

Birla Institute of Technology & Science, Pilani
Work Integrated Learning Programmes
Course handout

Part A: Content Design

Course Title	Open Source Software Engineering
Course No(s)	SE ZG587
Credit Units	4
Course Author	Kumar Manish
Version No	3.0
Date	July 2023

Course Objectives:

No	Course Objective
CO1	To enable students to learn basic and advanced concepts in Open Source Software Engineering, as employed by the open-source community
CO2	To familiarize students with the open source movement, its philosophy and the history behind it
CO3	To provide a deeper understanding of various licensing issues associated with open source software and its societal, commercial, legal and philosophical origins and impacts
CO4	To enable students to understand open source process, its development methods, associated tools and communication mechanisms

Learning Outcomes:

No	Learning Outcome
LO1	Students will be able to understand and explain the nature of open source software, and the ways in which it differs from proprietary software
LO2	Students will be able to describe the concept of software licensing for open source software, distinguish between different types of licences, and be able to choose an appropriate license type keeping in mind the associated rules and regulations
LO3	Students will be able to understand development process and use them to develop open source software by effectively collaborating with fellow student or community members
LO4	Students will be able to contribute to the development of open source software

The following advisory pre-requisites are not mandatory, however, student would benefit more if he/she has good knowledge of the

following courses:

- Software Engineering or its equivalent
- Object Oriented Programming (with Java) or its equivalent

Reference Books and Material:

R1	Producing Open Source Software: How to Run a Successful Free Software Project, 2nd edition, Karl Fogel
R2	Practical Open Source Software Exploration, Greg DeKoenigsberg, Chris Tyler, Karsten Wade, Max Spevack, Mel Chua, and Jeff Sheltren
R3	Getting Started With Open Source Software Development by Rachna Kapur, Mario Briggs, Tapas Saha, Ulisses Costa, Pedro Carvalho, Raul F. Chong, Peter Kohlmann; DB2 ON CAMPUS Book Series
Web References	
W1	Open Source Initiative (https://opensource.org/)
W2	Open Source Resources (https://opensource.com/)
W3	Open Source Guides (https://opensource.guide/)
W4	Working with GitHub for Open Source Software Development (https://github.com/)

Content Structure

Module No	List of Topic Title
M1	Introduction to Open Source Software <ul style="list-style-type: none">• What is Open Source Software?• Principles of Open Source Software• Advantages and Disadvantages of OSS• Cost of Open Source Software• History of Open Source Software
M2	Understanding Free and Open Source <ul style="list-style-type: none">• Understanding Free Software• Understanding Open Source Software• Understanding Freeware• Understanding Public- domain Software
M3	Understanding Open Source Licensing Models <ul style="list-style-type: none">• Understanding Intellectual Property Rights and Software Licenses• Licensing models in OSS: Copyright, Copyleft, Permissive, Creative Commons• Choosing an Open Source License

M4	Understanding Open Source Business Model <ul style="list-style-type: none"> • Dual Licensing and Open Core Model • Selling users, services and merchandise • Donations, funding and Crowd-Sourcing • Other business models
M5	Lifecycle and methodologies in Open Source Software <ul style="list-style-type: none"> • Open Collaboration Model • Community Driven Development • Open Source Software Development Process Model • Unique characteristics of the Open Source Software Development Process Model • Comparing OSS development methodologies with traditional methodologies
M6	Contributing to Open Source Software Projects <ul style="list-style-type: none"> • Contribution models and roles in OSS • Familiarizing yourself with the open source software ecosystem • Starting your own Open Source Project • Best practices in running/ managing OSS project
M7	Working with Git/GitHub/GitHub Desktop <ul style="list-style-type: none"> • Working with GitHub and GitHub Desktop App • Working with Git: Unique Characteristics of Git • Working with Repositories -Push-Pull model • GitHub Workflows • Git Branching • Working with GitHub pages • Mastering Markdown
M8	Tools and Technologies in OSSE <ul style="list-style-type: none"> • Collaboration Tools • Communication Tools • Source Code Management Tools
M9	Understanding Open Source Projects (Case Study): <ul style="list-style-type: none"> • Linux Project • Kubernetes Project • Eclipse Project • Moodle Project

Part B: Contact Session Plan

Academic Term	First Semester 2022-2023
Course Title	Open Source Software Engineering
Course No	SE ZG587
Lead Instructor	Kumar Manish

Glossary of Terms

- Contact Hour (CH) stands for a hour long live session with students conducted either in a physical classroom or enabled through technology. In this model of instruction, instructor led sessions will be for 22 CH.
 - Pre CH = Self Learning done prior to a given contact hour
 - During CH = Content to be discussed during the contact hour by the course instructor
 - Post CH = Self Learning done post the contact hour
- Contact Hour (CS) stands for a two-hour long live session with students conducted either in a physical classroom or enabled through technology. In this model of instruction, instructor led sessions will be for 11 CS.
 - Pre CS = Self Learning done prior to a given contact session
 - During CS = Content to be discussed during the contact session by the course instructor
 - Post CS = Self Learning done post the contact session
- RL stands for Recorded Lecture or Recorded Lesson. It is presented to the student through an online portal. A given RL unfolds as a sequences of video segments interleaved with exercises
- SS stands for Self-Study to be done as a study of relevant sections from textbooks and reference books. It could also include study of external resources.
- LE stands for Lab Exercises
- HW stands for Home Work.
- M stands for module. Module is a standalone quantum of designed content. A typical course is delivered using a string of modules. M2 means module 2.

Teaching Methodology (Flipped Learning Model)

The pedagogy for this course is centred around flipped learning model in which the traditional class-room instruction is replaced with recorded lectures to be watched at home as per the student's convenience and the erstwhile home-working or tutorials become the focus of classroom contact sessions. Students are expected to finish the home works on time.

Contact Session Plan

- Each Module (M#) covers an independent topic and module may encompass more than one Recorded Lecture (RL).
- Contact Sessions (2hrs each week)** are scheduled alternate weeks after the student watches all Recorded Lectures (RLs) of the specified Modules (listed below) during the previous week
- In the flipped learning model, Contact Sessions are meant for in-classroom discussions on cases, tutorials/exercises or responding to student's questions/clarification--- may encompass more than one Module/RLs/CS topic.
- Contact Session topics listed in course structure (numbered CSx.y) may cover several RLs; and as per the pace of instructor/students' learning, the instructor may take up more than one CS topic during each of the below sessions.

Detailed Structure

Introductory Video/Document: << *Introducing the faculty, overview of the course, structure and organization of topics, guidance for navigating the content, and expectations from students* >>

- Each of the sub-modules of **Recorded Lectures (RLx.y)** shall delivered via **30 – 60mins videos** followed by:
- Contact session (CSx.y)** of 2Hr each for illustrating the concepts discussed in the videos with exercises,

tutorials and discussion on case-problems (wherever appropriate); contact sessions (CS) may cover more than one recorded-lecture (RL) videos.

Course Contents

Contact Session 1

Time	Type	Description	Content Reference
Pre CS	RL1.1	What is Open Source Software?	Lecture Notes & Slides
	RL1.2	Principles of Open Source Software	Lecture Notes & Slides
	RL1.3	Advantages and Disadvantages of OSS	Lecture Notes & Slides
	RL1.4	Cost of Open Source Software	Lecture Notes & Slides
	RL1.5	History of Open Source Software	Lecture Notes & Slides
During CS	CS	Introduction to Open Source Software <ul style="list-style-type: none"> What is Open Source Software? Principles of Open Source Software Advantages and Disadvantages of OSS Cost of Open Source Software History of Open Source Software 	R1, R2, R3 Web Resources: W1
Post CS	SS1	Recommended Reading: <ul style="list-style-type: none"> https://opensource.org 	
	HW1	<ul style="list-style-type: none"> Apart from open source software, what other areas operate through the open-collaboration model. Identify, list and elaborate. Identify categories of Open Source Software currently available and give at-least two examples of each. 	
Lab Reference			

Contact Session 2

Time	Type	Description	Content Reference
Pre CS	RL2.1	Understanding Free Software	Lecture Notes & Slides
	RL2.2	Understanding Open Source Software	Lecture Notes & Slides
	RL2.3	Understanding Freeware	Lecture Notes & Slides
	RL2.4	Understanding Public- domain Software	Lecture Notes & Slides
During CS	CS	Understanding Free and Open Source <ul style="list-style-type: none"> Understanding differences between Free Software, OSS, Freeware and Public-domain software 	R1, R2, R3 Web Resources
Post CS	SS1	5 Reasons Why Contributing To Open Source Projects Helps In Landing A Job [https://analyticsindiamag.com/5-reasons-why-contributing-to-open-source-projects-helps-in-landing-a-job/]	

		Recommended Reading: <ul style="list-style-type: none"> • https://opensource.org/osd • https://opensource.org/licenses/category 	
	HW1		
Lab Reference			

Contact Session 3

Time	Type	Description	Content Reference
Pre CS	RL3.1	Understanding Intellectual Property Rights and Software Licenses	Lecture Notes & Slides
	RL3.2	Licensing models in OSS: Copyleft, Permissive, Creative Commons	Lecture Notes & Slides
During CS	CS	Understanding Open Source Licensing Models <ul style="list-style-type: none"> • Understanding Intellectual Property Rights and Software Licenses • Licensing models in OSS: Copyright, Copyleft, Permissive, Creative Commons 	R1, R2, R3 Web Resources
Post CS	SS1	Recommended Reading: <ul style="list-style-type: none"> • Google Image Search Implements CC License Filtering: https://creativecommons.org/2009/07/09/google-image-search-implements-cc-license-filtering/ • https://www.gnu.org/licenses/copyleft.en.html • https://copyleft.org/ • https://creativecommons.org 	
	HW1		
Lab Reference			

Contact Session 4

Time	Type	Description	Content Reference
Pre CS	RL3.2	Licensing models in OSS: Copyleft, Permissive, Creative Commons	Lecture Notes & Slides
	RL3.3	Choosing the right license	Lecture Notes & Slides
During CS	CS	Understanding and Choosing Open Source Licensing Models <ul style="list-style-type: none"> • Work with a community • Keep it simple and permissive • Need to share improvements • Work without a license 	R1, R2, R3 Web Resources
Post CS	SS1	Recommended Reading: <ul style="list-style-type: none"> • https://choosealicense.com/ 	

		<ul style="list-style-type: none"> • Apache License 2.0 (https://www.apache.org/licenses/LICENSE-2.0)
	HW1	<ul style="list-style-type: none"> • Identify 3 Open Source Software projects and study the type of license used. • Select one license and study it in detail. • Search for some open source project that requires a CLA. • Study the CLA and discuss its salient points.
Lab Reference		

Contact Session 5

Time	Type	Description	Content Reference
Pre CS	RL4.1	Dual Licensing and Open Core Model	Lecture Notes & Slides
	RL4.2	Selling users, services and merchandise	Lecture Notes & Slides
	RL4.3	Donations, funding and Crowd-Sourcing	Lecture Notes & Slides
	RL4.4	Other business models	Lecture Notes & Slides
During CS	CS	Understanding Open Source Business Model <ul style="list-style-type: none"> • Dual Licensing and Open Core Model • Selling users, services and merchandise • Donations, funding and Crowd-Sourcing • Other business models 	R1, R2, R3 Web Resources
Post CS	SS1	Recommended Reading: <ul style="list-style-type: none"> • How Developers Can Make money with Open Source Projects https://rubygarage.org/blog/how-make-money-with-open-source-projects • What Motivates a Developer to Contribute to Open-Source Software? https://clearcode.cc/blog/why-developers-contribute-open-source-software/ • How do Open Source Programmers make money https://www.thewindowsclub.com/open-source-companies-programmers-make-money 	
	HW1		
Lab Reference			

Contact Session 6

Time	Type	Description	Content Reference
Pre CS	RL5.1	Open Collaboration Model	Lecture Notes & Slides
	RL5.2	Community Driven Development	Lecture Notes & Slides
	RL5.3	Open Source Software Development Process	Lecture Notes & Slides

	RL5.4	Unique characteristics of the Open Source Software Development Process Model	Lecture Notes & Slides
	RL5.5	Comparing OSS development methodologies with traditional methodologies	Lecture Notes & Slides
During CS	CS	Lifecycle and methodologies in OSS <ul style="list-style-type: none"> • Open Collaboration Model • Community Driven Development • OSS Development Process Model • Unique characteristics of the Open Source Software Development Process Model • Comparison between OSS development methodologies with traditional 	R1, R2, R3 Web Resources
Post CS	SS1	Recommended Reading: <ul style="list-style-type: none"> • Open Source Software Development Model http://aaaea.org/AI-muhandes/2008/February/open_src_dev_model.htm • Innovation Happens Elsewhere https://dreamsongs.com/IHE/IHE-28.html 	
	HW1		
Lab Reference			

Contact Session 7

Time	Type	Description	Content Reference
Pre CS	RL6.1	Contribution models and roles in OSS	Lecture Notes & Slides
	RL6.2	Familiarizing yourself with the open source software ecosystem	Lecture Notes & Slides
	RL6.3	Starting your own Open Source Project	Lecture Notes & Slides
	RL6.4	Best practices in running/ managing OSS project	Lecture Notes & Slides
During CS	CS	Contributing to Open Source Software Projects <ul style="list-style-type: none"> • Contribution models and roles in OSS • Familiarizing yourself with the open source software ecosystem • Starting your own Open Source Project • Best practices in running/ managing OSS project 	Web Resources
Post CS	SS1	Recommended Reading: <ul style="list-style-type: none"> • How to contribute to Open Source https://opensource.guide/how-to-contribute/ 	
	HW1	Try this out <ul style="list-style-type: none"> • https://github.com/firstcontributions/first-contributions/blob/master/README.md 	

Lab Reference			
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Contact Session 8 and 9

Time	Type	Description	Content Reference
Pre CS	RL7.1	Working with GitHub and GitHub Desktop App	Lecture Notes & Slides
	RL7.2	Unique Characteristics of Git	Lecture Notes & Slides
	RL7.3	Working with Repositories -Push-Pull model	Lecture Notes & Slides
	RL7.4	GitHub Workflows	Lecture Notes & Slides
	RL7.5	Git Branching	Lecture Notes & Slides
	RL7.6	Working with GitHub pages	Lecture Notes & Slides
	RL7.7	Mastering Markdown	Lecture Notes & Slides
During CS	CS	Working with Git/GitHub/GitHub Desktop <ul style="list-style-type: none"> Working with GitHub and GitHub Desktop App Working with Git: Unique Characteristics of Git Working with Repositories -Push-Pull model GitHub Workflows Git Branching Working with GitHub pages Mastering Markdown 	Web Resources
Post CS	SS1	Recommended Reading: <ul style="list-style-type: none"> GitHub Pages https://pages.github.com/ 	
	HW1	Create Your Own GitHub Page <ul style="list-style-type: none"> Navigate to GitHub.com Create an account – it is linked to your email id Example –username is ritubits Create a repository in your login with the same name as your username – ritubits.github.io You may NOT choose any license for the same Create a file index.html Use HTML to write content - create your profile page View your profile: https://ritubits.github.io/ 	
Lab Reference			

Contact Session 10

Time	Type	Description	Content Reference
Pre CS	RL8.1 to RL 8.3	Tools and Technologies in OSSE	Lecture Notes & Slides
During CS	CS	Tools and Technologies in OSSE <ul style="list-style-type: none"> • Collaboration Tools • Communication Tools • Source Code Management Tools 	Web Resources
Post CS	SS1	Recommended Reading: <ul style="list-style-type: none"> • Types of version control systems https://subscription.packtpub.com/book/application_development/9781849517522/1/ch01lv11sec12/types-of-version-control-systems • Git Book https://git-scm.com/book/en/v2/Getting-Started-About-Version-Control 	
	HW1		
Lab Reference			

Contact Session 11

Time	Type	Description	Content Reference
Pre CS	RL9.1	Case Study	Lecture Notes & Slides
During CS	CS	Understanding Open Source Projects (Case Study): <ul style="list-style-type: none"> • Linux Project • Kubernetes Project • Eclipse Project • Moodle Project 	Web Resources
Post CS	SS1		
	HW1		
Lab Reference			

Detailed Plan for Experiential Learning Components

Lab No	Lab Objective	Lab Sheet Access URL	Content Reference
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1.	Working with GitHub The aim of this lab sheet is to develop an understanding about the basic environment and workflow of GitHub. It also guides the students to create a repo on GitHub and initialize it with some relevant files. Additionally, it helps students to familiarize themselves with the various open source projects available on GitHub and navigate through them. Technologies used: GitHub.com		
2.	Using GitHub and GitHub Desktop for contributing to Open Source Projects The aim of this lab sheet is to guide the student to develop an understanding of the simple process in which one can contribute to open source projects hosted on GitHub and also provides a hands-on on the same. Technologies used: GitHub.com, GitHub Desktop		
3.	Using Eclipse to contribute to Open Source Java Projects hosted over GitHub The aim of this lab sheet is to guide the students to be able to configure and use Eclipse IDE to work with Java project repositories hosted over GitHub. Technologies used: GitHub.com, Eclipse IDE		
4.	Working with Git The aim of this lab sheet is to develop an understanding of the basic Git commands used for uploading, cloning, committing and pushing content to GitHub. Technologies used: GitHub.com, Git		

Evaluation Components

No	Name	Type	Duration	Weight	Day, Date, Session, Time
EC-1	Quiz-I	Online / Open Book		10%	September 1-10, 2023
	Quiz-II	Online / Open Book		10%	October 1-10, 2023
	Assignment I / Project – Phase I	Online / Open Book		10%	November 1-10, 2023
EC-2	Mid-Semester Exam	Closed Book	2 Hours	30%	22/09/2023 (FN)
EC-3	Comprehensive Exam	Open Book	2 ½ Hours	40%	24/11/2023 (FN)

Note - Evaluation components can be tailored depending on the proposed model.

Important Information:

Evaluation Guidelines:

1. For Closed Book tests: No books or reference material of any kind will be permitted. Laptops/Mobiles of any kind are not allowed. Exchange of any material is not allowed.
2. For Open Book exams: Use of prescribed and reference text books, in original (not photocopies) is permitted. Class notes/slides as reference material in filed or bound form is permitted. However, loose sheets of paper will not be allowed. Use of calculators is permitted in all exams. Laptops/Mobiles of any kind are not allowed. Exchange of any material is not allowed.
3. If a student is unable to appear for the Regular Test/Exam due to genuine exigencies, the student should follow the procedure to apply for the Make-Up Test/Exam. The genuineness of the reason for absence in the Regular Exam shall be assessed prior to giving permission to appear for the Make-up Exam. Make-Up Test/Exam will be conducted only at selected exam centres on the dates to be announced later.

It shall be the responsibility of the individual student to be regular in maintaining the self-study schedule as given in the course handout, attend the lectures, and take all the prescribed evaluation components such as Assignment/Quiz, Mid-Semester Test and Comprehensive Exam according to the evaluation scheme provided in the handout.