## UAB014:: COMPUTER ARCHITECTURE I

**INSTITUTION:** Universitat Autònoma de Barcelona (UAB)

**PREREQUISITES:** None

**LANGUAGE:** English

**CREDITS:** 3

**CONTENTS:**

1. Review of basic concepts.
    - 1.1. Basic number representations and arithmetic algorithms
    - 1.2. Floating Point Arithmetic - Representation, Algorithms and Conversions
    - 1.3. Advanced Concepts - Multioperand Adders - Shift and rotation operations. Barrel shifters and barrel rotators. - Multiplication: Overlapped and non-overlapped bit scanning methods Cellular Multipliers (ROM, Braun) - Division: Convergence and Reciprocal methods.

2. Memory Hierarchy
    - 2.1. Memory hierarchy organization - General Concepts. Memory levels and operation - Virtual Memory: structure and operation.
    - 2.2 Cache Memory - The principle of locality. - Cache memory organizations. - Issues with writes in Cache Memories - Performance impact of Cache Parameters.

3. Introduction to Pipelining
    - 3.1. Historical review (IBM 360/CDC 6602/ Micros and Supercomputers)
    - 3.2. Instruction Prefetching - Instruction Buffering (Inst. Look-Ahead): Structure and operation - Instruction Stacks and Instruction Loop Management.
    - 3.3. Pipeline Design Techniques - Principles of Pipeline Design - Control of Pipeline Stages: Reservation tables and collision vectors. – Multifunction Pipelines and Reduced State Diagrams. - Pipelining in the CPU: processing unit and control unit.