UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Sistemi di Elaborazione delle Informazioni

2526-2-I0301D032-I0301D048M

Aims

The course provides the foundations for understanding the architecture of information processing systems, software, and telecommunications networks.

Contents

The course delves into the scientific fields and skills related to information processing systems and their management. Key concepts of data processing system architecture, electronic information management and coding, data storage, as well as the evolution of the Internet and the Web will be addressed. Various architectures of web information systems will be explored, providing an overview of online information exchange. The course aims to provide a solid knowledge base for understanding and effectively using information systems in application contexts.

Detailed program

This course provides a solid foundation for understanding the fundamental principles related to information processing systems. The course includes three modules.

Module 1: Fundamentals of Computer Science and Information Processing Systems
The first module introduces the fundamental concepts of computer science and information processing systems. It explores the crucial role that computer science plays in managing and processing information, outlining the difference between raw data and processed information, with practical examples to clarify these concepts. Students learn about the essential hardware components of a computer, such as the CPU, RAM, and storage devices, and understand the distinction between system software and application software, with examples like operating

systems and specific applications. Topics such as the interaction between hardware and software, the definition and importance of algorithms, and the representation of information in binary systems, including advanced concepts like overflow and Boolean algebra, are also covered. This section provides a solid foundation for understanding computer programming and basic computer technologies.

Module 2: Computer Architecture
The second module focuses on computer architecture, providing a detailed overview of the different components and their functions within a computer system. It starts with the Von Neumann architecture, analyzing its main components and their operation. The differences between CISC and RISC architectures are explored, explaining the implications of these differences in terms of performance and practical applications. Additionally, the module covers the structure and functions of the motherboard, memory hierarchy, the role of the CPU, and the comparison between various types of memory such as RAM and mass storage. Students also learn about connection technologies like USB, Thunderbolt, and the differences between serial and parallel connection interfaces. Topics such as CPU overclocking, the function of the SATA controller, and the distinction between hard disk drives (HDD) and solid-state drives (SSD) are discussed in depth to offer a comprehensive understanding of a computer's hardware configuration.

Module 3: Digitization and Digital Graphics
The third module explores the world of digitization and digital graphics, a crucial aspect for many modern computer applications. The process of digitizing images is explained, including the difference between vector graphics and raster graphics, with their respective advantages and disadvantages. Students learn about image resolution and the importance of color calibration to ensure the quality of digital images. The process of quantization and the errors that can affect image quality, as well as techniques like dithering to improve visual rendering, are discussed. The module also covers major image formats, color representation in color spaces such as RGB and CMYK, and dynamic range. Topics like image interpolation, compression techniques, and methods to improve the quality of digital images during post-production are covered to provide a comprehensive overview of the technologies and techniques used in digital graphics.

Prerequisites

Basic computer science knowledge.

Teaching form

Frontal lessons.

Textbook and teaching resource

Slides and teaching materials provided by the instructor.

Semester

Second semester.

Assessment method

Exam mode: Written test.
Question type: Multiple-choice quiz with 5 options, one correct answer, for a total of 16 questions.

Office hours

By appointment requested via e-mail.

Sustainable Development Goals