

CSC4054-1 SP23 - Computer Architecture And Assembly Language

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CSC4054

Computer Architecture and Assembly Language

Spring 2023

4 units

Point Loma Nazarene University

College of Natural and Social Sciences

PLNU Mission

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service is an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

Instructor:

Dr. Benjamin Mood

bmood@pointloma.edu (<mailto:bmood@pointloma.edu>)

619 849 2269

Rohr Science 216

Meeting Times and Locations:

Lecture:

MWF – RS365 – 10:55am – 12:05pm

Tentative Open Office Hours:

Monday: 12:15 – 1:15 @ Caf; 2:30 - 4:15 @ office

Thursday: 12:00 – 1:00pm @ Caf; 1:00pm – 2:45pm @ office.

Friday: 12:15 – 1:15 @ Caf; 2:30 – 3:30 @ office

Tentative On-Request-Only Office Hours

Monday: 9:30 – 10:45am @ office

Friday: 9:30 – 10:45am @ office

Books:

Computer Organization: The Hardware Software Interface by Patterson and Hennessy

Course Description:

This course covers the fundamentals of current pipelined computer designs. Experience with assembly language programming and digital logic and circuit design will be used to motivate the need for certain facets of the more general instruction set architecture. Throughout the course, performance issues, hardware constraints, and memory hierarchy will be shown to inform processor design. Additional topics include integer and floating point arithmetic, I/O and considerations surrounding multi-core architectures.

COURSE LEARNING OUTCOMES

- Students will analyze the interaction between hardware and software.
- Students will collaborate effectively in teams.

Specific Course Objectives:

- To provide an in-depth treatment of computer architecture, including digital logic, digital systems, computer pipelines, memory organization and processor design, both single and multi-core.
- To gain further understanding of computer organization and architecture by studying the MIPS assembly language and writing and analyzing programs using the SPIM simulator.
- To gain a better overall perspective of the interrelationship between computer architecture and other aspects of computer science including compilers, operating systems and programming.

- To gain an understanding of the tradeoffs considered when designing for increased performance including parallelism, power, convenience, and cost.

Department Mission:

The Mathematical, Information, and Computer Sciences department at Point Loma Nazarene University is committed to maintaining a curriculum that provides its students with the tools to be productive, the passion to continue learning, and Christian perspectives to provide a basis for making sound value judgments.

Additional Course Information:

Cheating: Unless otherwise noted, talking and working with fellow students to understand concepts is OK. However, copying code from another student (or giving your code to another student) is not acceptable and can result in a staggering penalty of -100% on whatever assignment/exam it was. Although sharing code seems a “nice” to help a friend, the penalty applies to all involved. **Do not share your assignments with anyone. Do not let someone look at your assignments.** If you use online resources, you must site the direct URLs in the labs you turn in.

Missed Classes: Homework/Quizzes/Exams missed due to PLNU excused absences (i.e., sports teams, choirs, etc), can be made up. Missed Quizzes/Exams/etc. due to emergencies can be made up once the dean of students informs Dr. Mood that PLNU has approved the reason. Non-emergency missed exams will result in a zero. It is the student’s responsibility to inform the professor of when they will be gone. Missed class activities, which are due to a non-dean of students approved-emergency situation, will result in a zero.

Grading:

Labs/Homework	30%
Quizzes	15%
Midterm	25%
Final	30%

Grading scale

93 – 100%	A
90 – 92%	A-
87 – 89%	B+
83 – 86%	B
80 – 82%	B-
77 – 79%	C+
73 – 76%	C
70 – 72%	C-
67 – 69%	D+
63 – 67%	D
60 – 62%	D-
0 – 59%	F

PLNU Policies

COURSE CREDIT HOUR INFORMATION

In the interest of providing sufficient time to accomplish the stated Course Learning Outcomes, this class meets the PLNU credit hour policy for a 4 unit class delivered over 15 weeks. It is anticipated that students will spend a minimum of 37.5 participation hours per credit hour on their coursework. For this course, students will spend an estimated 150 total hours meeting the course learning outcomes. The time estimations are provided in the Canvas modules.

USE OF TECHNOLOGY

In order to be successful in the online or hybrid environment, you'll need to meet the minimum technology and system requirements; please refer to the [Technology and System Requirements](https://help.pointloma.edu/TDClient/1808/Portal/KB/ArticleDet?ID=108349) (<https://help.pointloma.edu/TDClient/1808/Portal/KB/ArticleDet?ID=108349>) information. Additionally, students are required to have headphone speakers, microphone, or webcams compatible with their computer available to use. Please note that any course with online proctored exams require a computer with a camera (tablets are not compatible) to complete exams online.

Problems with technology do not relieve you of the responsibility of participating, turning in your assignments, or completing your class work.

STATE AUTHORIZATION

State authorization is a formal determination by a state that Point Loma Nazarene University is approved to conduct activities regulated by that state. In certain states outside California, Point Loma Nazarene University is not authorized to enroll online (distance education) students. If a student moves to another state after admission to the program and/or enrollment in an online course, continuation within the program and/or course will depend on whether Point Loma Nazarene University is authorized to offer distance education courses in that state. It is the student's responsibility to notify the institution of any change in his or her physical location. Refer to the map on [State Authorization \(https://www.pointloma.edu/offices/office-institutional-effectiveness-research/disclosures\)](https://www.pointloma.edu/offices/office-institutional-effectiveness-research/disclosures) to view which states allow online (distance education) outside of California.

SPIRITUAL CARE

PLNU strives to be a place where students grow as whole persons. To this end, we provide resources for our students to encounter God and grow in their Christian faith.

If you have questions, a desire to meet with the chaplain, or if you have prayer requests, you can contact the [Office of Student Life and Formation \(https://www.pointloma.edu/offices/student-life-formation\)](https://www.pointloma.edu/offices/student-life-formation).

PLNU COPYRIGHT POLICY Ⓢ

Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

PLNU ACADEMIC HONESTY POLICY Ⓢ

Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See [Academic Policies \(https://catalog.pointloma.edu/content.php?catoid=52&navoid=2919#Academic_Honesty\)](https://catalog.pointloma.edu/content.php?catoid=52&navoid=2919#Academic_Honesty) for definitions of kinds of academic dishonesty and for further policy information.

PLNU ACADEMIC ACCOMMODATIONS POLICY ⓘ

PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities. Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center (EAC@pointloma.edu (<mailto:EAC@pointloma.edu>) or 619-849-2486). Once a student's eligibility for an accommodation has been determined, the EAC will issue an academic accommodation plan ("AP") to all faculty who teach courses in which the student is enrolled each semester.

PLNU highly recommends that students speak with their professors during the first two weeks of each semester/term about the implementation of their AP in that particular course and/or if they do not wish to utilize some or all of the elements of their AP in that course.

Students who need accommodations for a disability should contact the EAC as early as possible (i.e., ideally before the beginning of the semester) to assure appropriate accommodations can be provided. It is the student's responsibility to make the first contact with the EAC.

SEXUAL MISCONDUCT AND DISCRIMINATION

Point Loma Nazarene University faculty are committed to helping create a safe learning environment for all students. If you (or someone you know) have experienced any form of sexual discrimination or misconduct, including sexual assault, dating or domestic violence, or stalking, know that help and support are available through the Title IX Office at pointloma.edu/Title-IX (<http://pointloma.edu/Title-IX>). Please be aware that under Title IX of the Education Amendments of 1972, it is required to disclose information about such misconduct to the Title IX Office.

If you wish to speak to a confidential employee who does not have this reporting responsibility, you can contact Counseling Services at counselingservices@pointloma.edu (<mailto:counselingservices@pointloma.edu>) or find a list of campus pastors at pointloma.edu/title-ix (<http://pointloma.edu/title-ix>).

Final Exam: 5/3 at 10:30pm

The final exam date and time is set by the university at the beginning of the semester and may not be changed by the instructor. This schedule can be found on the university website and in the course calendar. No requests for early examinations will be approved. Only in the case that a student is required to take three exams during the same day of finals week, is an instructor authorized to consider changing the exam date and time for that particular student.

Class Enrollment:

It is the student's responsibility to maintain his/her class schedule. Should the need arise to drop this course (personal emergencies, poor performance, etc.), the student has the responsibility to follow through (provided the

drop date meets the stated calendar deadline established by the university), not the instructor. Simply ceasing to attend this course or failing to follow through to arrange for a change of registration (drop/add) may easily result in a grade of F on the official transcript.

COURSE MODALITY DEFINITIONS

1. **In-Person:** Course meetings are face-to-face with no more than 25% online delivery.
2. **Online:** Coursework is completed 100% online and asynchronously.
3. **Online Synchronous:** Coursework is completed 100% online with required weekly online class meetings.
4. **Hybrid:** Courses that meet face-to-face with required online components.

PLNU ATTENDANCE AND PARTICIPATION POLICY ⊕

Regular and punctual attendance at all class sessions is considered essential to optimum academic achievement. If the student is absent for more than 10 percent of class sessions, the faculty member will issue a written warning of de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university drop date or, after that date, receive the appropriate grade for their work and participation.

Tentative Schedule

Monday	Tuesday	Wednesday	Thu	Friday
Jan: 9	10: Intro	11: Chapter 2	12:	13 Chapter 2 Assembly Lab 1
16 (no classes)	17	18 Chapter 2	19	20 Chapter 2 Assembly Lab 2
23 Chapter 2	24	25 Chapter 2	26	27 Chapter 2 Assembly Lab 3

30				3
Chapter 2	31	1	2	Chapter 3
		Chapter 3		Circuit lab 1
				10
6		8		Chapter 3
Chapter 3	7	Chapter 3	9	Circuit lab 2
		Quiz 1		
13		15		17
Chapter 4	14	Chapter 4	16	Chapter 4
20		22	23	24
Chapter 4	21	Chapter 4		Chapter 4
				3
27		1		Midterm Exam
NDSS	28	NDSS	2	(Yes, it's the day before spring break)
6 (spring break)	7	8	9	10 (spring break)
13		15		17
Chapter 4	14	Chapter 4	16	Chapter 4
20		22	23	24
Chapter 4	21	Chapter 4		Chapter 4

Pipeline Exercises

27		29		31
Chapter 5	28	Chapter 5	30	Chapter 5
				Cache Exercises
3		5	6	7
Chapter 5	4	Chapter 5	EASTER	EASTER
		Quiz 2		
10		12		14
EASTER	11	Chapter 6	13	Chapter 6
17		19		21
Chapter 6	18	Chapter 6	20	Chapter 6
24		26	27	28
Chapter 6	25	Review		Review
1	2	3 Final @	5	6
		10:30am		

Course Summary:

Date	Details	Due
Fri Jan 27, 2023	 Lab 1 https://canvas.pointloma.edu/courses/66371/assignments/888479	due by 10:55am