CSC3501 Computer Organization and Design

Course Schedule:	Monday and Wednesday 3:30 PM - 4:50 PM
Classroom:	100 Dodson Hall
Course Website:	LSU Moodle
Instructor:	Dr. Hao Wang
Email:	haowang@lsu.edu
Office Hours:	Wednesday 1:00PM - 3:00 PM via Zoom
Office Phone:	(225) 578-7510
Office	3272X PFT
TA:	TBD
TA Office Hour:	By appointment only via Zoom

Course Description

This course introduces a programmer's view of how computer systems execute programs, store information, and communicate. It enables students to become more effective programmers, especially in dealing with issues of performance, portability and robustness. It also serves as a foundation for courses on compilers, networks, operating systems, and computer architecture, where a deeper understanding of systems-level issues is required. Topics of interest include, but not limited to the following:

- Overview of Computer Systems
- Data Representations and Operations
- Assembly Programming
- Memory Hierarchy
- Processor Architecture

Textbooks

[Required] Randal E. Bryant and David R. O'Hallaron, *Computer Systems: A Programmer's Perspective, Third Edition (CS:APP3e)*, Pearson, 2016 https://www.vitalsource.com/referral?term=9780134092997.

[Reference] Brian Kernighan and Dennis Ritchie, *The C Programming Language*, Second Edition, Prentice Hall, 1988.

Prerequisites

- CSC 2259 Discrete Structures
- C programming experience (highly recommended)

  We will be programming in a Unix (GNU/Linux) environment, using assembly and ANSI C (gcc).

Course Calendar

Week	Date	Lecture Topic	Notes
1	Jan 11 (M)	Course Overview	
	Jan 13	Data Representations and Operations: Bits and Bytes	
2	~~Jan 18 (M)~~	Martin Luther King Day Holiday	
	Jan 20	Data Representations and Operations: Bits and Bytes (cont.)	
3	Jan 25 (M)	Data Representations and Operations: Integers	
	Jan 27	Data Representations and Operations: Integers (cont.)	
4	Feb 1 (M)	Data Representations and Operations: Arithmetic	
	Feb 3	Data Representations and Operations: Arithmetic (cont.)	
5	Feb 8 (M)	Data Representations and Operations: Floating Point	
	Feb 10	Data Representations and Operations: Floating Point (cont.)	
6	Feb 15 (M)	Assembly Programming I: Basics	
	Feb 17	Assembly Programming II: Control	
7	Feb 22 (M)	Assembly Programming III: Procedures	
	Feb 24	Assembly Programming IV: Data	
8	Mar 1 (M)	Assembly Programming V: Advanced Topics	
	Mar 3	Midterm Exam; Grades due on Mar 9	
9	Mar 8 (M)	C Review	
	Mar 10	The Memory Hierarchy	
10	Mar 15 (M)	The Memory Hierarchy (cont.)	
	Mar 17	Cache Memories	
11	Mar 22 (M)	Cache Memories (cont.)	
	Mar 24	Concurrent Programming	
12	Mar 29 (M)	Concurrent Programming (cont.)	
	Mar 31	Processor Design: Overview and ISA	
13	Apr 5 (M)	Processor Design: Logic Design	
	Apr 7	Processor Design: Sequential Implementation	
14	Apr 12 (M)	Processor Design: Pipelined Implementation	
	Apr 14	Processor Design: Pipelined Implementation (cont.)	
15	Apr 19 (M)	Processor Design: Wrap up	
	Apr 21	Final review; Concentrated study period	
	Apr 26-May 1	Final Exam (TBD); Grades due on May 4	

Components

- Exams: 75% (midterm: 30%, final: 45%)
  - If you miss any exams, you will get F as your final course grade.
- Quizzes: 5%
- Assignments: 20% (Assignment 1: 2%, Assignments 2-4: 6% each)
  - You are expected to be able to explain the workings of your own programs, and may be called upon to do so via Zoom. No credit for the assignment if you fail to explain your code.
  - Assignments turned in after the due date will be penalized 20% per day. Assignments that are submitted later than three days after the due date will result in a grade of zero.
  - For **each** missed assignment, your final grade can be lowered by one grade (e.g., from A- to B+) in addition to the zero point for the assignment. Missed assignments include, but not limited to empty code, meaningless code, and unrelated code.
  - If you miss all assignments, you will get F as your final course grade regardless of your exam grades.

Grading

Final grade calculation based on your total aggregated point (rounded off to the nearest whole number)

- A+ (100, 99, and 98), A (97, 96, 95, and 94), and A- (93, 92, and 91)
- B+ (90, 89, and 88), B (87, 86, 85, and 84), and B- (83, 82, and 81)
- C+ (80, 79, and 78), C (77, 76, 75, and 74), and C- (73, 72, and 71)
- D+ (70, 69, and 68), D (67, 66, 65, and 64), and D- (63, 62, and 61)
- F (less than 61)
- If necessary, grading on a curve may be used for final grades in which aggregated raw scores will be used for curved grading (*i.e.*, no curved grading for each graded item)

LSU Student Code of Conduct

Students are required to be familiar with the LSU student code of conduct, which describes the student rights, excused absences, and what is expected of student behavior. The details can be found at http://www.lsu.edu/students/saa/students/codeofconduct.php. Any violations of the LSU student code will be duly reported to the Dean of Students.

COVID-19 Statement

We remain under pandemic conditions and expect to be in this state for the entire semester. In order to consistently provide the highest quality LSU education, all students should follow current LSU guidelines. These include the following:

- If you have any signs of illness, do not come to class.
- In order to protect all campus community members, the University requires everyone to wear facemasks/cloths on campus. Failure to do so is a violation of the code of student conduct.
- Faculty can ask students who are not wearing facemasks/cloths in the classroom to leave, and they can be referred to Dean of Students for violation of the Student Code of Conduct and University Policy through the CARES system.

- Wash hands with soap and water or clean with sanitizer frequently, and refrain from touching your face.
- If you have to cough or sneeze unexpectedly, please be mindful of others nearby and cough or sneeze into your elbow or shield yourself the best you can.
- If you have been exposed to others who have tested positive for COVID-19, self-quarantine consistent with current CDC guidelines.

For students who miss the in-person classes, we will provide slides online and answer your questions during office hours.

Daily Symptom Checker

You are required to respond to a daily symptom check request sent via email or text message each morning. Completing the symptom checker will take approximately one to two minutes. Once you have provided information about your symptoms, you will be given feedback on whether or not you are certified to return to campus and attend your classes. Additionally, if you test positive for COVID-19, you are required to report it in your daily symptom checker application.

Resources for Students

Your health and safety are LSUs top priority. If you are feeling ill or overwhelmed with anxiety, please contact the LSU Student Health Center for medical advice and mental health support. General health care and mental health support are available for all enrolled students through telehealth appointments.

Cheating

Students are encouraged to discuss programs in a general way to gain greater insight. Copying another's code, writing code for someone else, or allowing another to copy your code are cheating, and can result in a grade of zero for all parties. Therefore, take precautions so that your old printouts, unattended screen, etc. are not available to other students. Discussing the details of the solution or showing/examining actual code are not acceptable. If you are in doubt whether an activity is permitted collaboration or cheating, ask the instructor.

Disability

If you have a physical, psychological, medical or learning disability that may impact on your ability to carry out assigned course work, you need to contact University Disability Services (DS), 115 Johnston Hall (225-578-5919, https://www.lsu.edu/disability/). Please bring a letter (or email its photocopy) to the instructor from the DS indicating your need for academic accommodations within the first week of class. The syllabus and other class materials can be made available in alternative format upon request.

Syllabus Changes

This syllabus is provided for informational purposes regarding the anticipated course content. It is based upon the most recent information available on the date of issuance, and is as accurate and complete as possible. The instructor reserves the right to make any changes deemed necessary and/or appropriate. The instructor will make his best effort to communicate any changes in the syllabus in a timely manner, and post the updated document to the class homepage. This syllabus is adapted from Dr. Kisung Lee and Dr. Chen Wang's syllabus for CSC 3501.