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**Birla Institute of Technology & Science, Pilani**

**Work Integrated Learning Programmes**

**Course handout**

**Part A: Content Design**

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| --- | --- |
| **Course Title** | Open Source Software Engineering |
| **Course No(s)** |  |
| **Credit Units** |  |
| **Course Author** | Ritu Arora |
| **Version No** | 3.0 |
| **Date** | December 27, 2020 |

**Course Objectives:**

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| --- | --- |
| **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:**

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| **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 agile development processes 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:**

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| --- | --- |
| **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 |
| **R4** | The Architecture of Open Source Applications, Volume I: Elegance, Evolution, and a Few Fearless Hacks by Amy Brown and Greg Wilson |
| **R5** | The Architecture of Open Source Applications, Volume II: Structure, Scale and a Few More Fearless Hacks by Amy Brown and Greg Wilson |
| **Web References** | |
| **W1** | Open Source Guides (https://opensource.guide/) |
| **W2** | Open Source Resources (https://opensource.com/) |
| **W3** | Working with GitHub for Open Source Software Development (https://github.com/) |

**Content Structure**

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| --- | --- |
| **Module No** | **List of Topic Title** |
| M1 | **Introduction to Open Source Software**   * What is Open Source Software? * Principles of open source software * History and evolution of open source software * Free versus Open Software * Advantages vs Disadvantages of OSS * Open source culture and community |
| M2 | **Open Source Business Model**   * The Business of Open Source * Commercial and legal aspects of open source software * Intellectual Property Rights * Licensing models in OSS: GNU, Copyleft, Creative Commons * Choosing the right license |
| M3 | **Lifecycle and methodologies in Open Source Software**   * Open Source Software Development Process Model * Open Collaboration Model * Comparing OSS development methodologies with traditional methodologies |
| M4 | **Contributing to Open Source Projects**   * How to use/adapt the open source software ecosystem * FOSS and cross platform application development * Contribution models * Key characteristics of OSS projects * Key challenges in OSS projects * Starting your own Open Source Project * Managing distributed teams * Best practices in running an OSS project |
| M5 | **Tools and Technologies in OSSE**   * Collaboration Tools * Communication Tools * Source Code Management Tools * Run-time System Constraints |
| M6 | **Working with Git/GitHub**   * Getting source code * Updating your working copy * Examine your changes * Undoing working changes * Resolve Conflicts * Commit Changes * Debugging and Fixing code * Release Early, Release Often * Working with GitHub pages * Mastering Markdown |
| M7 | **Understanding Open Source Projects (Case Study):**   * Linux Project * sourceForge Project * Ruby on Rails Project * Kubernetes Project |
| M8 | **Architecture of Open Source Applications**   * Introduction to Scalable Web Architecture and Distributed Systems * Case Study * Eclipse * Selenium Web Driver * Moodle |

**Part B: Contact Session Plan**

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| **Academic Term** |  |
| **Course Title** | Open Source Software Engineering |
| **Course No** |  |
| **Lead Instructor** |  |

**Course Contents**

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| **Contact Session**  **(2Hrs)** | **List of Topic Title**  **(from content structure in Part A)** | **Text/Ref Book/external resource** |
| CS1 | **Introduction to Open Source Software**   * What is Open Source Software? * Principles of open source software * History and evolution of open source software * Free versus Open Software * Advantages vs Disadvantages of OSS * Open source culture and community | R1, R2, R3 |
| CS2 |
| CS3 | **Open Source Business Model**   * The Business of Open Source * Commercial and legal aspects of open source software * Intellectual Property Rights * Licensing models in OSS: GNU, copyleft, creative commons * Choosing the right license | R1, R2, R3 |
| CS4 | **Lifecycle and methodologies in Open Source Software**   * Open Source Software Development Process Model * Open Collaboration Model * Comparing OSS development methodologies with traditional methodologies | R1, R2, R3 |
| CS5 |
| CS6 | **Contributing to Open Source Projects**   * How to use/adapt the open source software ecosystem * FOSS and cross platform application development * Contribution models * Key characteristics of OSS projects * Key challenges in OSS projects * Starting your own Open Source Project * Managing distributed teams * Best practices in running an OSS project | R1, R2, R3,  Web Resources |
| CS7 |
| CS8 | **Tools and Technologies in OSSE**   * Collaboration Tools * Communication Tools * Source Code Management Tools * Run-time System Constraints | R1, R2, R3,  Web Resources |
| CS9 | **Working with Git/GitHub**   * Getting source code * Updating your working copy * Examine your changes * Undoing working changes * Resolve Conflicts * Commit Changes * Debugging and Fixing code * Release Early, Release Often * Working with GitHub pages * Mastering Markdown | Web Resources |
| CS10 |
| CS11 |
| CS12 |
| CS13 | **Understanding Open Source Projects (Case Study):**   * sourceForge Project * Ruby on Rails Project | R3, Web Resources |
| CS14 |
| CS15 | **Architecture of Open Source Applications**   * Introduction to Scalable Web Architecture and Distributed Systems * Case Study * Eclipse * Selenium Web Driver * Moodle | R4, R5 |
| CS16 |

**Detailed Plan for Experiential Learning Components**

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| **Lab No** | **Lab Objective** | **Lab Sheet Access URL** | **Content Reference** |
| 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**

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| --- | --- | --- | --- | --- | --- |
| **No** | **Name** | **Type** | **Duration** | **Weight** | **Day, Date, Session, Time** |
| EC-1 | Quiz-I | Online |  | 5% |  |
|  | Quiz-II | Online |  | 5% |  |
|  | Assignment I /  Project – Phase I | Online |  | 5% |  |
|  | Assignment-II /  Project – Phase II | Online |  | 10% |  |
| EC-2 | Mid-Semester Exam | Closed Book | 2 Hours | 30% |  |
| EC-3 | Comprehensive Exam | Open Book | 3 Hours | 45% |  |

***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.