BOB JONES UNIVERSITY
EST. 1927

College of Arts and Science

CpS 310: Microprocessor Architecture

Fall Semester 2020-2021

Instructor:	Stephen Schaub	Email:	sschaub@bju.edu
Office:	Alumni 70	Telephone:	(864) 242-5100 ext. 2264
Office Hours:	MTWF 3:00-3:50pm Th electronic Others by appointment		

Course Information

Study of the basic microprocessor architecture focusing on the fetch-decode-execute cycle. Project involves writing a program which simulates the workings of a microprocessor including instruction decoding, addressing techniques, interrupt processing, etc. Discussion of RISC and CISC philosophies. *Prerequisites: CpS 209 and CpS 230.*

Overview: This course builds on the foundational concepts of computer systems covered in CpS 230. We will explore the organization and implementation of microprocessors, focusing on the ARM family. This will give you an exposure to an alternative to the x86 architecture you studied in CpS 230. In addition, you will be exposed to GPU concepts and programming.

A significant project in this course involves writing a program which simulates a microprocessor at the instruction set level. This involves writing a loader, a disassembler, a simulator, several assembly routines to test your system, and a technical report describing your system. You must follow prescribed coding standards to insure the best possible grade on your project.

Goals: The goals this semester are

- To introduce you to CPU implementation
- To give you a detailed understanding of how machine language programs produced by compilers are loaded and executed by a CPU
- To help you understand key differences between CPU and GPU architectures, and what types of problems are best solved by each
- To provide a capstone-level systems software development experience in which you build a large and complex software artifact using professional tools and practices

Course Resources

Textbook: *Computer Systems: A Programmer's Perspective,* by Bryant and O'Hallaron. 3rd ed. Pearson, 2016.

Announcements: Students are expected to participate in the Microsoft Teams Cps 310 team to receive course announcements and to engage in the online experiences of this course.

Website: See the course website for course assignments and schedule: https://cs.bju.edu/cps310/

Grading

Grading:			
Qty	Item	Points	Total
4	Project Deliverables		500
7	Quizzes / Exercises	10-40	200
2	Written Tests	100	200
1	Final Exam	100	100
Total Points:		1000	

Scale:	approximate
A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	<60%

Course Policies

Assignments can receive full credit only if submitted in full by 11:59 p.m. on the day due. A 25% penalty will be applied if the assignment is not turned in on time. No credit is possible after one week. I may waive one late penalty for students who are punctual in their class attendance. If you anticipate trouble on an assignment, see me as soon as possible for assistance.

For project deliverables, I award +3% bonus to the first three students who upload their solutions electronically. In order to receive this bonus, your submission must be in order and include all required elements.

Project deliverables may be submitted late only by approval of the instructor. I will allow this only for students who formally request permission to submit the deliverable late. The request must be made by email, and should report the number of hours invested, summarize the work completed to date, include a description of problems encountered, and your current code must be uploaded to the submission system. The request must be submitted by the original assignment deadline. Requests indicating little effort invested will be denied.

Electronic devices may not be used during class except by special arrangement with me.

Gum chewing in professional settings is inappropriate and therefore not permitted in class. Compliance with all student handbook policies is expected during class.

University Policies

Attendance Policy

You are expected to attend class and be on time per the standard University attendance policy: https://home.bju.edu/bju-policies/. If you come late or leave early, I will record a partial attendance mark if you missed at most 15 minutes of class. If you miss more than 15 minutes of class, you will be marked absent. If you exceed the 7 allowed absences, you may be withdrawn from class.

For planned absences, notify me a week ahead of time by e-mail. Written assignments and scheduled tests should be completed before your planned absence; please contact me to make arrangements for doing so. It is your responsibility to check in advance of a planned absence to verify what is due.

For absences due to a COVID-related matter, illness or emergency, contact me no later than 24 hours after class to indicate the reason for your absence and to arrange for making up any graded work without

penalty. In these situations, you will be able to make arrangements for making up tests without penalty for the first occurrence. Each subsequent time a test is missed because of incapacitating illness or emergency, an additional 10 percent grade penalty for that test will be incurred.

If you are sick, do not come to class. I will be recording all lectures this semester. For any day when you miss class due to a COVID-related issue, your absence will not be reported if you watch the lecture recording in full that day. Absences due to non-COVID illness will be reported, but the flexibility allowed by the attendance policy this semester is designed to allow a conscientious student to miss class when sick without worrying about the academic impact.

Accommodations for Students with Disabilities

If you have a documented learning disability or if you are impaired in some way (auditory, visual, cognitive, neurological, or physical), please let me know this within the first week of the course so that any necessary adjustments can be made before you get behind.

Academic Honesty and Integrity Policy

See the Computer Science Department's Academic Integrity Policy:

https://cs.bju.edu/academics/policies/academic-integrity-policy/

Curriculum Information

Context

This course addresses the following learning objectives of the computer science major:

CS1. Design and implement solutions to problems in various domains.

CS2. Demonstrate understanding of fundamental concepts in computer science.

CS4. Evaluate and assess software technologies for use in solving specific problems.

Learning Objectives

Objective	Content	Assessment
Explain different instruction formats, such as addresses per instruction and variable length vs. fixed length formats (CS 2)		
Explain the organization of the classical von Neumann machine and its major functional units. (CS 2)		
Summarize how instructions are represented at both the machine level and in the context of a symbolic assembler (CS 2)		
Explain how subroutine calls are handled at the assembly level (CS 2)		