

FAYETTEVILLE STATE UNIVERSITY

College of Arts and Sciences

Dr. Henry Eldridge Department of Mathematics and Computer Science

CSC 201 Computer Organization and Architecture I

Fall 2010

I. Locator Information

Instructor:	Dr. V. Dwight House	Office Location:	SBE 307C
Course/Section:	CSC 201-01	Office Telephone:	672-1664
Semester Credit Hours:	3		
Day and Time Class Meets:	MWF 11:00 to 11:50		
Bldg./Room Class Meets:	SBE 221		
Office Location:	SBE 307C	Office Hours:	MWF 10:00 – 11:00
Office Telephone:	672-1664		TR noon – 2:00
Email address:	dhouse@uncfsu.edu		Other Office Hours by Appointment

FSU Policy on Electronic Mail: Fayetteville State University provides to each student, free of charge, an electronic mail account (username@uncfsu.edu) that is easily accessible via the Internet. The university has established FSU email as the primary mode of correspondence between university officials and enrolled students. Inquiries and requests from students pertaining to academic records, grades, bills, financial aid, and other matters of a confidential nature must be submitted via FSU email. Inquiries or requests from personal email accounts are not assured a response. The university maintains open-use computer laboratories throughout the campus that can be used to access electronic mail. Rules and regulations governing the use of FSU email may be found at <http://www.uncfsu.edu/PDFs/EmailPolicyFinal.pdf>

II. Course Description

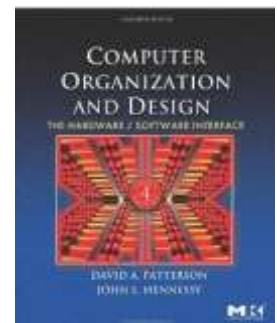
This course covers the relationship between computing hardware and machine language instruction sets, implementation of high level languages on the machine and some memory related issues. The study is organized into levels in the following order of topics: fundamental building blocks such as logic gates and flip-flops and combinational and sequential logic; machine level representation of data; basic assembly language, implementation of high level language constructs, addressing modes, compilation, assembly and interpretation; memory hierarchy; interrupts. Some real world computer systems and microprocessors are used as examples, along with their hardware and the organization of their instruction sets. Assembly language programming is studied in detail.

Prerequisite: CSC 130.

III. Disabled Student Services: If you have a disability or think you have a disability, please contact the Center for Personal Development in the Spaulding Building, Room 155 (1st Floor); 910-672-1203.

IV. Textbook

Patterson, David A. and John L. Hennessey. Computer Organization & Design: The Hardware/Software Interface, 4th ed. ISBN 978-0-12-374493-7. San Francisco, CA: Morgan Kaufmann Publishers, Inc., 2009.



V. Student Learning Outcomes

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

1. Understand basic terminology of computer organization and assembly language programming. (e.g. machine code, instruction sets, addressing modes, logic gates, architectures)
2. Create assembler programs that use selection, repetition, recursion, good and plentiful documentation, and good style.
3. Understand the fetch-execute cycle.
4. Students will understand the IEEE-754 floating point representation and be able to convert a decimal number to its 32 (64) bit representation and vice versa.
5. Represent integers in decimal, binary and hexadecimal bases.
6. Construct a half-adder, full adder and 1-bit ALU which supports AND, OR, set on less than, add, and sub using the basic building blocks of AND gates, OR gates, inverters, and multiplexors.
7. Understand performance criteria, and be able to make performance evaluations.
8. Read and understand MIPS assembly language programs.

VI. Course Requirements and Evaluation Criteria

There will be four tests, four lab assignments (computer programs), ten quizzes, five classroom activities, and a comprehensive final exam. The grading scale for determining the course grade is given below on the left. The weight given to various activities for evaluation is given below on the right. To see how your grade will be calculated, suppose your test scores are 87, 94, 84 and 91, your final exam score is 88, your top seven quiz scores average 73, your average (mean) activity score is 93, and your average (mean) lab score is 92. Since the lowest test score is dropped (see item 1 below), your grade would be calculated as follows:

$$0.36 \times (87 + 94 + 91)/3 + 0.2 \times 88 + 0.16 \times 73 + 0.1 \times 93 + 0.18 \times 92 = 87.78$$

Since 87.78 lies between 80 and 90, you would receive a B.

A	90 - 100%	highest three tests	36%
B	80 - 89.9%	four lab assignments	18%
C	70 - 79.9%	highest seven quizzes	16%
D	60 - 69.9%	five activities	10%
F	below 60%	comprehensive final	20%

W Student initiated withdrawal from class.

I Incomplete grade by prior approval of the instructor.

1. All tests will be announced prior to their administration. Since the lowest test score will be dropped no make-up test will be given. In case of a planned absence (e.g. a doctor's appointment or court appearance) a test may be taken early if adequate notice is given. There is no possibility of making up a pop quiz – even if you enter class after it has been given. Your lowest three pop quiz scores will be dropped. The final exam will be comprehensive, and the final exam grade will not be dropped. Cell phones must not be out during a test.

2. Students are expected to attend all class sessions, to enter the classroom on time, and remain until the class ends. You should try real hard not make other appointments in conflict with your class. The FSU Attendance Policy from the 2010-11 University Catalog (<http://catalog.uncfsu.edu/ug/academicregulations/classattendance.htm>) will be followed. When a student enters the classroom after the roll call, it is the responsibility of the student to inform the instructor after class that (s)he was in attendance. You must notify the instructor when it is necessary for you to leave early.

3. There will be extra credit (5% of total) available to students who qualify by:

- Submitting all 4 programs on time – the programs must NOT have compile or execution errors
- Attending 80% of the scheduled classes
- Obtaining permission from the instructor to do extra credit work
- Taking all four tests, at least 8 quizzes, and doing all 5 class activities

4. Students are encouraged to ask questions of the instructor in class and to respond to those posed by the

instructor. One should not discourage others from raising or answering questions. Often, other students have the same questions which they wish to ask, but are hesitant to do so. In class dialogue is a valuable learning medium and is encouraged.

5. **READING and WORKING are FUNDAMENTAL for SUCCESS!**

Students are expected to study the text materials for each class session prior to the class time. Students are expected to spend **AT LEAST** two (2) hours of study outside the classroom for each hour in class. During the first half of the semester a fair amount of class time will be spent working on programming assignments. At first I will be generous with my help, but after the first programming assignment I will expect a student to have first done something on paper or on a file before getting help. Don't expect to get help without demonstrating some initial effort on your part. The rest of the class time will be spent on answering questions, very short lectures, and learning activities.

6. Programming assignments usually require that you spend some time on the computer system periodically over several days. Thus you should not expect to complete the assignment on time by starting the day before it is due. Each programming assignment must be submitted on time. **Late programs will NOT be accepted.** All assignments will be submitted electronically, and the time of submission of an assignment means the time it was submitted electronically - a time determined by the computer. Details will be discussed further in class. This will help to avoid mishandling of assignments, and enforce the deadlines. Any expected or unexpected machine failure not exceeding 48 hours will not be a basis for extending the deadline.

7. Email is one way to contact me. I will do my best to respond within 24 hours during the M-F work week. Email should be written carefully so it can be read quickly and easily. Your message is likeliest to receive a useful, prompt response when you follow these guidelines:

A) Use university email. When you do, your name will show up as the "sender" of the message. I would not recognize mrpotatohead13@hotmail.com. Messages from non-university accounts may be deleted unread unless the subject line indicates that you are one of my students.

B) Provide a meaningful subject line that tells me what action you want from me or the important information you are giving me.

Helpful subject lines:

need to schedule an appointment
excused absence on 9/15 in CSC 332
question on homework due tomorrow in CSC 410
letter of recommendation request

Unhelpful Subject Lines:

student in your class
requesting assistance
exam
hello professor

C) Provide all the information I need to act on your message. Put the purpose of your message into the first sentence or two, more specifically than in your subject line: "I write to schedule an appointment this week, preferably on Thursday afternoon if you have time. I am confused about how to write a for loop in Tcl and believe that it would be beneficial for you to look at what I've done and tell me how to make sense of the error message I got." Telling me what you need and why helps me schedule and plan for your appointment.

After your "purpose" sentence, include details that would help me respond to you effectively—in the case above, it would be useful to list times you are unavailable for appointments and possibly times you prefer.

D) Attend to grammar, spelling, capitalization, and punctuation. *Avoid* text message spelling and abbreviations like 2nite and ru. I need to be able to tell where your paragraphs begin and end, where your sentences begin and end, and which whole words you are using. Misspellings, no punctuation, missing capital letters and other things that are acceptable in a txt msg are not acceptable in professional email.

E) Avoid writing something that you would not say in person. You want your email to show that you are an intelligent, logical, and professional adult. Everyone gets impatient and even angry sometimes, but email can stay in someone's

memory—and inbox—much longer than those feelings last. Read your email out loud before you send it, and try to think about how you will “sound” to your reader. Do you sound calm and intelligent? Do you sound like someone that **you** would want to work with?

8. Dishonesty on graded assignments will not be tolerated. Students must neither give nor receive help on any work to be graded. The University policy on cheating will be applied to any violations. The minimum penalty will be a grade of zero on the assignment (including tests). Having access to another student's work on the system is definitely not allowed. See the policy on COLLABORATION RESTRICTIONS below. Each student is responsible for disposing of printouts safely (Do **NOT** simply throw away printouts in a trash can where they can easily be retrieved by another person.) and for protecting their home directory on the Linux system.

COLLABORATION RESTRICTIONS

The following identifies the restrictions for graded assignments performed in this course:

UNIT TESTS AND FINAL EXAMINATION

The student must neither give nor receive any assistance from another person. No access to any type of written material is allowed unless explicitly stated by the instructor. However, the student may ask the instructor to clarify questions.

PROGRAMMING ASSIGNMENTS

Access to the individual's notes, textbooks, reference books and materials, and other publications is allowed, and encouraged. The program code, drawings, diagrams, text, and comments from/to another person (FSU student or others) is **NOT** allowed. Both the giving and receiving of such assistance is a violation of honor. The student must neither allow nor obtain access to another person's files on the computer system. The student is responsible for disposing of any unwanted printouts to avoid their use by others. The student may seek assistance from the lab assistants and/or an instructor in **LOCATING** any programming errors (bugs), but the student is responsible for determining how to correct these errors.

9. FSU Policy on Disruptive Behavior in the Classroom

The *Code of the University of North Carolina* (of which FSU is a constituent institution) and the *FSU Code of Student Conduct* affirm that all students have the right to receive instruction without interference from other students who disrupt classes.

FSU Core Curriculum Learning Outcome under Ethics and Civic Engagement (6.03): All students will “prepare themselves for responsible citizenship by fulfilling roles and responsibilities associated with membership in various organizations.” Each classroom is a mini-community. Students learn and demonstrate responsible citizenship by abiding by the rules of classroom behavior and respecting the rights all members of the class.

The FSU Policy on Disruptive Behavior (see FSU website for complete policy) identifies the following behaviors as disruptive:

1. Failure to respect the rights of other students to express their viewpoints by behaviors such as repeatedly interrupting others while they speak, using profanity and/or disrespectful names or labels for others, ridiculing others for their viewpoints, and other similar behaviors;
2. Excessive talking to other students while the faculty member or other students are presenting information or expressing their viewpoints.
3. Use of cell phones and other electronic devices
4. Overt inattentiveness (sleeping, reading newspapers)
5. Eating in class (except as permitted by the faculty member)
6. Threats or statements that jeopardize the safety of the student and others
7. Failure to follow reasonable requests of faculty members
8. Entering class late or leaving class early on a regular basis
9. Others as specified by the instructor – in this course smoking, eating and drinking

The instructor may take the following actions in response to disruptive behavior. Students should recognize that refusing to comply with reasonable requests from the faculty member is another incidence of disruptive behavior.

1. Direct student to cease disruptive behavior.
2. Direct student to change seating locations.
3. Require student to have individual conference with faculty member. At his meeting the faculty member will explain the consequences of continued disruptive behavior.
4. Dismiss class for the remainder of the period. (Must be reported to department chair.)
5. Lower the student's final exam by a maximum of one-letter grade.
6. File a complaint with the Dean of Students for more severe disciplinary action.

Students who believe the faculty member has unfairly applied the policy to them may make an appeal with the faculty member's department chair.

VII. Academic Support Resources

VIII. Course Outline (See last page of syllabus.)

IX. Teaching Strategies

The primary teaching strategies for this course will be discussion, class activities and programming. You are strongly encouraged to participate in any discussion. Lecture will also be used a little.

X. Bibliography

Britton, Robert L. MIPS Assembly Language Programming. Upper Saddle River, NJ: Prentice Hall, 2004.

Harris, David M. & Sarah L. Harris. Digital design and Computer Architecture. San Francisco, CA: Morgan Kaufmann Publishers, Inc., 2007.

Null, Linda & Julia Labur. The essentials of Computer Organization and Architecture, 2nd ed. Boston, MA: Jones and Bartlett, 2006.

Overton, Michale L. Numerical Computing with IEEE Floating Point Arithmetic. Philadelphia, PA: SIAM, 2001.

Stallings, William. Computer Organization and Architecture: Designing for Performance, 7th ed. Upper Saddle River, NJ: Prentice Hall, 2006.

Tannenbaum, Andrew S. Structured Computer Organization, 5th ed. Upper Saddle River, NJ: Prentice Hall, 2006.

White, Ron and T. E. Downs. How Computers Work, 9th ed. Que, 2007.

VIII. Course Outline and Assignment Schedule*

WEEK	DAYS	TOPICS
1	Aug 20	Administrative details, introduction to course, chapter 1 of P&H (Patterson and Hennessey – the textbook for this course)
2	Aug 23 - 27	sections 2.1 – 2.6 of P&H; <i>Aug 25</i> : late registration ends
3	Aug 30 – Sep 3	sections 2.7 - 2.9 of P&H; <i>Aug 31</i> : deadline for X grades
	Sep 6	Labor Day - university closed
4	Sep 8 & 10	sections 2.10 & 2.11 of P&H, Test # 1 on Friday
5	Sep 13 - 17	Return Test # 1, sections 2.13 & 2.14 of P&H
6	Sep 20 - 24	chapter 2 of MIPS Tutorial,
7	Sep 27 – Oct 1	chapters 3 & 4 of MIPS Tutorial
8	Oct 4 - 8	sections 2.16 – 2.20 of P&H, chapter 5 of MIPS Tutorial, Test # 2 on Friday
9	Oct 11 & 13	Return Test # 2, sections 3.1 – 3.5 of P&H
	Oct 15 - 18	MIDTERM BREAK
10	Oct 20 & 22	sections 3.5 – 3.7 of P&H, chapter 1 of MIPS Tutorial
11	Oct 25 - 29	section 3.8 – 3.10 of P&H, Test # 3 on Friday , also deadline for withdrawing from classes and removing I grades from previous semester
12	Nov 1 - 5	Return Test # 3, sections 4.1 – 4.4 of P&H
13	Nov 8 - 12	sections 4.5 & 4.6 of P&H
14	Nov 15 - 19	sections C.1 – C.3 and pages C-26 to C-36 of P&H, Test # 4 on Friday <i>Nov 17</i> : deadline for withdrawing from the university (WU)
15	Nov 22 & 24	Return Test # 4, section C.6 of P&H
	Nov 25 & 26	Thanksgiving - university closed
16	Nov 29 – Dec 3	pages 95 – 113 of Sequential Logic, pages 113 – 140 of Sequential Logic
	Mon, Dec 6	Final Exam from 10:00 a.m. to 11:50 a.m.

* This schedule is subject to change for the optimum benefit of the class as a whole. Therefore, it is important to stay alert and attend class regularly. In case FSU must close for an emergency during the semester, instruction will continue using Blackboard.