

Dr Ambedkar Institute of Technology, Bengaluru-56

Department of Master of Computer Applications

Scheme and Syllabus - CBCS – 2022 -2024

Semester	INTER DEPARTMENTAL ELECTIVE (IDE)						
Course Title	DATA SCIENCE USING PYTHON						
Course Code	22MCAE01						
Category	Computer Applications						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
CIE Marks: 50	SEE Marks: 50		Total Max. marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVE:

- **Describe the Fundamentals of Python**
- **Demonstrate the python data structure**
- **Implement the data wrangling and data preprocessing**
- **Understand and learn data analytics concept using Numpy, pandas and data visualization.**

UNIT I: Python Collections	6 hours
Strings: Creating and storing strings, string operations, formatting Strings. Lists: Basic List operations, Built in functions used on lists, List Comprehensions. Tuples and Sets: Basic Operations on Tuples, Functions to Process Tuples. Set Methods, set operations. Dictionaries: Operations on Dictionaries, Dictionary Methods.	
UNIT II: Numpy, Pandas and Data Visualization	09 hours
Numpy: The Numpy Array, N-dimensional array operations and manipulations. Data processing using arrays. Pandas: Essential Functionality, Data frames, computing descriptive statistics, Time series analysis with pandas. Data Visualization: Matplotlibs package-plotting graphs-controlling Graph-Adding Text- More Graph types. Data Visualization with Seaborn.	
UNIT III: Introduction to Data Science, Data Pre-processing and Data Wrangling	10 hours
Introduction to Data Science: Introduction to Data science, Applications of Data Science, Roles, components, Life cycle of data science. Acquiring Data with python: Loading from different files, Accessing databases. Data Wrangling: Missing values, duplicate, grouping, merging, combining, concatenating Reshaping(pivoting), Data Transformation –Mapping.	
Understanding Descriptive statistics, standard deviations, probability distribution, Normal distribution-Skewness, kurtosis, Inferential statistics-Hypothesis testing- t-test -One Sampled t-test, Correlation - Person correlation coefficient.	
UNIT V: Modelling Techniques	09 hours

<p>Classification techniques-Naïve Bayes classifier, K Nearest Neighbor Classification Technique.</p> <p>Implementation in Python</p> <p>Clustering techniques, Applications, k-means Clustering algorithm, Performance of k-means, choosing Initial centroid- Implementation in Python, Efficiency using Confusion matrix</p>
--

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES:

C01: Understand the Fundamentals of Python programming

CO2: Demonstrate various features of python programming for building applications.

CO3: Apply python programming for designing the applications efficiently.

CO4:Design and Develop applications to be deployed in real world scenarios.

TEXT BOOKS

1. Python for Data Analysis 2nd Edition, O'Reilly Publications
2. Python Data Analytics Fabio Nelli , APRESS
3. Data Science from Scratch, Joel Grus, O'Reilly Publications

REFERENCE BOOKS

1. Python Data Science Handbook, Essential Tools for Working with Data, Jake VanderPlas, O'Reilly Publications
2. Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining, Addison-Wesley, 2005

SCHEME FOR EXAMINATIONS

- Each full question consists of 20 marks.
- Questions are set covering all the topics under each module

MAPPING of COs with POs

[illegible]

Dr Ambedkar Institute of Technology, Bengaluru-56

Department of Master of Computer Applications

Scheme and Syllabus - CBCS – 2022 -2024

Semester	INTER DEPARTMENTAL ELECTIVE (IDE)						
Course Title	R PROGRAMMING FOR DATA SCIENCE						
Course Code	22MCAE02						
Category	Computer Applications						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
CIE Marks: 50	SEE Marks: 50		Total Max. marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVE:

To understand the concepts of Data science.

To analyse the sampling techniques for data classification.

To implement modelling methods for machine learning problems.

Analyzing data from files and visualizing graphical presentations using R.

UNIT I: Data Science	08 hours
Introduction, Evolution of data science, Data science process – roles, stages in datascience project – components of the Data Science lifecycle, data analytics, exploring data – managing data –cleaning and sampling for modeling and validation.	
UNIT II: Exploratory Data Analysis using R	08 hours
Introduction, R features basic data types, Vectors, Lists, Arithmetic, logical & MatrixOperations, Control structures, Functions in R, Data frames, Reading Data & cleaning data, Data visualization techniques –Histograms, box plot, bar chart, scatter plot.	
UNIT III: Statistical Analysis	08 hours
Descriptive statistics, Inferential Statistics-Hypothesis testing- t-test -One Sampledand two sampled tests, Correlation -Person correlation coefficient. Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions	
UNIT IV: Data Science algorithms	08 hours
Classification of Regression Analysis, Regression process, Linear Regression, Understanding Linear regression, making prediction-hypothesis on regression coefficients, multiple Linear Regression, concepts and formulas, Logistic regression,Model building and making predictions, Adding best fit.	
UNIT V: Analytical Algorithms	08 hours
Classification techniques-Decision Trees, K Nearest Neighbor ClassificationTechnique. Implementation in R Clustering techniques, Applications, k-means Clustering algorithm, Performance ofk-means, choosing Initial centroid- Implementation in R, Efficiency using	

Dr Ambedkar Institute of Technology, Bengaluru-56

Department of Master of Computer Applications

Scheme and Syllabus - CBCS – 2022 -2024

Semester	INTER DEPARTMENTAL ELECTIVE (IDE)						
Course Title	FULL STACK WEB DEVELOPMENT						
Course Code	22MCAE03						
Category	Computer Applications						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
CIE Marks: 50	SEE Marks: 50		Total Max. marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVES:

- To design as web page using front end technologies
- To develop application with server-side scripting tools
- To develop web application with REST APIs and use of framework to communicate client-server applications.
- To build as responsive web application with managing NOSQL databases.

UNIT I: Introduction to React	8 hours
The Basics-Introduction, Installation, getting started -hello world program, Lifecycle of Components, Page Setup, The Virtual DOM, React Elements, React DOM, Children, constructing elements with data, React Components, DOM Rendering.	
UNIT II: Reacts & Props	8 hours
React Props- Passing data- using properties, react state-setting state, Event handling, communicating from child to parent. Designing components- state vs props	
UNIT III: Programming in NodeJS	8 hours
Node.js Installation getting started, Control flow, asynchronous pattern callback, REPL-an interactive environment, nested callbacks and exception handling, Routing Traffic, Serving Files and Middleware: Building a Simple Static File Server from Scratch, Middleware-routers	
UNIT IV: Expressing REST APIs	8 hours
HTTP Methods as actions- REST API-handling GET and POST method, file upload, Express-Installation, Routing, Handler Functions, The List API-automatic Server Restart, testing, Create API, Error Handling.	
UNIT V: MongoDB	8 hours
Introduction to MongoDB: -Installation-Databases, Data Types, data formats, Introduction to the MongoDB Shell, Running the Shell, Creating, Updating, Deleting and Querying Documents- CRUD operations with NodeJS and querying with documents.	

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES:

CO1: Demonstrate basic concepts of react, node, express and mongo dB technologies.

CO2: Design an application and apply the knowledge of React.js, Node.js, Express.js and MongoDB for a given scenario.

CO3: Develop interactive web applications on server side with NodeJS and MongoDB.

CO4: Build responsive web application communicating with REST API and managing data with NOSQL databases.

TEXT BOOKS

1. MERN Quick Start Guide, Eddy Wilson Iriarte Koroloiva, 2018, PACKT Publication, ISBN 978-1-78728-108-0
2. Learning React Functional Web Development with React and Redux, Alex Banks and Eve Porcello, O'Reilly Media, Inc., May 2017
3. Pro MERN Stack, Vasan Subramanian, 2019, ISBN-13(pbk):978-1-4842-2653-7

REFERENCE BOOKS

1. MERN Quick Start Guide, Eddy Wilson Iriarte Koroloiva, 2018, PACKT Publication, ISBN 978-1-78728-108-0.

EBOOKS/ONLINE RESOURCES

1. <http://www.nptel.ac.in>
2. <https://en.wikipedia.org>

SCHEME FOR EXAMINATIONS

- Each full question consists of 20 marks.
- Questions are set covering all the topics under each module

MAPPING of COs with POs

[illegible]

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Master of Computer Applications
Scheme and Syllabus - CBCS – 2022 -2024

Semester	INTER DEPARTMENTAL ELECTIVE (IDE)						
Course Title	ETHICAL HACKING						
Course Code	22MCAE04						
Category	Computer Applications						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
CIE Marks: 50	SEE Marks: 50		Total Max. marks=100		Duration of SEE: 03 Hours		

COURSE OBJECTIVE:

- **Students will remember and understand the fundamental aspects and importance of ethical hacking.**
- **Students will gain knowledge on the basic working principles of Kali Linux environment.**
- **Students will apply the hacking tools to identify the security issues and exploitable insecurities.**
- **Students will analyze and assess the effectiveness of the security policies.**

UNIT I : Introduction to IoT	8 hours
Concept of Ethical Hacking: Hacking, Hackers, Types of Hackers - Phases of hacking: Reconnaissance, Scanning, Gaining Access, Maintaining access, Clearing tracks, Reporting	
Ethical Hacking - Working of an ethical hacker, responsibilities	
Vulnerabilities: Human and System - Exploits: Gaining access and denying access	
Gaining access: Social engineering, Passive password acquisition, Phishing, Spear-phishing, and Whaling	
Web Exploits: SQL Injection, URL Manipulation, Cross-Site Scripting and Request	
Malicious activity: Denial-of-Service attacks, malware, viruses, worms	
Wireless Hacking: Hacking Wi-Fi, Wi-Fi Encryption Protocols, Wi-Fi Attacks	
Defensive Security: Protecting self, password and email practices, computer software security, network security and encryption, web application security	
UNIT II : Getting started with Kali Linux and Getting anonymous	8 hours
Installing VMWare, Kali Linux – Overview	
Command line arguments: ls, cd, mkdir, rmdir, cp, rm, mv, updatedb, grep, echo, man	
Networking Commands: ifconfig, iwconfig, ping, arp, netstat, route	
Editing Commands: echo, cat, replacing, appending, touch, nano, gedit	
Installing updates and tools: wget, sudo apt install, sudo apt remove, sudo apt upgrade, apt-get, sudo apt update, sudo su	
Users and Privileges: chmod, useradd, userdel, passwd	

Anonymity: Working with Proxychains: installation, tor service, proxychains.conf	
Address Spoofing: What is Address Spoofing, MAC address spoofing – Spoofing with Macchanger.	
UNIT III: Information Gathering and Scanning	8 hours
Reconnaissance: What is Reconnaissance? Types – HTTrack: Features - Working with HTTrack and WebHTTrack	
Information gathering: What is information gathering? - Types – Maltego: Features - Working with Maltego	
Recon-ng: What is Recon-ng and Features – uses – Working with Recon-ng recon-ng: Workspaces – databases – marketplace and modules – API keys	
Passive information gathering tool: Dmitry: Features and usages – Working with Dmitry	
Scanning: Definition, Phases of scanning: Determining live systems, using ping and ping sweeps – Port scanning: Working with Nmap-Nmap scanning commands – Nmap for TCP connect scan, Nmap for SYN scan, Nmap for Xmas scan, Nmap for Null scan	
UNIT IV : Exploitation	8 hours
Exploits: What is Exploits? Types: Active and Passive, Gaining access to remote services: Working with Medusa	
Network sniffing: What is network sniffing – Types – network sniffing with wireshark	
Metasploit: Working with Metasploit framework - Modules: Exploit, payloads, auxillary, post-exploitation, NOP generator - working with MSFconsole - MSFconsole commands – Payloads in Metasploit - Using the database in Metasploit	
Password cracking: Definition – Working with John the ripper tool	
UNIT V : Web-based Exploitation and Maintaining Access	8 hours
Web application analysis: Spidering a website - burpsuite: Features – Tools: spider, proxy, intruder, repeater, sequencer, decoder, extender, scanner– spidering with burpsuite	
Wireless attacks: Features of aircrack-ng – monitoring, attacking, testing, cracking– working with aircrack-ng	
Maintaining Access: Definition – Tools: backdoor, covert channel, root kit, data exfiltration	

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES:

- CO1: Remember the fundamental aspects of hacking and understand the role of ethical hacking
CO2: Develop a practical understanding on the basic principles and techniques of Kali Linux
CO3: Apply various hacking tools to gather information and gain access to networks and systems
CO4: To build a network system with an offensive security strategy.

TEXT BOOKS

1. Basics of hacking and penetration testing, Patrick Engebretson, Elsevier, 2011 edition
2. Computer Hacking Beginner's Guide. Alan T. Norman

REFERENCE BOOKS

1. Hacking: The Art of Exploitation, John Ericson, 2nd Edition
2. Penetration Testing: A Hands-On Introduction to Hacking by Georgia Weidman.
3. Hacking for Beginners: Manthan Desai -2010.

SCHEME FOR EXAMINATIONS

- Each full question consists of 20 marks.
- Questions are set covering all the topics under each module

MAPPING of COs with POs

[illegible]