p>Data</p> <ul style="list-style-type: none"> • Data Collection • Data Management • Big Data Management • Organization/sources of data • Importance of data quality • Dealing with missing or incomplete data 	6	6
3	<p>Data Classification Data Science Project Life Cycle</p> <ul style="list-style-type: none"> • Business Requirement • Data Acquisition • Data Preparation • Hypothesis and Modeling • Evaluation and Interpretation, Deployment. 	6	6
4	<p>Introduction to Data Mining</p> <ul style="list-style-type: none"> • The origins of Data Mining • Data Mining Tasks • OLAP and Multidimensional data analysis • Basic concept of Association Analysis and Cluster Analysis 	6	6
5	<p>Introduction to Machine Learning</p> <ul style="list-style-type: none"> • History and Evolution • AI Evolution • Statistics Vs Data Mining Vs, Data Analytics Vs, Data Science • Supervised Learning • Unsupervised Learning • Reinforcement Learning • Frameworks for building Machine Learning Systems. 	6	6
6	<p>Application of Business Analysis</p> <ul style="list-style-type: none"> • Retail Analytics 	6	6

	<ul style="list-style-type: none"> ● Marketing Analytics ● Financial Analytics ● Healthcare Analytics ● Supply Chain Analytics. 		
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Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -II Semester- III		
Course Code: 23-CSDP234C	Course Name: Practical on Data Science	Total Practicals: (30 Hours)
Teaching Scheme: 4 hrs/week	Examination Scheme: IA: 15 Marks CE: 35 Marks	No. of Credits: 2
Course Prerequisites	<ul style="list-style-type: none"> ● Problem solving using computers ● Basic mathematics and statistics ● Knowledge of Databases ● Basic knowledge of Python 	
Assignment No	Assignment	No. of Sessions
1	Data Pre-processing Write a python program to find all null values in a given data set and remove them. (Download dataset from github.com)	1
2	Write a python program to implement complete data pre-processing in a given data set.(missing value, encoding categorical value, Splitting the dataset into the training and test sets and feature scaling.(Download dataset from github.com).	1

3	<p>Classification</p> <p>Write a Python program build Decision Tree Classifier using Scikit-learn package for diabetes data set (download database from https://www.kaggle.com/uciml/pima-indians-diabetes-database)</p>	1
4	<p>Consider following dataset</p> <pre>weather=['Sunny','Sunny','Overcast','Rainy','Rainy','Rainy','Overcast','Sunny','Sunny','Rainy','Sunny','Overcast','Overcast','Rainy'] temp=['Hot','Hot','Hot','Mild','Cool','Cool','Cool','Mild','Cool','Mild','Mild','Mild','Hot','Mild'] play=['No','No','Yes','Yes','Yes','No','Yes','No','Yes','Yes','Yes','Yes','Yes','Yes','No']. Use Naïve Bayes algorithm to predict[0:Overcast, 2:Mild] tuple belongs to which class whether to play the sports or not.</pre>	1
5	<p>Association Rules</p> <p>Write a Python Programme to read the dataset (“Iris.csv”). dataset download from (https://archive.ics.uci.edu/ml/datasets/iris) and apply Apriori algorithm.</p>	1
6	<p>Write a Python program to read “StudentsPerformance.csv” file. Solve following:</p> <ul style="list-style-type: none"> - To display the shape of dataset. - To display the top rows of the dataset with their columns. - To display the number of rows randomly. - To display the number of columns and names of the columns. <p>Note: Download dataset from following link :</p> <p>https://www.kaggle.com/spscientist/students-performance-in-exams?select=StudentsPerformance.csv</p>	1
7	<p>Regression Analysis and Outlier Detection</p> <p>Consider following observations/data. And apply simple linear regression and find out estimated coefficients b_1 and b_0 Also analyse the performance of the model (Use sklearn package)</p> <pre>x = np.array([1,2,3,4,5,6,7,8]) y = np.array([7,14,15,18,19,21,26,23])</pre>	1
8	<p>Write a python program to implement multiple Linear Regression model for a car</p>	1

	<p>dataset. Dataset can be downloaded from: https://www.w3schools.com/python/python_ml_multiple_regression.asp</p>	
9	<p>Write a python program to implement k-means algorithm to build prediction model (Use Credit Card Dataset CC GENERAL.csv Download from kaggle.com)</p>	1
10	<p>Write a python program to implement hierarchical clustering algorithm. (Download Wholesale customers data dataset from github.com).</p>	1

**Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016
M.Sc. (Computer Science) Year -II Semester- III**

Course Code: 23-CSUP235	Course Name: Practical on CSUT231, CSUT232 and CSUT233	Total Practical's: 10
Teaching Scheme: 8 hrs/week 10 students per batch	Examination Scheme: IA: 30 Marks CE: 70 Marks	No. of Credits: 4
Course Prerequisites	<ul style="list-style-type: none"> ● Programming in Java ● Programming in Python ● Programming in Nodejs 	
Course Objectives:	<ul style="list-style-type: none"> ● To write java programs using Design Pattern and Frameworks to create reusable and flexible software systems. ● To understand about the process of deploying web apps using specific Frameworks. ● To write python programs using machine learning algorithms for solving practical problems. ● To understand about the process of deploying ML model. 	
Course Outcomes:	After successful completion of course students will be able to: <ul style="list-style-type: none"> ● Able to use specific frameworks as per applications need. ● Design java application using design pattern techniques. ● Process available data using python libraries and predict outcomes using Machine Learning algorithms to solve given problem. ● Able to estimate Machine Learning models efficiency using suitable metrics. 	
	Software Architecture & Design Pattern List of Assignments	
Assignment Number	Assignment Name	Number of Sessions
1	Virtual Lab Assignment Software Engineering Virtual Lab Lis of experiment <ol style="list-style-type: none"> 1. Modeling UML USE case Diagrams and Capturing Use Case Scenarios http://vlabs.iitkgp.ernet.in/se/ 2. Identifying Domain Classes From the Problem Statements 3. Modeling UML class diagram and sequence diagram 4. State Chart and Activity Modelling 5. Identifying the requirements from problem statements 6. ER Modelling from problem statements 	1
2	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() Book 6: (Page No.-67) Write a Java Program to implement I/O Decorator for converting uppercase letters to lower case letters.	

3	Write a Java Program to implement Factory method for Pizza Store with createPizza(), orederPizza(), prepare(), Bake(), cut(), box(). Use this to create variety of pizza's like NyStyleCheesePizza, ChicagoStyleCheesePizza etc. Book 6:(Page No.-125-130)	
4	Write a Java Program to implement Singleton pattern for multithreading. Book 6(Page no 180)	2
5	Write a Java Program to implement command pattern to test Remote Control. Book Page no 210)	
6	Write a Java Program to implement undo command to test Ceiling fan. Book (Page no 222)	
7	Write a Java Program to implement Adapter pattern for Enumeration iterator.(Page no 250)	3
8	Write a Java Program to implement Iterator Pattern for Designing Menu like Breakfast, Lunch or Dinner Menu Book6(Page no 326)	
9	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. Book 6(Page no 390/391)	
10	Write a java program to implement Adapter pattern to design Heart Model to Beat Model. Book 6(Page no 546/547) Design simple HR Application using Spring Framework Book 9	4
Machine Learning Practical's		
	<p>Virtual Lab for Python</p> <p>Kindly use the below link for checking Python programming</p> <ol style="list-style-type: none"> 1. Arithmetic Operations 2. Built-in Functions 3. Loops 4. Data Types 5. Strings 6. Classes and Objects 7. Built-in Modules 8. Constructors and Inheritance 9. File Operators <p>Link: Welcome to Virtual Labs - A MHRD Govt of india Initiative (vlabs.ac.in)</p>	5
1	Write a python program to Prepare Scatter Plot (Use Forge Dataset / Iris Dataset)	
2	Write a python program to find all null values in a given dataset and remove them.	
3	Write a python program the Categorical values in numeric format for a given dataset.	
4	Write a python program to implement simple Linear Regression for predicting house price.	

5	Write a python program to implement multiple Linear Regression for a given dataset.	
6	Write a python program to implement Polynomial Regression for given dataset	6
7	Write a python program to Implement Naïve Bayes.	
8	Write a python program to Implement Decision Tree whether or not to play tennis.	
9	Write a python program to implement linear SVM.	7
10	Write a python program to find Decision boundary by using a neural network with 10 hidden units on two moons dataset	
11	Write a python program to transform data with Principal Component Analysis (PCA)	8
12	Write a python program to implement k-nearest Neighbors ML algorithm to build prediction model (Use Forge Dataset)	
13	Write a python program to implement k-means algorithm on a synthetic dataset.	9
14	Write a python program to implement <i>Agglomerative clustering</i> on a synthetic dataset. Data Sets for ML <ul style="list-style-type: none"> - <u>UCI Machine Learning Repository</u> - <u>www.kaggle.com</u> 	

Web Frameworks Practical's

Note : Install node js and visual studio editor on your machine

	HTML Virtual Lab <ol style="list-style-type: none"> 1. Introduction to HTML 2. Applying Attributes in HTML Tags 3. Inserting images through img tags 4. Using Anchor Tags for Hyperlinks 5. How marquee Tags work in HTML 6. Creating Tables in HTML 7. Types of Lists in HTML 8. Working of div Tag in HTML 9. Embedding through iframe Tag 10. Creating Webpage Layout in HTML <p>Link : Virtual Labs (vlabs.ac.in)</p>	10
1	Create an HTML form that contain the Student Registration details and write a JavaScript to validate Student first and last name as it should not contain other than alphabets and age should be between 18 to 50.	
2	Create an HTML form that contain the Employee Registration details and write a JavaScript to validate DOB, Joining Date, and Salary	11

3	Create an HTML form for Login and write a JavaScript to validate email ID using Regular Expression.	12
4	Create a Node.js file that will convert the output "Hello World!" into upper-case letters:	13
5	Using nodejs create a web page to read two file names from user and append contents of first file into second file	14
6	Create a Node.js file that opens the requested file and returns the content to the client. If anything goes wrong, throw a 404 error	
7	Create a Node.js file that writes an HTML form, with an upload field	15
8	Create a Node.js file that demonstrate create database and table in MySQL	
9	Create a node.js file that Select all records from the "customers" table, and display the result object on console	16
10	Create a node.js file that Insert Multiple Records in "student" table, and display the result object on console	
11	Create a node.js file that Select all records from the "customers" table, and delete the specified record.	17
12	Create a Simple Web Server using node js	
13	Using node js create a User Login System	
14	Using node js create a eLearning System	
15	Using node js create a Recipe Book	18
16	write node js script to interact with the filesystem, and serve a web page from a file	
17	Write node js script to build Your Own Node.js Module. Use require ('http') module is a built-in Node module that invokes the functionality of the HTTP library to create a local server. Also use the export statement to make functions in your module available externally. Create a new text file to contain the functions in your module called, "modules.js" and add this function to return today's date and time.	19
18	Create a js file named main.js for event-driven application. There should be a main loop that listens for events, and then triggers a callback function when one of those events is detected	
19	Implement a simple Django application for portfolio management.	
20	Create your own blog using Django	20
21	Build your own To-Do app in Django	
22	Develop Online School System using Django	
23	Create a clone of the "Hacker News" website.	
24	Implement your E-commerce Website using Django Implement Login System using Django	

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016
M.Sc. (Computer Science) Year -II Semester- III

Course Code: 23-392	Course Name: Introduction to Constitution	Total Lectures (30 Hours)
Teaching Scheme: 2 hrs/week	Examination Scheme: CE: 25 Marks	No. of Credits: 2
Course Prerequisites:	<ul style="list-style-type: none"> ● Basic Knowledge of Computer Science Subjects ● Basic knowledge of computer networks 	
Course Objectives:	<p>This course introduces students to the Constitution of India. The Constitution, being supreme law of the land, must be known to every citizen of India. It begins with the Preamble, which indicates the source and objects of it.</p> <p>We, the people of India, are the source of the Constitution and have resolved to constitute India into a sovereign, socialist, secular, democratic and republic. The Course has been designed for everyone to make acquaint themselves with their fundamental rights and of others. No right is absolute one; it is subject to others right, as well. Directive Principles of State Policy are nothing but rights, though not enforceable by any court. These Directive Principles are basically ‘Fundamental Principles’ in the governance of the country. Powers and freedoms come with responsibility, State’s responsibility to implement Directive Principles and citizens must perform their duties towards others, society and nation.</p>	
Course Outcomes:	<p>After successful completion of course students will be able to:</p> <ul style="list-style-type: none"> ● To introduce the philosophy of Constitution of India to students. ● To acquaint them with their freedoms and responsibilities. 	
UNIT	Course Contents	No. of hours
I	<p>PHILOSOPHY OF THE INDIAN CONSTITUTION</p> <p>a) Constitutional History of India b) Role of Dr. B.R. Ambedkar in Constituent Assembly c) Preamble – Source and Objects d) Sovereign and Republic e) Socialist and Secular f) Democratic – Social and Economic Democracy g) Justice – Social, Economic and Political h) Liberty – Thought, Expression, Belief, Faith and Worship</p>	5

	<ul style="list-style-type: none"> i) Equality – Status and Opportunity j) Fraternity, Human Dignity, Unity and Integrity of the Nation 	
II	FUNDAMENTAL RIGHTS <ul style="list-style-type: none"> a) Right to equality b) Right to freedoms c) Right against exploitation d) Right to freedom of religion e) Cultural and educational rights f) Right to property g) Right to constitutional remedies 	10
III	DIRECTIVE PRINCIPLES OF STATE POLICY <ul style="list-style-type: none"> a) Equal Justice and free legal aid b) Right to work and provisions for just and humane conditions of work c) Provision for early childhood, Right to education and SC,ST, weaker section d) Uniform Civil Code e) Standard of Living, nutrition and public health f) Protection and improvement of environment g) Separation of Judiciary from executive h) Promotion of International peace and security 	10
IV	FUNDAMENTAL DUTIES <ul style="list-style-type: none"> a) Duty to abide by the Constitution b) Duty to cherish and follow the noble ideals c) Duty to defend the country and render national service d) Duty to value and preserve the rich heritage of our composite culture e) Duty to develop scientific temper, humanism ,the spirit of inquiry & reform f) Duty to safeguard public property and abjure violence g) Duty to strive towards excellence 	5

References:

<ul style="list-style-type: none"> a) D. D. Basu, Introduction to the Constitution of India, LexisNexis b) Granville Austin, The Constitution of India: Cornerstone of a Nation, Oxford University Press c) Subhash Kashyap, Our Constitution, National Book Trust d) M.P. Jain, Indian Constitutional Law, LexisNexis V.N.Shukla, Constitution of India, Eastern Book Company f) P.M. Bakshi, The Constitution of India, Universal Law Publishing g) M.V.Pylee, Constitutional Government in India, S. Chand h) V. S. Khare, Dr. B.R.Ambedkar and India’s National Security

- i) डॉ. सत्यरंजन साठे, भारताच्या राज्यघटनेची ५० वर्षे, कॉन्टिनेन्टल प्रकाशन
 j) नरेन्द्र चपळगावकर, राज्यघटनेचे अर्धशतक, मौज प्रकाशन गृह
 k) सुहास पळशीकर, राजकारणाचा ताळेबंद भारतीय लोकशाहीची वाटचाल, साधना प्रकाशन
 l) जयदेव गायकवाड, संविधान सभेत डॉ. आंबेडकर, पद्मगंगा प्रकाशन
 m) झिया मोदी, टेन जजमेंट्स दॅट चेंज् इंडिया, सकाळ प्रकाशन
 n) डॉ. रावसाहेब कसबे, डॉ. आंबेडकर आणि भारतीय राज्यघटना, सुगावा प्रकाशन

**Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016
 M.Sc. (Computer Science) Year -I Semester- I**

Course Code: 23-392	Course Name: Introduction to Cyber Security / Information Security- III	Total Lectures (14 Hours)
Teaching Scheme: 2 hrs/week	Examination Scheme: IA: 10 Marks CE: 15 Marks	No. of Credits: 1
Course Prerequisites:	<ul style="list-style-type: none"> • Basic Knowledge of Computer Science Subjects • Basic knowledge of computer networks 	
Course Objectives:	<ul style="list-style-type: none"> • To understand networking concepts • To learn cryptography, security concepts in networking 	
Course Outcomes:	<ul style="list-style-type: none"> • After successful completion of course students will be able to: • Learn various computer networking concepts • Understand need and applications of information security • Learn different security threats and vulnerabilities • Learn different cryptographic techniques in computer networks 	
Chapter	Course Contents	No. of Lectures
Module 3: Information and Network Security		
1	Chapter 1: Access Control and Intrusion Detection 1. Overview of Identification and Authorization 2. Overview of IDS 3. Intrusion Detection Systems and Intrusion Prevention Systems	4
2	Chapter 2: Server Management and Firewalls 1. User Management 2. Overview of Firewalls 3. Types of Firewalls 4. DMZ and firewall features	4

3	Chapter 3: Security for VPN and Next Generation Technologies 1. VPN Security 2. Security in Multimedia Networks 3. Various Computing Platforms: HPC, Cluster and Computing Grids 4. Virtualization and Cloud Technology and Security	6
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Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016
M.Sc. (Computer Science) Year -II Semester- IV

Course Code: 23-CSUIT241	Course Name: Industrial Training /Institutional project	
Teaching Scheme: 2 hrs/week	No. of Credits: 20	
Course Prerequisites:	The Industrial Training /Institutional project is equivalent to 5 theory courses of 4 credits each. Marks per 4 credits = 100. The total weightage for Industrial/Institutional training is 500 marks.	
<p>Workload :</p> <ol style="list-style-type: none"> 1. One mentor to be assigned for 5 students. 2. 2 hours /week to be allotted for 5 students 		
	<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

Examination and Evaluation guidelines

- The project done during internship period will be evaluated in the following manner:
IA - 150 marks + UE-350 marks.
- The final presentation and documentation will be evaluated by three examiners:
 1. Student mentor (appointed by respective college)
 2. External examiner (appointed by the University)
 3. IT expert (appointed by respective college)

IA (150 marks)				
Weekly Attendance	Weekly Reports	First Presentation	Second Presentation	Documentation
20	40	20	40	30

UE (350 marks)		
Mentor	IT Expert	External Examiner
100	125	125

Recommended Documentation contents:

Title page

Company / Institute certificate Internship
completion certificate **Abstract**

Introduction

- motivation
- problem statement
- purpose/objective and goals
- literature survey
- project scope and limitations

System analysis

- Comparative study of Existing systems
- scope and limitations of existing systems
- project perspective, features
- stakeholders
- Requirement analysis - Functional requirements, performance requirements, security requirements etc.

System Design

- Design constraints
- System Model: UML diagrams
- Data Model

User interfaces

Implementation details

- Software/hardware specifications, etc.

Reports Testing

Test Plan, Black Box Testing or Data Validation Test Cases, White Box Testing or
Functional Validation Test cases and results

Conclusion and Recommendations Future

Scope

Bibliography and References

Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- I		
Course Code: 23-492	Course Name: Introduction to Cyber Security / Information Security- IV	Total Lectures (14 Hours)
Teaching Scheme: 2 hrs/week	Examination Scheme: IA: 10 Marks CE: 15 Marks	No. of Credits : 1
Course Prerequisites:	<ul style="list-style-type: none"> ● Basic Knowledge of Computer Science Subjects ● Basic knowledge of computer networks 	
Course Objectives:	<ul style="list-style-type: none"> ● To understand networking concepts ● To learn cryptography, security concepts in networking 	
Course Outcomes:	<ul style="list-style-type: none"> ● After successful completion of course students will be able to: ● Learn various computer networking concepts ● Understand need and applications of information security ● Learn different security threats and vulnerabilities ● Learn different cryptographic techniques in computer networks 	
Chapter	Course Contents	No. of Lectures
Module 4: System and Application Security		
1	Chapter 1: Security Architectures and Models 1. Designing Secure Operating Systems 2. Controls to enforce security services 3. Information Security Models	2
2	Chapter 2: System Security 1. Desktop Security 2. email security: PGP and SMIME 3. Web Security: web authentication, SSL and SET 4. Database Security	2
3	Chapter 3: OS Security 1. OS Security Vulnerabilities, updates and patches 2. OS integrity checks 3. Anti-virus software 4. Configuring the OS for security 5. OS Security Vulnerabilities, updates and patches	6

4	Chapter 4: Wireless Networks and Security 1.Components of wireless networks 2. Security issues in wireless	4
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Modern College of Arts, Science and Commerce (Autonomous), Ganeshkhind, Pune 411016 M.Sc. (Computer Science) Year -I Semester- I

Course Code: 23-494	Course Name: Skill Development II	Total Lectures (14 Hours)
Teaching Scheme: 2 hrs/week	Examination Scheme: IA: 10 Marks CE: 15 Marks	No. of Credits: 2
Student are informed to perform project based on any technology/language/platform		