

Saint Leo University
COM 312
Computer Architecture

Course Description:

Knowledge of the fundamental operations of computers is essential in a program in computer science. This course is designed to provide the student with an understanding of the structure and operations of the digital computer including its history, how their systems are organized, the logic used in the computer, the use of micro-technology in computers, a foundation in the functioning of the computer at various levels including the instruction set level, the operating machine level and assembly language programming, and parallel computing concepts.

Prerequisite:

COM 203

Textbook:

Tanenbaum, A. S. (2013). *Structured computer organization* (6th ed.). Upper Saddle River, NJ: Pearson. ISBN-13: 978-0-132-91652-3

Learning Outcomes:

The student will be able to:

1. Describe and explain the history of digital computers.
2. Explain and demonstrate computer systems organization
3. Demonstrate a knowledge of digital logic in computers
4. Describe and explain concept and use of microarchitecture in computers
5. Explain and utilize functionality at the instruction set architecture level, the operating machine level, and the assembly language level
6. Describe and explain the concept of parallel computer architecture and its operations
7. Demonstrate and explain the relevance of **Integrity** in using computers.

Core Value:

Integrity: The commitment of Saint Leo University to excellence demands that its members live its mission and deliver on its promise. The faculty, staff, and students pledge to be honest, just, and consistent in word and deed.

Evaluation:

Assignments	Percentage
Quizzes (3)	30
Homework (8)	55
Discussion (8)	15
Total	100%

Quizzes: Three quizzes will be given and will cover the material presented since the previous quiz.

Homework Questions/Problems: Students will perform exercises related to the content covered within the module.

Discussion/Participation: Students are encouraged to interact with each other and exchange opinions of technical issues as well as the ethical issues of these technologies. This interaction can provide great opportunities to explore how these issues relate to our Core Values.

Assessment of the Learning Outcomes

Learning Outcome	Assessment Method(s)
1	Quizzes, Homework
2	Quizzes, Homework
3	Quizzes, Homework
4	Quizzes, Homework
5	Quizzes, Homework
6	Quizzes, Homework
7	Discussions

Grading Scale:

Grade Score (%)

A	94-100
A-	90-93
B+	87-89
B	84-86
B-	80-83
C+	77-79
C	74-76
C-	70-73
D+	67-69
D	60-66
F	0-59

Course Schedule:

Module 1 Introduction to Computer Architecture

Objectives When you complete this module, you should be able to:

- Summarize structured computer organization.
- Describe the history of computers.
- Categorize computer types.
- Identify metrics units.

Readings Complete the following readings for this module:

- Chapter 1

Assignments

Items to be Completed:	Due No Later Than:
Post an introduction to the class	Thursday 11:59 PM EST/EDT
Read the assigned material	
Post an initial response to the discussion question	Thursday 11:59 PM EST/EDT
Post responses to at least two classmates	Sunday 11:59 PM EST/EDT
Submit Homework Assignment 1	Sunday 11:59 PM EST/EDT

Module 2 Computer Systems Organization

Objectives When you complete this module, you should be able to:

- Outline computer processors.
- Explain how primary memory works.
- Explain how secondary memory works.
- Understand input/output devices.

Readings Complete the following readings for this module:

- Chapter 2

Assignments

Items to be Completed:	Due No Later Than:
Read the assigned material	
Post an initial response to the discussion question	Thursday 11:59 PM EST/EDT
Post responses to at least two classmates	Sunday 11:59 PM EST/EDT
Submit Homework Assignment 2	Sunday 11:59 PM EST/EDT

Module 3 The Digital Logical Level

Objectives

When you complete this module, you should be able to:

- Identify gates and their relationship with Boolean algebra.
- Explain digital logic circuits.
- Contrast the components of a memory system.
- Summarize CPU chips and buses.
- Outline I/O interfaces.

Readings

Complete the following readings for this module:

- Chapter 3

Assignments

Items to be Completed:	Due No Later Than:
Read the assigned material	
Post an initial response to the discussion question	Thursday 11:59 PM EST/EDT
Post responses to at least two classmates	Sunday 11:59 PM EST/EDT
Submit Homework Assignment 3	Sunday 11:59 PM EST/EDT
Complete Quiz 1	Sunday 11:59 PM EST/EDT

Module 4 The Microarchitecture Level

Objectives

When you complete this module, you should be able to:

- Describe microarchitecture.
- Distinguish the design of the microarchitecture level.
- Identify performance improvement.

Readings

Complete the following readings for this module:

- Chapter 4

Assignments

Items to be Completed:	Due No Later Than:
Read the assigned material	
Post an initial response to the discussion question	Thursday 11:59 PM EST/EDT
Post responses to at least two classmates	Sunday 11:59 PM EST/EDT
Submit Homework Assignment 4	Sunday 11:59 PM EST/EDT

Module 5 The Instruction Set Architecture Level

Objectives When you complete this module, you should be able to:

- Analyze the ISA level.
- Distinguish computer data types.
- Examine instruction formats, addressing, and types.
- Dissect flow of control.

Readings Complete the following readings for this module:

- Chapter 5

Assignments

Items to be Completed:	Due No Later Than:
Read the assigned material	
Post an initial response to the discussion question	Thursday 11:59 PM EST/EDT
Post responses to at least two classmates	Sunday 11:59 PM EST/EDT
Submit Homework Assignment 5	Sunday 11:59 PM EST/EDT

Module 6 The Operating System Machine Level

Objectives When you complete this module, you should be able to:

- Define virtual memory.
- Identify hardware virtualization.

Readings Complete the following readings for this module:

- Chapter 6

Assignments

Items to be Completed:	Due No Later Than:
Read the assigned material	
Post an initial response to the discussion question	Thursday 11:59 PM EST/EDT
Post responses to at least two classmates	Sunday 11:59 PM EST/EDT
Submit Homework Assignment 6	Sunday 11:59 PM EST/EDT
Complete Quiz 2	Sunday 11:59 PM EST/EDT

Module 7 The Assembly Language Level

Objectives When you complete this module, you should be able to:

- Construct assembly language.
- Build macros.
- Identify the assembly process.
- Explain linking and loading.

Readings Complete the following readings for this module:

- Chapter 7

Assignments

Items to be Completed:	Due No Later Than:
Read the assigned material	
Post an initial response to the discussion question	Thursday 11:59 PM EST/EDT
Post responses to at least two classmates	Sunday 11:59 PM EST/EDT
Submit Homework Assignment 7	Sunday 11:59 PM EST/EDT

Module 8 Parallel Computer Architecture

Objectives When you complete this module, you should be able to:

- Outline on-chip parallelism.
- Differentiate coprocessors.

Readings Complete the following readings for this module (read all subsections):

- Chapter 8

Assignments

Items to be Completed:	Due No Later Than:
Read the assigned material	
Post an initial response to the discussion question	Thursday 11:59 PM EST/EDT
Post responses to at least two classmates	Sunday 11:59 PM EST/EDT
Submit Homework Assignment 8	Sunday 11:59 PM EST/EDT
Complete Quiz 3	Sunday 11:59 PM EST/EDT