

COURSE DESCRIPTION – ACADEMIC YEAR 2019/2020

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| Course title | Development of Data Products |
| Course code | 73007 |
| Scientific sector | INF/01 |
| Degree | Master in Computational Data Science (LM-18) |
| Semester | 1 |
| Year | 2 |
| Credits | 6 |
| Modular | No |

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| Total lecturing hours | 40 |
| Total lab hours | 20 |
| Attendance | <p>Attendance is not compulsory, but recommended. Non-attending students have to contact the lecturer at the start of the course to agree on the modalities of the independent study.</p> <p>Both non-attending and attending students have to pass the assessment of practical skills (lab exam) to be admitted to the assessment of theoretical aspects (oral exam).</p> <p>The exam modalities for non-attending students are indicated below, in the fields "Assessment" and "Evaluation criteria and criteria for awarding marks".</p> |
| Prerequisites | <ul style="list-style-type: none"> • Programming skills • Practical experience in writing small programs • Experience in the usage of Integrated Development Environments |
| Course page | https://ole.unibz.it/ |

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| Specific educational objectives | <p>The course belongs to the type "caratterizzanti – discipline informatiche" in the curriculum "Data Analysis".</p> <p>The major aim of the course is to provide students with solid foundation on principles, methods, and techniques supporting the development process of data software products.</p> <p>By the end of the course, successful students will achieve the following objectives:</p> <ul style="list-style-type: none"> • ability of producing good quality data products; • ability of defining the development process aiming at ensuring good quality; • ability of working and communicating inside a team; • acquisition of both theoretical/empirical and technical/organizational notions. • The students will be trained to apply software engineering principles, methods, and techniques able to increase the quality of delivered products. Lab lectures allow students to put into place theoretical aspect of the course by developing (components of) data products in a team. |
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| Lecturer | Matteo Camilli |
| Contact | Office POS 1.13, matteo.camilli@unibz.it |
| Scientific sector of lecturer | INF/01 |

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| Teaching language | English |
| Office hours | Tuesday 10:00-12:00, arrange by email |
| Lecturing Assistant (if any) | Damiano Somenzi |
| Contact LA | Office POS 1.04, damiano.somenzi@unibz.it |
| Office hours LA | TBD |
| List of topics | <ul style="list-style-type: none"> • Data centric software engineering • Methods and practices for data product development • Domain engineering for data product • Managing the software quality of data products • Methods for testing • Maintenance of software |
| Teaching format | Frontal lectures, exercises in lab, projects. |

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| Learning outcomes | <p>Knowledge and understanding:</p> <ul style="list-style-type: none"> • D1.3 - Knowledge of principles, methods and techniques for processing data in order to make them usable for practical purposes, and understanding of the challenges in this field <p>Applying knowledge and understanding:</p> <ul style="list-style-type: none"> • D2.1 - Practical application and evaluation of tools and techniques in the field of data science • D2.4 - Ability to develop programmes and use tools for the analysis and management of data and related infrastructures • D2.8 - Practical application and evaluation of tools and techniques for data analysis <p>Making judgments</p> <ul style="list-style-type: none"> • D3.1 - Ability to plan and, if necessary, re-plan a technical project activity for the analysis and management of data, or for the implementation of corresponding software systems or applications, and to complete it within the defined deadlines • D3.2 - Ability to autonomously select the documentation (in the form of books, web, magazines, etc.) needed to keep up to date in a given sector • D3.3 - Ability to identify reasonable work goals and estimate the resources needed to achieve these goals <p>Communication skills</p> <ul style="list-style-type: none"> • D4.1 - Ability to use English at an advanced level with particular reference to disciplinary terminology. • D4.3 - Ability to structure and draft scientific and technical documentation <p>Learning skills</p> <ul style="list-style-type: none"> • D5.1 - Ability to autonomously extend the knowledge acquired during the study course • D5.3 - Ability to deal with problems in a systematic and creative way and to appropriate problem solving techniques. |
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| Assessment | <p>Exam type for regularly attending students follows.</p> <p>Lab project and oral exam:</p> <ul style="list-style-type: none"> • lab project to apply software engineering principles, methods and practices in software development (50% of the final mark); |
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| | <ul style="list-style-type: none"> • oral exam to assess understanding of theoretical aspects, and verification of project results (50% of the final mark). <p>Exam type for non-attending students follows.</p> <p>Assignment and oral exam:</p> <ul style="list-style-type: none"> • homework assignment consisting in the development of a data software product given by the lab lecturer (50% of the mark); • oral exam to assess understanding of theoretical aspects, and verification of assignment results (50% of the final mark). <p>Note: Positive evaluation of the practical part (either the project or the assignment) is necessary to access the oral exam. A Positive evaluation obtained in the practical part remains valid for the entire academic year. Both parts must be positive to pass the exam.</p> |
| Assessment language | English |
| Assessment Typology | Monocratic |
| Evaluation criteria and criteria for awarding marks | <p>The final mark is composed of:</p> <ul style="list-style-type: none"> • 50% lab assessment (project or assignment); • 50% oral exam assessment. <p>Evaluation criteria follow.</p> <ul style="list-style-type: none"> • Project work (for attending students): <ul style="list-style-type: none"> - effective application of software engineering principles, methods and practices to development; - good teamwork; - Qualities of the applied development process and the delivered data product. • Homework assignment (for non-attending students): <ul style="list-style-type: none"> - effective application of software engineering principles, methods and practices to development; - Effective usage of productivity tools to develop software and track progress; - Quality of the delivered data product. • Oral exam (for both attending and non-attending students): <ul style="list-style-type: none"> - degree of understanding of theoretical aspects related with software development; - ability to put into place theoretical aspects to solve small exercises; - effectiveness of design/implementation choices made during the development of the target data product (project or assignment).. |
| Required readings | <ul style="list-style-type: none"> • Carlo Ghezzi, Mehdi Jazayeri, and Dino Mandrioli. 2002. Fundamentals of Software Engineering (2nd ed.). Prentice Hall PTR, Upper Saddle River, NJ, USA. • Kleppmann, Martin. Designing data-intensive applications: The big ideas behind reliable, scalable, and maintainable systems. O'Reilly Media, Inc., 2017. <p>Subject Librarian: David Gebhardi, David.Gebhardi@unibz.it</p> |

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| Supplementary readings | <ul style="list-style-type: none">• Fowler, Martin. Refactoring: improving the design of existing code. Addison-Wesley Professional, 2018.• Freeman, Eric, Elisabeth Robson, Bert Bates, and Kathy Sierra. Head first design patterns. O'Reilly Media, Inc., 2008. |
| Software used | <ul style="list-style-type: none">• Python• PyCharm IDE• Bokeh visualization library |