Syllabus

Course Description

Course Title	Software as a Research Contribution (seminar)
Course Code	71077
Course Title Additional	
Scientific-Disciplinary Sector	INFO-01/A
Language	English
Degree Course	PhD Programme in Computer Science
Other Degree Courses (Loaned)	
Lecturers	Prof. Dr. Andrea Alexander Janes, Andrea.Janes@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/2237 Prof. Eduardo Martins Guerra, Eduardo.MartinsGuerra@unibz.it https://www.unibz.it/en/faculties/engineering/academic-staff/person/43879
Teaching Assistant	
Semester	First semester
Course Year/s	2025-2026
CP	3
Teaching Hours	30
Lab Hours	0
Individual Study Hours	45
Planned Office Hours	
Contents Summary	The goal of this module is to present how the software produced as part of their research projects can also be a relevant research contribution. Students will acquire skills and competencies related to how to share and structure their code in a way that it could be reused in the future in other studies. The students are exposed to techniques for development an open-source community around the software, to improve the software maintainability, to identify

	possible hot-spots to make the software extensible, and to use good practices for software documentation. These topics will be complemented with discussions of the importance of these properties for reproducibility. Finally, it will also present the format used in conference tracks and Journals focused on software tools, explaining how the students can publish this kind of result.
Course Topics	- Open-source software - Concepts of software maintainability - Clean code - Refactoring and automated testing - Software documentation practices - Software role in studies reproducibility - How to report Software as a research contribution in tracks dedicated to software tools
Keywords	Research software, Licenses, Patents, Reusability, Reproducibility, Documentation.
Recommended Prerequisites	
Propaedeutic Courses	
Teaching Format	Frontal lectures, exercises; team and/or individual projects.
Mandatory Attendance	Compulsory
Specific Educational Objectives and Learning Outcomes	Knowledge and understanding • To have a thorough knowledge of the fundamental techniques for software maintainability • To have a thorough knowledge of how to prepare your software to be reused in future studies. Applying knowledge and understanding • Be able to apply principles of Clean Code to improve the internal software quality. • Be able to apply refactoring and automated testing as a mean to keep the code maintainable. Making judgments • Be able to make design decisions to modularize parts of the software that might be replaced in future studies. • Be able to choose the best approach to document the software developer as part of a research study.

	Communication skills • Present and share the software in as open-source project that can attract contributors. • Present the software in publications to tracks dedicated to software tools Learning skills • Have developed learning skills to extract information of existing projects targeting their reuse.
Specific Educational Objectives and Learning Outcomes (additional info.)	
Assessment	The assessment is based on assignments done by students related to the content of the course.
Evaluation Criteria	The student's grade is calculated based on the average grade from the course assignments.
Required Readings	The course will be based on lecture notes.
Supplementary Readings	
Further Information	- Fogel, K. (2005). Producing open source software: How to run a successful free software project. " O'Reilly Media, Inc.". - Martin, R. C. (2009). Clean code: a handbook of agile software craftsmanship. Pearson Education. - Santos, J., & Correia, F. (2022). Patterns for Documenting Open Source Frameworks. arXiv preprint arXiv:2203.13871. - Fowler, M., Beck, K., Brant, J., Opdyke, W., & Roberts, D. (2002). Refactoring: improving the design of existing code. 1999. - Open educational resources, representing alternative or supplementary materials, shall be linked to the course website.
Sustainable Development Goals (SDGs)	Quality education