

INSTITUTE	FACULTY OF TECHNOLOGY
PROGRAM	BACHELOR OF TECHNOLOGY (COMPUTER ENGINEERING)
SEMESTER	5
COURSE TITLE	OPEN SOURCE TECHNOLOGIES
COURSE CODE	01CE0526
COURSE CREDITS	3

Objective:

- 1 This course enables students to analyze and apply open-source technologies through the study of software licensing models, version control systems, package managers, and deployment platforms. Students will also evaluate and use open-source tools for application development, automation, and testing in real-world scenarios. The course emphasizes hands-on exploration and understanding of contributions within open- source communities.

Course Outcomes: After completion of this course, student will be able to:

- 1 Understand the principles of Open Source Software and explore various open-source licenses
- 2 Apply version control tools for effective team collaboration and code management
- 3 Analyze the architecture and deployment strategies of full-stack open-source applications to determine their suitability for various industry use cases
- 4 Analyze open-source database architecture and create databases and related objects
- 5 Evaluate software reliability using open-source testing frameworks and tools

Pre-requisite of course: Basic understanding of operating systems, programming and web technologies.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
2	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	Introduction to Open Source, Licensing and Communities Definition, History, OSS vs Proprietary vs Freeware, GPL, MIT, BSD, Apache, LGPL Copyleft vs Permissive, Copyright, Patent and, Trademark, Communication platforms	6
2	Version Control Systems Git Basics, Git workflows (feature branches, pull requests), GitHub/GitLab/Bitbucket usage.	5

Contents : Unit	Topics	Contact Hours
3	Web App Development using OSS Frameworks Introduction to Laravel, Django, Node.js, MVC architecture overview, Setting up development environments,	6
4	Open-Source Databases Relational - MySQL and PostgreSQL - Basic setup, CRUD operations, common use cases,, Non-Relational - MongoDB - Document-based model,, CRUD operations, basic comparison with SQL, MySQL workbench and MongoDB compass - GUI for interaction.	6
5	Open-Source Testing and Automation Tools: Unit testing (PyTest, PHPUnit, JUnit), Web testing (Selenium, JMeter), API testing (Postman), Security testing (OWASP ZAP).	5
Total Hours		28

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Practical 1 Explore GitHub/GitLab for open-source projects with different licenses.	2
2	Practical 2 Setup git and explore commands related to VCS.	2
3	Practical 3 Create a GitHub/GitLab repository and upload sample code.	2
4	Practical 4 Implement CI/CD Pipeline using GitHub Actions / GitLab CI.	2
5	Practical 5 Develop a Laravel/Django based web application.	2
6	Practical 6 Deploy a simple app using Nginx/Apache.	2
7	Practical 7 Setup Nginx to handle proxy request and load balancing.	2
8	Practical 8 Use MongoDB to create a NoSQL database, perform CRUD operations, and query documents using basic operators.	2
9	Practical 9 Use PostgreSQL to create a relational database, design tables, and perform CRUD operations using SQL queries.	2
10	Practical 10 Use pytest to test python application.	2
11	Practical 11 Use selenium to create browser-based test.	2
12	Practical 12 Use Postman to test sample API.	2

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
13	Practical 13 Use OWASP ZAP to check security integrity.	2
14	Practical 14 Use JMeter to test web application for load testing.	2
Total Hours		28

Textbook :

- 1 Producing Open Source Software, Karl Fogel, O'Reilly Media, 2005

References:

- 1 Pro Git, Pro Git, Scott Chacon & Ben Straub, Apress, 2014
- 2 Automate the Boring Stuff with Python Al Sweigart, Automate the Boring Stuff with Python Al Sweigart, AL Sweigart, No Starch Press, 2015
- 3 MongoDB: The Definitive Guide, MongoDB: The Definitive Guide, Kristina Chodorow, O'Reilly Media, 2013
- 4 Selenium Testing Tools Cookbook, Selenium Testing Tools Cookbook, Unmesh Gundecha, Packt Publishing, 2015

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
0.00	10.00	40.00	40.00	10.00	0.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and the needs of students. The teacher, in addition to conventional teaching methods by black board, may also use any tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in the laboratory.

Supplementary Resources:

- 1 <https://www.edx.org/certificates/professional-certificate/linuxfoundationx-open-source-software-development-linux-and-git>
- 2 <https://www.coursera.org/specializations/oss-development-linux-git>

Supplementary Resources:

- 3 <https://docs.github.com/>
- 4 <https://www.selenium.dev/documentation/>