Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

# Syllabus
# Course description

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| **Course title** | Fundamentals of Programming II |
| **Course code** | 42405B |
| **Scientific sector** | INF/01 |
| **Degree** | CORSO DI LAUREA IN INGEGNERIA ELETTRONICA E DEI SISTEMI CIBERFISICI<br>BACHELOR IN ELEKTROTECHNIK UND CYBERPHYSISCHEN SYSTEMEN |
| **Semester** | 2nd[nd] |
| **Year** | I |
| **Academic year** | 2022/23 |
| **Credits** | 6 |
| **Modular** | Yes |

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| **Total lecturing hours** | 40 |
| **Total exercise hours** | 20 |
| **Attendance** | |
| **Prerequisites** | Programming I. |
| **Course page** | |
| **Lecturers** | Gennari Rosella, Ianeselli Alan |

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| **Specific educational objectives** | Type: "attività formativa di base"<br>Scientific area: "Matematica, informatica e statistica"<br><br>The course is designed for acquiring professional skills and knowledge.<br><br>The goal is to teach students to program basic cyber-physical solutions, in which physical and computing components are deeply intertwined.<br><br>The first objective of this course is thus to introduce students to physical-computing devices, such as Rasbperry Pi computers and microcontrollers, for sensing data and interacting with people in their environment.<br><br>The second objective is then to move students beyond the basics of procedural programming, and to introduce them to the basics of object-oriented programming, besides built-in data structures of Python, such as lists, dictionaries, and tuples.<br><br>The emphasis is on how to process data acquired through cyber-physical devices, with Python. Therefore, the third objective is to introduce students to Python data |

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| | structures and modules for mastering the basics of data analysis and visualisation.<br><br>The final objective for the student is to acquire the ability to translate a set of functional and non-functional requirements, and specifically user requirements, into a solution that can be deployed on cyber-physical computing devices. |

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| **Learning outcomes** | Knowledge and understanding<br>• Know the fundaments of cyber-physical systems.<br>• Know the fundamentals of computing with cyber-physical devices.<br>• Have a solid knowledge of the most relevant data structures and programming techniques for cyber-physical devices.<br><br>Applying knowledge and understanding<br>• Be able to solve problems using programming for cyber-physical systems.<br>• Be able to develop small and medium size programs using different programming languages and paradigms.<br><br>Making judgements<br>• Be able to collect and interpret useful data and to judge information systems and their applicability.<br>• Be able to identify an appropriate programming paradigm and data structures to solve a given problem.<br><br>Communication skills<br>• Be able to describe and motivate the software design choices.<br>• Be able to properly document a software artifact to ensure its usability and integration in more complex systems.<br><br>Learning skills<br>• Be able to learn how to use different procedural programming languages in autonomy, by identifying and understanding the relevant literature. |

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| **Assessment** | Project and a final written exam. The student's project assesses the learning outcomes related to the application |

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| | of the acquired knowledge, the ability to make judgments and the communication and learning skills. The written exam has verification questions, transfer of knowledge questions and exercises. The written examination assesses the learning outcomes related to knowledge and understanding, applying knowledge and understanding, and those related to the student ability to learn. |
| **Assessment language** | English |
| **Evaluation criteria and criteria for awarding marks** | The student's project counts for 50% of mark, and the final exam (written) for 50% of the mark. In case of a positive mark, the project counts for three exam sessions. The project is evaluated in term of quality of the solution, e.g., design of the algorithm, quality of the implementation. Written exam questions are evaluated in term of correctness, clarity and the displayed analytical skills. |

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| **Required readings** | Course notebooks and material provided by the course teacher, explained during the first class. |
| **Supplementary readings** | Additional material will be provided during the course |