

NIRMA UNIVERSITY

Institute:	Institute of Technology
Name of Programme:	BTech CSE, Integrated BTech (CSE)-MBA, BTech CSE (Artificial Intelligence & Machine Learning)
Course Code:	XXXX
Course Title:	Open Source Technologies
Course Type:	Department Elective-I
Year of Introduction:	2024-25

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Course Learning Outcomes (CLO):

At the end of the course, students will be able to-

1. demonstrate proficiency in using popular open-source development tools and frameworks (BL2)
2. apply open source solutions to real-world problems with various databases (BL3)
3. inspect suitable open-source tools for the given problem (BL4)
4. propose a solution to data science and AI projects using open source technologies. (BL6)

Unit	Contents	Teaching Hours (Total 45)
Unit-I	Introduction to Open Source Technologies: Definition and history of open source, Importance and advantages of open source, Key open source licenses (GPL, MIT, Apache), Examples of successful open source projects	08
Unit-II	Open Source Development Tools: Version control systems (e.g., Git), Integrated Development Environments (IDEs), Package managers (e.g., npm, pip), Code collaboration platforms (GitHub, GitLab)	08
Unit-III	Open Source Web Development: Introduction to web development with open source technologies, Using HTML, CSS, and JavaScript with open source libraries and frameworks (e.g., Bootstrap, jQuery), Server-side scripting with open source languages (e.g., Python, Ruby), Building web applications with open source frameworks (e.g., Django, Ruby on Rails)	08
Unit-IV	Open Source Databases: Introduction to open source databases (e.g., MySQL, PostgreSQL), Database design and management, SQL and NoSQL databases, Interfacing databases with applications	08
Unit-V	Open Source in Data Science and AI: Introduction to open source data science tools (e.g., Jupyter, Pandas), Machine learning and AI libraries (e.g., TensorFlow, scikit-learn), Data visualisation with open source tools (e.g., Matplotlib, Seaborn)	05
Unit-VI	Open Source Security and Privacy: Open Source Security Tools, Privacy Considerations, Ethical Hacking and Penetration Testing	08

Self-Study:

The self-study contents will be declared at the commencement of the semester. Around 10% of the questions will be asked from self-study content

Suggested Readings/ References:

1. Scott Chacon And Ben Straub, "Pro Git", Apress
2. Dimitri Fontaine, "The Art of PostgreSQL", Paperback
3. Michael Bazzell, "Open Source Intelligence Techniques", CCI Publishing
4. Scott Murray, "Interactive Data Visualisation for The Web", O'Reilly
5. Aravind Shenoy And Ulrich Sossou, "Learning Bootstrap", Packt Publishing

Laboratory Work:

Laboratory work will be based on the above syllabus with a minimum of 10 experiments to be incorporated. The students in a suitable group size will design and perform one experiment as a part of Laboratory work.

Sr. No.	List of Experiments/Exercises	Hours
1	HTML and CSS Webpage: Create a basic HTML webpage with CSS styling. Customize the page layout, fonts, and colors.	02
2	JavaScript Interactivity: Enhance the HTML webpage with JavaScript to add interactivity. Implement features like image sliders, form validation, or simple games.	02
3	Database Management with MySQL: Install MySQL and create a database. Perform SQL operations, including table creation, data insertion, and querying.	02
4	Data Visualisation with Matplotlib: Use Matplotlib to create various data visualisations, such as bar charts, scatter plots, and histograms.	02
5	Set up a Django project and create a basic web application.	02
6	Build a responsive webpage layout using the Bootstrap framework. Customize the design and explore Bootstrap components.	04
7	Use jQuery to manipulate a webpage's Document Object Model (DOM).	04
8	Install Jupyter Notebook and create a Jupyter notebook. Learn the basics of data manipulation with Pandas, including data loading, cleaning, and exploration.	04
9	Exploratory Data Analysis (EDA): Perform an EDA on a given dataset using Pandas and Matplotlib. Visualize data distributions, correlations, and trends.	04
10	Use Python to interact with a database using SQLite. Create a basic CRUD (Create, Read, Update, Delete) application with a database.	04