

# Comp 7300: Computer Architecture

## 3 Credits

## Syllabus

**Instructor:** Dr. Sanjeev Baskiyar, Professor, Dept. of Computer Science and Software Engineering, 3127C Shelby Center  
<http://www.eng.auburn.edu/users/baskiyar/>  
Office hours: Tu Th 2 pm- 3 pm.  
Phone: (334) 844-6306; e-mail: [baskiyar@eng.auburn.edu](mailto:baskiyar@eng.auburn.edu)  
(Please note: No response to aspects already addressed in class, in Canvas, or not originating from your auburn e-mail id)

**Instructional Mode:** The instructional mode for this course is Hyflex.

**Prerequisites:** Comp 3350: Computer Org and Programming

**Lecture hours:** Tu. Th 9:30 am-10:45 am

**Teaching Assistant:** Ms. Ziyang Tian  
Office: Shelby 3132; e-mail: [zzt0009@tigermail.auburn.edu](mailto:zzt0009@tigermail.auburn.edu)  
Office hours: MWF 1 pm- 2 pm

**Materials used:** (i) Textbook: *Computer Organization and Architecture*, 10<sup>th</sup> edition, William Stallings, Prentice-Hall, 2015.  
(ii) Selected Readings.

**References:** *Computer Architecture: A Quantitative Approach*, Hennessy and Patterson, Morgan Kaufman, 6<sup>th</sup> edition, 2017.

**Course Objective:** Become familiar with the design of modern computer systems at the architectural level and the impact of design trade-offs on system performance.

### Course Outline:

1. Introduction.
2. Computer evolution and performance.
3. System bus.
4. Cache memory.
5. Internal memory.
6. External memory.
7. Input/Output.
8. CPU structure.
9. RISC.
10. Parallel processing.

## Goals or knowledge you would gain upon completing this course

1. Master the fundamentals of system and I/O buses
2. Master direct, associative, and set-associative cache mapping
3. Master concepts in volatile memory storage
4. Master concepts in non-volatile memory storage
5. Master programmed I/O, isolated I/O and DMA
6. Master concepts in instruction pipelining
7. Master the differences between RISC and CISC architectures
8. Master architectural support for storage for local variables
9. Understand temporal and storage efficiency of program implementations

**Grading:** The following represent general guidelines:

**Table 1. Points, coverage, and locations**

<i>Item</i>	<i>Weight</i>	<i>Coverage</i>	<i>Date /Time</i>	<i>Location</i>
HWs/Quiz	25%	As assigned	See Schedule	Submit on Canvas
Exam1	25%	Day1-to date	See Schedule	Classroom/ ProctorU
Exam2	25%	Day following exam1-to date	See Schedule	Classroom
Final Exam	25%	Comprehensive —day1-to date	See Schedule	Classroom

**Table 2. Grading scale**

<i>Grade</i>	<i>Score range</i>
A	90+
B	80-89
C	70-79
D	60-69
F	<60

The instructor may do downward scale revisions, e.g. an A may start at 89 but no upward revisions. Programming HWs will be graded using the following structure: Correct Assembly: 25%, Correct Function: 25%, Proper Documentation: 25%, Proper Usage: 25%

FAQ: Among other things, what can I do to get 'A'?

Answer:

1. Attend classes.
2. Listen to the lecture taking notes of key concepts.
3. Do HWs yourself.
4. Read textbook several times.
5. Review current and future material before and after each lecture.
6. Peer discussion (not copying).

7. Read from other sources.

### Course Policy

1. **Contingency Statements:** If normal class activities are interrupted due to illness, emergency or crisis situation (e.g. H1N1, flu, Corona epidemic), the syllabus, course plans and assignments may be modified to allow completion of the course. In such a situation, an addendum to your syllabus and/or course assignments will replace the original materials. If the class is offered online, you are required to have your own computer with a camera and the exams will be through ProctorU. Extended Student Absence. If illness causes you to be unable to participate in the course, please contact me as soon as possible to discuss your options. Extended Instructor Absence: If illness causes me to be unable to continue teaching the course, a back-up instructor has been selected who will assume all teaching responsibilities to ensure that the course will proceed uninterrupted. Auburn University Transition to Remote Operations. Course requirements or course delivery will change if the University is forced to move to remote operations and fully online instruction. However, you should personally plan now for this contingency to ensure that you will be able to minimize the disruption this move could cause to your personal living and study arrangements, including access to a personal laptop/desktop computer.
2. **Policy changes:** Please be aware of policy changes announced in the class and by group e-mail. Important course information may be sent by group e-mail on Canvas and AU-e-mail (the two are not connected, so please read both periodically).
3. **Lecture Notes:** You are strongly advised to take lecture notes—the process of taking notes may help you understand the material. The notes may also help you review the course material before the exams.
4. **Homework:** Most homework submissions are to be made electronically on Canvas—the due date for the HW is the date specified on Canvas submission area. *HW submissions should be neat with 1" margins on all sides, your name, date, HW#, question #'s written neatly.*
  - a. **Due Time:** All HWs are due at **1 pm** on the specified due date for that HW. After 1 pm the submissions are marked late. Students should not wait until the last minute for submission. Please re-check the submission to confirm whether your file uploaded correctly.
  - b. **Late Submissions on same day:** You can submit up to three (3) HWs until 4:59 pm on the same day that it is due on Canvas, however such HWs *are marked late*. After the third late submission, we may penalize late submissions (those between 1 – 5 pm) on the same day.

- c. **Late Submission:** Beyond the above 4:59 pm cut-off on the same day, for electronic or any other reason, you can submit HWs late but they will suffer penalty as follows.

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
-10%	-25%	-40%	-55%	-70%	-85%	-100%

For uniformity for everyone, holidays, Saturdays, and Sundays each are counted as a day in the same fashion as a weekday, e.g. Saturday and Sunday together are counted as two days, only Saturday is counted as one day. During the entire semester, for an AU defined excuse, we will waive the late penalty for **only one** HW submission. Students are strongly advised to retain this option until the last HW as much as possible and not to use this feature unless absolutely essential.

**Please e-mail the TA with the specific HW# that you want excused.** The above policies are already very generous and account for contingencies. **Please do not ask or e-mail requests for additional waiver of late penalties.**

Submission of fewer than two-thirds of the homeworks may result in a grade lower than the earned grade.

- d. *Please submit .lst files for programming part questions too where execution is required. Please also embed output trace as and when needed.*

## 5. Exams:

- a. *Format:* All exams are closed book, closed notes and closed communication (internet or otherwise) unless otherwise stated explicitly.
- b. *Missed Exams:* In general, there will be NO substitute exams. For a missed exam (except the final exam), only *under extraordinary circumstances* as specified by AU rules (health, jury duty etc.) and when *accompanied with verifying evidence presented within a week of the exam date*, prorated score or a substitute exam may be used at the discretion of the instructor. *This feature is only available to students in good standing, good conduct in class, attending more than two thirds of the classes, and submitting more than two thirds of assignments.* Missing any exam without an excuse as specified by AU rules will automatically result in an F in the course. *Prorated Score:* The prorated score in missed exam =  $\{(\text{your score in taken exam1}/\text{class average in taken exam1} + \text{your score in taken exam2}/\text{class average in taken exam2})/2\} * \text{class average of missed exam}$ . Such normalization attempts to account for different class averages in the exams.

6. **Return of graded material:** Generally, all graded material is returned in the classroom once. Uncollected homeworks, exams, projects could be discarded two weeks after the final exam.

7. **Grading concerns:** Here is how we can address your grading concerns. Upon receipt of the graded material you should write on a piece of paper

any totaling/grading errors and staple it to your homework/exam papers and turn it in to the instructor or the TA. If you have concerns regarding your grade in the homework, please contact the TA directly. If you have concerns about the exam, you may hand over the exam paper to me after attaching your “concern paper” to the exam as described above. You need to bring/attach a copy of the solutions, if provided along with the exam paper. Grading and other concerns about homeworks and exams should be addressed within *two* weeks of their return.

**8. Class Participation:**

- a. *Attendance:* Attending fewer than 80% of lectures may result in a letter grade lower than the earned letter grade.
- b. *Use of cell phones, laptop computers is prohibited under normal circumstances during class hours!* Such use is considered negative participation, as often one tends to be distracted from the lecture. Laptops can be used for class purposes only on those days when specifically allowed by the instructor. For taking notes, please use paper/pencil/pen.
- c. *Positive Participation:* Good conduct is required during the lecture hour. No exceptions.
  - i. Attend class and be attentive with an intention to learn.
  - ii. Be respectful to class (fellow students and professor).
  - iii. Do not disturb other students and the class by talking to one another (regardless of the matter talked about being course related)
  - iv. No food during class time
  - v. Follow generally accepted social behavior.
  - vi. As part of class participation, you may be asked to solve problems on the board or answer questions in the class.
- d. *Borderline grades:* The professor may decide borderline grades with grace points in favor of students with good conduct and positive class participation. For example, if your score is 79/100, with grace points it will be 80/100 resulting in upgrading your final letter grade from C to B. In award of these grace points, it is expected of students to abide by good participating conduct. Furthermore, poor conduct will be viewed *negatively* towards class participation (*regardless of course subject matter participation*), may result in further lowering the grade in the course and/or being reported.
- e. The attendance and class participation will not be considered for assigning grades for the outreach students for obvious reasons.

9. **Plagiarism:** The Auburn University student academic honesty code applies. Your submission must be your individual work. Look-alike/similar programs/submissions are not allowed, and **it is your responsibility** to protect your work so that others may not copy. Similar submissions or parts thereof may result in no credit for the work and can result in a failing grade in the course *regardless* of the score. **Recording**

lectures and copying exam question paper by any means is prohibited. The following is from the Student Code:

- a) The possession, receipt, or use of any material or assistance not authorized in the preparation of any essay, laboratory report, examination, or class assignment, to be submitted for credit as a part of a course or to be submitted in fulfillment of a university requirement. The possession, receipt, or use of unauthorized material while an exam or quiz is in progress, or cheating, will be a violation of the Code
- b) Knowingly giving assistance to another person in such preparation.
- c) Selling, giving, lending, or otherwise furnishing to any other person any material which can be shown to contain the questions or answers to any examination scheduled to be given at some subsequent date in any course of study, excluding questions and answers from tests previously administered and returned to a student by the instructor;
- d) The submission of themes, essays, term papers, design projects, theses and dissertations, similar requirements or parts thereof that are not the work of the student submitting them. In the case of a graduate thesis or dissertation, submission is defined as the time at which the first complete draft of such is submitted to the major professor for review. When direct quotations are used, they must be indicated, and when the ideas of another are incorporated into a paper, they must be appropriately acknowledged. Plagiarism is a violation. In starkest terms, plagiarism is stealing using the words or ideas of another as if they were one's own. For example, if another person's complete sentence, syntax, key words, or the specific or unique ideas and information are used, one must give that person credit through proper documentation or recognition, as through the use of footnotes

10. **Special Accommodations:** Students who need special accommodations should send me e-mail during the first week of classes to arrange a meeting time preferably during my office hours. Please bring your memo from the Office of Accessibility, Auburn University, to this meeting. Accommodations for each exam must be arranged one week in advance.

11. **Missing a class:** If you miss a class, you can estimate the coverage using the schedule and last class coverage and from peers. No E-mails are sent explaining material covered in missed class.