

People's Democratic Republic of
Algeria

Ministry of Higher Education and
Scientific Research

UNIVERSITY OF GUELMA

Department of Computer Science



الجمهورية الجزائرية الديمقراطية الشعبية

وزارة التعليم العالي والبحث العلمي

جامعة قلمة

قسم الإعلام الآلي

SYLLABUS

Semester: 03

Teaching Unit: UEF1 (Fundamental)

Course: Computer Architecture

Field: 2nd Year Bachelor's in Computer Science

Credits: 05

Coefficient: 03

Language of Instruction: French - English

Course Instructor: Mr. Bourbia Riad

Office: E8.3 Email: Bourbia.riad@univ-guelma.dz

Course Objectives

The MIPS architecture is an excellent choice for teaching RISC architecture concepts. Thanks to its simplicity, clear structure, and the availability of educational simulators like MARS, MIPS allows students to develop a solid understanding of processors and instruction sets.

Towards the end of this course, students should be able to:

- Describe the instruction set architecture of a MIPS processor
- Analyze, write, and test MIPS assembly language programs
- Describe the organization/operation of integer and floating-point arithmetic units
- Design the datapath and control of a single-cycle processor
- Design the datapath and control of a pipelined processor and handle hazards
- Describe the organization/operation of memory and caches
- Analyze the performance of processors and caches

Course Topics

- 01- Introduction to Basic Computer Architecture
- 02- Introduction to Assembly Language Programming
- 03- Data Representation
- 04- ALU and Logic Instructions
- 05- Control Flow and Arrays
- 06- MIPS-Functions and the Runtime Stack
- 07- Floating Point Arithmetic
- 08- Single Cycle Processor
- 09- Performance
- 10- Pipelined Processor
- 11- Memory Hierarchy and Caches

Grading Policy

- Exam (60%)
- Continuous Assessment (40%) = Tutorials (20%) + Practical Work (20%)
- **Tutorials Grading :**
 - Quizzes : 50%
 - Continuous work (in-class and distance): 50%
- **Practical Work Grading :**
 - Final Test : 50%
 - Continuous work (in-class and distance): 50%
- Attendance will be taken regularly during tutorial and practical sessions.
- Excuses for officially authorized absences must be presented no later than 48 hours afterward.

Text Books

- Alain Cazes , Joëlle Delacroix, Architecture des machines et des systèmes informatiques 4ème édition, *Collection : Informatique, Dunod, 2011.*
- Andrew S. Tanenbaum, Todd Austin Structured Computer Organization, Pearson, 2012.
- Paolo Zanella, Yves Ligier, Emmanuel Lazard, Architecture et technologie des ordinateurs : Cours et exercices - *Collection : Sciences Sup, Dunod, 5ème édition, 2013.*
- David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware /Software Interface, Fifth Edition, Morgan Kauffmann Publishers, 2013.

MIPS R3000 Microprocessor Links

- https://faculty.kfupm.edu.sa/COE/aimane/coe301/tools_manuals/MIPS32Vol1.Architecture.pdf
- https://faculty.kfupm.edu.sa/COE/aimane/coe301/tools_manuals/MIPS32Vol2.InstructionSet.pdf
- https://faculty.kfupm.edu.sa/COE/aimane/coe301/tools_manuals/MIPS32Vol3.PrivilegedArchitecture.pdf

MARS Simulator: Runs MIPS-32 Assembly Language Programs

- [Download MARS 4.5 Simulator](#) (Requires JAVA runtime environment on your computer)

Module Coordinator
R. Bourbia