

COMP375 Computer Architecture and Organization

Spring Semester 2016

Instructor: Dr. Kenneth A. Williams

email: williams@ncat.edu

office: 503 McNair Hall

office phone: (336) 285-3697

home phone: 674-0535

office hours: MWR 3:00 to 5:00, Thursdays 9:00 to 11:00

other times by appointment

Prerequisites: COMP280 Data Structures or ELEN327 Digital Logic

Required Text: *The Essentials of Computer Organization and Architecture, fourth edition*, by Linda Null and Julia Lobur, Jones & Bartlett Learning (2014), ISBN-13: 9781284045611, ISBN-10: 1284045617

Lectures: Monday, Wednesday and Friday 1:00pm – 1:50pm in Graham 210

Communication: Assignments and course material will appear on the University's online Blackboard system, <http://blackboard.ncat.edu> The web page <http://williams.comp.ncat.edu/comp375> may contain the lecture slides and other information. Email messages are sent to the student's A&T email address. It is the student's responsibility to regularly check their A&T email account.

Description:

3 credits

This course explores the design of computer systems and their architectures. Topics include central processing unit architecture, microcode, system interconnections, memory systems, input/output systems, interrupt handling and peripherals. The topics to be covered include:

- Assembly level machine organization
- Memory system organization and architecture
- Interfacing and communication
- Functional organization
- Multiprocessing and alternative architectures
- Performance enhancements

Goals: Upon completion of this course, the student should be able to:

1. Apply knowledge of computing, statistics and mathematics to solve problems of design and performance analysis
2. Demonstrate how instructions can be implemented in microcode
3. Understand how the architecture affects program performance
4. Understand the basics of computer hardware and how software interacts with computer hardware
5. Use critical thinking to make informed decisions in the selection of computers
6. Write a simple program in assembler language to implement a high level program segment

Response clickers: This course will use response clickers during the lecture. All students are required to have an i>clicker 2 response clicker. Response clickers may be purchased at the A&T bookstore. The response clickers will be used to provide input during the lectures and to record attendance. If you do not bring your response clicker to lecture, you will only get half credit for attendance.

COMP375 Computer Architecture and Organization

Spring Semester 2016

Grading : A student's grade in the class will be based on their performance on the exams, quizzes, programs and homework assignments. All work will be graded on a numerical scale from 0 to 100. The final grade will be the weighted sum of all work using the following weights:

attendance	4 %
assignments and quizzes	16 % combined
3 exams	20 % each
final exam	20 %

The lowest homework or quiz grade will be discarded. Homework must be turned in at the beginning of class on the assigned day for full credit, unless accompanied by a valid excuse. Homework turned in within one day of the assigned time will be penalized 15%. Homework turned in within two days of the assigned time will be penalized 25%. **No homework will be accepted after two days.** Students who are absent during a class period when a test is given, will receive a score of zero unless previous arrangements are made or a valid written excuse is presented.

Final letter grades will be based on the following scale:

Letter Grade	from	up to but not including
A	87	100
A-	85	87
B+	82	85
B	77	82
B-	75	77
C+	72	75
C	62	72
C-	60	62
D+	57	60
D	50	57
F	0	50

Students will be allowed one and only one 8½ by 11 inch page of notes during the exams. Both sides of the note page can contain information as small as the student desires. You are not allowed to use more than 187 square inches of paper surface to hold your notes. Any additional pages, fold outs, flaps or other means of extending the page of notes will be considered cheating.

The final exam will be optional for a student when it is determined by the instructor that it is statistically unlikely that the final exam will change the student's grade. A student always has the option to take the final exam if they wish to do so. When a student is permitted to not take the final exam, their course grade will be determined by the weighted average of all other graded work.

Attendance: The lectures introduce the class material. Some material presented in the lectures is not covered in the text. Students are responsible for all class material covered or assigned in lectures. After the first three classes, students must attend 39 of the remaining 42 lectures to receive 100% of their attendance grade. For each class missed the attendance grade will be lowered by 5 points. If you come to class without your clicker, you will only receive half credit for your attendance that day. If your clicker comes to class without you, you will lose all attendance points.

COMP375 Computer Architecture and Organization

Spring Semester 2016

Cheating: Instances of cheating will be handled according to departmental policy. Cheating covers any case in which a student has received unauthorized aid in his/her performance that contributes to a course grade or submits material contributing to a course grade with the intent to deceive the instructor or grader. If the unauthorized aid includes help from another student, then that student is considered to have cheated as well. Students are expected to submit assignments that are entirely their own work. A common example of cheating is to copy another person's program or homework assignment.

If a student cheats on a homework assignment, then he/she will receive a grade of zero (a grade of F) for that item as will anyone assisting him/her in an unauthorized way. If a student cheats on an exam or the final, he/she will receive a failing grade for the class. All cases of cheating will be reported to the Director of Undergraduate Studies. When a student cheats for the second or more time in any Computer Science class, he/she will receive an F in the class in which the most recent case occurred and will be referred to the University authorities for disciplinary action.

Special needs: Students with special needs (e.g. hearing, vision, etc.) should inform the instructor at the beginning of the semester.

COMP375 Computer Architecture and Organization

Spring Semester 2016

Class Schedule

Monday, January 11 Introduction scan chapter 1	Wednesday, January 13 History & Performance read chapter 1.5	Friday, January 15 Assembly language metric online quiz due
Monday, January 18 <i>Martin Luther King Day holiday</i> <i>(no classes)</i>	Wednesday, January 20 Programming in assembler	Friday, January 22 Programming in assembler HW1, hex quiz due
Monday, January 25 Programming in assembler read 4.11.2	Wednesday, January 27 Programming in assembler HW1 due, HW2	Friday, January 29 Programming in assembler Log2 quiz due, Quiz 1
Monday, February 1 Instruction formats read chapter 5.1-5.4, HW2 due	Wednesday, February 3 Processor structure read chapter 4.1 – 4.7	Friday, February 5 Microcode read 4.13, HW3
Monday, February 8 Microcode	Wednesday, February 10 Microcode HW3 due Quiz 2	Friday, February 12 review
Monday, February 15 Exam 1	Wednesday, February 17 Bus read 4.3 & 7.4	Friday, February 19 VLSI logic
Monday, February 22 Digital logic read chapter 3	Wednesday, February 24 Digital logic HW4	Friday, February 26 Data representation read chapter 2
Monday, February 29 Memory types read 6.1 – 6.3	Wednesday, March 2 Memory types HW4 due	Friday, March 4 Cache read 6.4 Quiz 3
Monday, March 7 <i>Spring Break</i> <i>(no classes)</i>	Wednesday, March 9 <i>Spring Break</i> <i>(no classes)</i>	Friday, March 11 <i>Spring Break</i> <i>(no classes)</i>
Monday, March 14 Cache HW 5	Wednesday, March 16 Virtual Memory read chapter 6.5	Friday, March 18 Virtual Memory HW5 due
Monday, March 21 Multimedia & review	Wednesday, March 23 Exam 2	Friday, March 25 <i>Good Friday</i> <i>(no classes)</i>
Monday, March 28 I/O controllers read 7.1-7.4	Wednesday, March 30 External memory read chapter 7.6-7.8	Friday, April 1 Disk performance
Monday, April 4 Disk performance HW6	Wednesday, April 6 RAID read 7.9-7.10	Friday, April 8 Pipelining read 5.5 & 9.1 Quiz 4
Monday, April 11 RISC read chapter 9.2, HW6 due	Wednesday, April 13 RISC	Friday, April 15 Multiprocessors read 9.3-9.5
Monday, April 18 Multiprocessors	Wednesday, April 20 ARM processor	Friday, April 22 Security Quiz 5
Monday, April 25 Security	Wednesday, April 27 review	Friday, April 29 Exam 3
Monday, May 2 Advances in architecture	Wednesday, May 4 final review	
Monday, May 9 Final Exam 10:30am – 12:30pm		