Course Code Course Title

**COMP 2611** Computer Organization

## Course Description

Inner workings of modern digital computer systems and tradeoffs at the hardware-software interface. Topics include: digital logic, data and instruction representation, instruction set architecture, assembly language programming, computer arithmetic, processor, pipelining, and memory systems. Prerequisite(s): COMP 2011 OR COMP 2012H. Exclusion(s): ELEC 2300, ELEC 2350

## **List of Topics**

Introduction of digital logic
Data representation
MIPS ISA and assembly
Computer Arithmetic
Processor: Datapath and Control
Pipelined Processor
Memory System

### Textbooks

Computer Organization and Design MIPS Edition: The Hardware/Software Interface

6th Edition

### Reference books

N/A

### **Grading Scheme**

4 Homework	15%
1 Individual Programming Project	15%
Mid-term Exam	30%
Final Exam	40%
Total	100%

#### Course Intended Learning Outcomes

- Understand the basic concepts of digital logic and build the small circuits involved in computer systems
- Describe the interaction between software and hardware and instruction set architecture

- Write and execute small programs of a few hundred lines in assembly language
- Define the basic concepts of modern computer hardware, including datapath, control, memory and input/output

# Assessment Rubrics

Course Learning Outcome	Exemplary (A-to A+)	Competent (C to B+)	Needs Work (D to C-)	Unsatisfactory (F)
1. Use the basic concepts of digital logic and build the small circuits involved in computer systems	Demonstrates thorough theoretic knowledge of digital logic design principles.  Has a high degree of correctness in designing small circuits	Demonstrates sufficient theoretic knowledge of digital logic design principles.  Has a considerable degree of correctness in designing small circuits.	Demonstrates some theoretic knowledge of digital logic design principles  Has some degree of correctness in designing small circuits.	Demonstrates limited theoretic knowledge of digital logic design principles.  Has a low degree of correctness in designing small circuits.
2. Describe the interaction between software and hardware and instruction set architecture	Demonstrates thorough knowledge and understanding of the design principles of instruction set architecture	Demonstrates sufficient knowledge and understanding of the design principles of instruction set architecture	Demonstrates some knowledge and understanding of the design principles of instruction set architecture	Demonstrates limited knowledge and understanding of the design principles of instruction set architecture
3. Write and execute small programs of a few hundred lines in assembly language	Program correctly handles all specified test cases. The code is very efficient with clear logic, easy to read and understand.	Program correctly handles majority of test cases  The code is fairly efficient, easy to read and understand.	Program correctly handles around half of test cases  The code works because of brute force; it's not easy to read and understand	Program fails majority of test cases  The code is huge and appears to be patched together without logic.

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4. Define the	Demonstrates	Demonstrates	Demonstrates	Demonstrates
basic	thorough	sufficient	some theoretic	limited
concepts of	theoretic	theoretic	knowledge of	theoretic
modern	knowledge of	knowledge of	computer	knowledge of
computer	computer	computer	hardware and	computer
hardware,	hardware and	hardware and	design	hardware and
including	design	design	principles	design
datapath,	principles	principles		principles
control,			Has some	
memory and	Has a high	Has a	degree of	Has a low
input/output	degree of	considerable	correctness in	degree of
	correctness in	degree of	describing	correctness in
	describing	correctness in	datapath and	describing
	datapath and	describing	control of given	datapath and
	control of given	datapath and	machine	control of given
	machine	control of given	instruction, and	machine
	instruction, and	machine	memory	instruction, and
	memory	instruction, and	structure	memory
	structure	memory		structure
		structure		