

COURSE DESCRIPTION – ACADEMIC YEAR 2023/2024

Course title	Fundamentals of Programming II
Course code	42405
Scientific sector	INF/01
Degree	Bachelor in Electronics and Cyberphysical Systems
Semester	II
Year	I
Credits	6
Modular	Yes
Total lecturing hours	40
Total lab hours	20
Attendance	
Prerequisites	Algorithmic thinking, common programming constructs, discrete math
Specific educational objectives	<p>Type: "attività formativa di base" Scientific area: "Matematica, informatica e statistica"</p> <p>The course is designed for acquiring professional skills and knowledge.</p> <p>The objective of the course is to teach the fundamental principles of programming and the use of tools to support the development of software.</p> <p>Students will learn how to solve computational problems with well-designed programs that implement effective and secure solutions. The learning will be based on examples, from very simple ones to more complex, and practical exercises. The final objective for the student is to acquire the ability to translate a set of functional requirements into a software solution that can be deployed on different hardware or virtual infrastructures.</p>
Lecturer	Prof. Sergio Tessaris
Contact	tessaris@inf.unibz.it
Scientific sector of lecturer	INF/01
Lecturing assistant (if any)	Muhammad Azfar Yaqub
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List of topics	<ul style="list-style-type: none"> • Introduction to C programming and toolchain • C language: syntax and data types • C memory management and activation record • C programming techniques • Tools to support modern software development (IDEs; software management tools: DVCS and cloud-based tools) • Debugging and software testing (debugging tools; writing safe and secure programs; type checking)
Teaching format	Frontal lectures, labs and final project.

<p>Learning outcomes</p>	<p>Knowledge and understanding</p> <ul style="list-style-type: none"> • Know the fundamental principles of programming. • Have a solid knowledge of the most relevant data structures and programming techniques for cyber-physical devices. <p>Applying knowledge and understanding</p> <ul style="list-style-type: none"> • Be able to solve problems using programming for cyber-physical systems. • Be able to develop small and medium size programs using different programming languages and paradigms. <p>Making judgements</p> <ul style="list-style-type: none"> • Be able to collect and interpret useful data and to judge information systems and their applicability. • Be able to identify an appropriate programming paradigm and data structures to solve a given problem. <p>Communication skills</p> <ul style="list-style-type: none"> • Be able to describe and motivate the software design choices. • Be able to properly document a software artifact to ensure its usability and integration in more complex systems. <p>Learning skills</p> <ul style="list-style-type: none"> • Be able to learn how to use different procedural programming languages in autonomy, by identifying and understanding the relevant literature.
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<p>Assessment</p>	<p>Project and a final written exam. The student's project assesses the learning outcomes related to the application 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.</p>
<p>Assessment language</p>	<p>English</p>
<p>Assessment Typology</p>	<p>Collegial</p>
<p>Evaluation criteria and criteria for awarding marks</p>	<p>Project counts for 50% of mark, and the final exam (written) for 50% of the mark. In case of a positive mark the project will count for three exam sessions. A project is evaluated in term of quality of the solution: easy to use, meaningfulness of the implemented functions, quality of the code (according to the principles that will be illustrated during the lectures). Written exam questions will be evaluated in term of correctness and clarity.</p>

<p>Required reading</p>	<p>C: How to Program, Paul J. Deitel, Harvey Deitel, 9th edition, Pearson Education</p>
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Supplementary readings

Additional material will be provided during the course