COURSE SYLLABUS – Spring 2025

COMPUTER ORGANIZATION AND ARCHITECTURE – CS 2810 – X03

3 Credit Hours

Semester: Spring
Year: 2025
Course Prefix: CS
Course and Section #: 2810-X03
Course Title: computer organization and architecture
Credits: 3

Course Description

Uses assembly language to introduce basic concepts of computer organization. Includes number systems, CPU organization, instruction sets, programming in assembly, memory organization, debugging, program design, and documentation. Covers interrupts, vector tables, and disk I/O.

This is required for all majors in the CS Department

Course Attributes

This course has the following attributes:
☐ General Education Requirements
☐ Global/Intercultural Graduation Requirements
☐ Writing Enriched Graduation Requirements
☒ Discipline Core Requirements in Program
☐ Elective Core Requirements in Program
☐ Open Elective
Other: *Click here to enter text.*

Instructor Information

Instructor Name: Ting Cao

Student Learning Outcomes

Upon successful completion of this course, students will be able to:

- Identify the major hardware components in a processor and their respective functions.
- Use transistors to construct logic gates, storage elements, combinational logic circuits, and sequential logic circuits.
- Design structured assembly language programs.
- Implement structured assembly language programs.

Course Materials and Texts

Textbook: Introduction to Computing Systems, from bits & gates to C & beyond Yale N. Patt & Sanjay J. Patel, Third Edition, McGraw Hill, 2020, ISBN # 1260150534.

Required materials and technology: Computer with Intel-compatible processor, or use computers in the lab.

Course Requirements

Course Assignments, Assessments, and Grading Policy

Course Prerequisites: CS 1400 or CS 1420

Technology Expectations: Some programming experience is needed before taking this course

Course Mode:

This course is completely online.

Description of how course works:

All labs and the final project will be submitted through Canvas. All grades will assigned through Canvas.

Teams will be used to contact the instructor, the Instructional Assistant, or fellow students.

Each class may consist of a lecture, discussion, and demonstration of theoretical concepts. Sometimes, we will have a handout sheet that applies the concepts taught on Tuesday (it may be helpful to the Lab assignments). The Final Project is the culmination of all the work. It is worth 300 points. A student should not expect to pass the class without submitting a Final Project.

Classroom recordings will be available for students who miss class.

For this three (3) **credit-hour** course students should expect to spend up to **9+ hours a week** completing course activities.

An important part of the course is setting up a Linux virtual machine to program in x86-64 assembly language.

Grading Scale:

The following grading standards will be used in this class:

Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
Percent	>93	90-92	87-89	83-86	80-82	77-79	73-76	70-72	67-69	63-66	60-62	0-59

Assignment Categories

Activity	Points
Labs	700

Final Project	300
Total	1000

Late Work Statement:

There are no late penalties. All labs must be submitted by the final day of class, April 22, 2025, at 11:59 pm. Final projects must be submitted by the end of the semester, April 30, 2025, at 11:59 pm.

No excuses will be accepted and no exceptions will be granted.

Labs:

Labs are generally due on Thursday, 11:59 pm after we complete a lesson.

Final Project:

The final project will be an original program in either LC-3 assembly language or x86-64 assembly language. It will function like a high-level language program, including input/output.

Required or Recommended Reading Assignments
Chapter 1 to Chapter 9 of the Textbook

General Description of the Subject Matter of Each Lecture or Discussion
Lesson 1 (Jan 7) - Introduction to Computer Architecture
Lesson 2 (Jan 9, 14, 16, 21) Binary Arithmetic, Data Types
Lesson 3 (Jan 23, 28, 30, Feb 4) Digital Logic, State Machines
Lesson 4 (Feb 6, 11, 13) von Neumann model
Lesson 5 (Feb 18, 20, 25, 27) LC-3 Machine Language
Lesson 6 (March 4, 6, 18) - LC-3 Assembly Language
Lesson 7 (March 20, 25, 27, Apr 1) - Subroutines, Data Structures
Lesson 8 (Apr 3, 8) Input/Output, Interrupts
Lesson 9 (Apr 10, 15) Useful Subroutines
Final Project (Apr 17, 22, 24, 29)

Required Course Syllabus Statements

Generative AI
Use ChatGPT as a Learning Assistant, not an Oracle. ChatGPT can significantly streamline the learning process for students in a programming class, but it's crucial to ensure that it doesn't inadvertently promote dependency or shortcut genuine understanding. The tool can provide immediate help on complex topics and code troubleshooting. Many companies are expecting students to graduate knowing how to use it to generate code, so using it can no longer be considered cheating or plagiarism. Nevertheless, students are encouraged to independently problem solve and think critically. These most important skills in programming are best developed through a balance of self-led exploration and learning with an assistant.

Using Remote Testing Software
☒ This course does not use remote testing software.

☐ This course uses remote testing software. Remote test-takers may choose their remote testing locations. Please note, however, that the testing software used for this may conduct a brief scan of remote test-takers' immediate surroundings, may require use of a webcam while taking an exam, may require the microphone be on while taking an exam, or may require other practices to confirm academic honesty. Test-takers therefore shall have no expectation of privacy in their test-taking location during, or immediately preceding, remote testing. If a student strongly objects to using test-taking software, the student should contact the instructor at the beginning of the semester to determine whether alternative testing arrangements are feasible. Alternatives are not guaranteed.

Required University Syllabus Statements

Accommodations/Students with Disabilities
Students needing accommodations due to a permanent or temporary disability, pregnancy or pregnancy-related conditions may contact UVU Accessibility Services at accessibilityservices@uvu.edu or 801-863-8747.

Accessibility Services is located on the Orem Campus in BA 110.

Deaf/Hard of Hearing students requesting ASL interpreters or transcribers can contact Accessibility Services to set up accommodations. Deaf/Hard of Hearing services can be contacted at DHHservices@uvu.edu

DHH is located on the Orem Campus in BA 112.

Academic Integrity
At Utah Valley University, faculty and students operate in an atmosphere of mutual trust. Maintaining an atmosphere of academic integrity allows for free exchange of ideas and enables all members of the community to achieve their highest potential. Our goal is to foster an intellectual atmosphere that produces scholars of integrity and imaginative thought. In all academic work, the ideas and contributions of others must be appropriately acknowledged and UVU students are expected to produce their own original academic work.

Faculty and students share the responsibility of ensuring the honesty and fairness of the intellectual environment at UVU. Students have a responsibility to promote academic integrity at the university by not participating in or facilitating others' participation in any act of academic dishonesty. As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, assessments, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Likewise, instructors are responsible to clearly state expectations and model best practices.

Further information on what constitutes academic dishonesty is detailed in UVU Policy 541: *Student Code of Conduct*.

Equity and Title IX

Utah Valley University does not discriminate on the basis of race, color, religion, national origin, sex, sexual orientation, gender identity, gender expression, age (40 and over), disability, veteran status, pregnancy, childbirth, or pregnancy-related conditions, citizenship, genetic information, or other basis protected by applicable law, including Title IX and 34 C.F.R. Part 106, in employment, treatment, admission, access to educational programs and activities, or other University benefits or services. Inquiries about nondiscrimination at UVU may be directed to the U.S. Department of Education's Office for Civil Rights or UVU's Title IX Coordinator at 801-863-7999 – TitleIX@uvu.edu – 800 W University Pkwy, Orem, 84058, Suite BA 203.

Religious Accommodation

UVU values and acknowledges the array of worldviews, faiths, and religions represented in our student body, and as such provides supportive accommodations for students. Religious belief or conscience broadly includes religious, non-religious, theistic, or non-theistic moral or ethical beliefs as well as participation in religious holidays, observances, or activities. Accommodations may include scheduling or due-date modifications or make-up assignments for missed class work.

To seek a religious accommodation, a student must provide written notice to the instructor and the Director of Accessibility Services at accessibilityservices@uvu.edu. If the accommodation relates to a scheduling conflict, the notice should include the date, time, and brief description of the difficulty posed by the conflict. Such requests should be made as soon as the student is aware of the prospective scheduling conflict.

While religious expression is welcome throughout campus, UVU also has a specially dedicated space for meditation, prayer, reflection, or other forms of religious expression.