

CS 0447: Computer Organization and Assembly Language (Fall 2024)

Department of Computer Science, SCUPI

Course Reference Number: 312192030 (CS0447)

When: Fall 2024

What & Where:

Lectures: 1:50PM-4:25PM on Wednesday (Section 1), 8:15AM-11:00AM on Friday (Section 2)
@ 4-212, Liberal Arts Building, Jiang'an Campus

Instructor: Dr. Guangwu Qian

Email: guangwu.qian@scupi.cn

Office: Room N524, 5th Floor, SCUPI Building

Web: [https://scupi.scu.edu.cn/en/faculty-staff-](https://scupi.scu.edu.cn/en/faculty-staff-en/faculty-en/guangwu-qian)

[en/faculty-en/guangwu-qian](https://scupi.scu.edu.cn/en/faculty-staff-en/faculty-en/guangwu-qian)

Office hours: Monday, 2:00PM-6:00PM

Wednesday, 10:00AM-11:30AM,

4:30PM-6:00PM

Friday, 2:00PM-4:00PM

Teaching Assistant: Junqiao Wang (Section 1) and Shiwei Hong (Section 2)

Course Description: The purpose of this course is to study the components of computing systems common to most computer architectures. In particular, this course is meant to introduce data representation, types of processors, memory types and hierarchy, and device drivers. The students will learn MIPS assembly language, the design of arithmetic and logic units, and basic designs for RISC processors.

Course Objectives: Students will be able to look at a low-level programming language: assembly language, to gain insight on how computers work internally and even to build one from using transistors to a fully working CPU.

Learning Outcomes:

- Representing numbers in different bases (binary, hexadecimal and octal).
- Logical operations in binary.
- Logic design (without knowing EE).
- Programming an assembly language.

Prerequisites: Before enrolling in this course, you need to have completed Data Structures (CS0445) or equivalent.

Blackboard: <https://pibb.scu.edu.cn>

All handouts, class notes and assignments will be published on Blackboard. You are expected to check this website frequently. If applicable, an OJ system may be used to evaluate your program.

Textbook: *Computer Organization and Design MIPS Edition The Hardware/Software Interface, Sixth Edition.* David A. Patterson and John L. Hennessy

Note on Email & Communication: The instructor and TA will periodically post announcements to the Blackboard website. It is every student's responsibility to regularly monitor these announcements. The instructor and TA will periodically email enrolled students with announcements. Students must check their SCUPI email at least once per day to ensure these announcements are received. When contacting the course staff via email, messages must be addressed to (or CC) both the instructor and the TA. Email subject should be prefaced with the appropriate prefix (e.g., "[CS0447]").

Grading Policy:

Attendance and participation in lecture may be used to decide borderline grades.

Unless explicitly noted otherwise, the work in this course is to be done independently. Discussions with other students on the assignments should be limited to understanding the statement of the problems. Cheating in any way, including giving your work to someone else will result in a low grade for the course and a report to the appropriate University authority.

Course Grading:

Ordinary Grade (Attendance, Questions, Assignments)	30%
Midterm Exam / Mini Project	20%
Final Exam	50%

Submission & Late Policy: All written assignments must be submitted electronically and required to submit on time. An assignment which is late will be accepted *but* the instructor will determine any penalty in a fair manner.

Make-up Policy: Students are expected to take both midterm and final exams. Make-up exams will only be given in the event of a medical situation, an emergency or a failure for the final exam, and only if this is documented and the instructor is notified *immediately if in advance is not possible*. Note that the make-up exam is *only* available for the final exam (50% of the overall score).

Students with Disabilities: If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and TA as early as possible in the term.

Religious Observance: In order to accommodate the observance of religious holidays, students should inform the instructor of any such days as early as possible in the term by email.

Audio/Video Recording To ensure the free & open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.

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You are allowed (and expected!) to use all the provided material for personal use. However, you are strictly prohibited from sharing the material with others in general and from posting the material on the Web or other file sharing venues in particular.

Outline: Tentative Syllabus

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| 1. Data Representation | 7. Logic Basics and Arithmetic |
| 2. Program Instructions and Registers | 8. Minimization and K-Maps |
| 3. Memory and Addresses | 9. Latches |
| 4. Flow, Conditionals and Loops | 10. ALU and Controlling |
| 5. Functions and the Stack | 11. Finite State Machines |
| 6. Bitwise Operations | 12. Multicycle and Pipelining |

References:

计算机组成与设计：硬件/软件接口（英文版·原书第6版·MIPS版），ISBN：9787111695707，出版社：机械工业出版社