Introduction to Computer Organization and Architecture
CS 286-001 - Fall 2021 (CRN: 34939)

Synchronous-Online Course

Welcome to CS 286!

Instructor: Dr. Hiroshi Fujinoki
Office: EB 2034
Email: hfujino@siue.edu
URL: www.siue.edu/~hfujino

Office Hours: Monday: 1:00 - 2:45 P.M.
Tuesday: 1:00 - 2:45 P.M.
Wednesday: 1:00 - 2:45 P.M.
Thursday: 1:00 - 2:45 P.M.
Friday: by appointment (please make an appointment 24 hours prior to the time you want to meet the instructor).

Note: All the office hour slots are by zoom meetings (no face-to-face meetings in my office without a prior appointment).

Class Meeting Room: online (no classroom assigned to this course)
Class Meeting Days: Monday, Wednesday, and Friday
Class Meeting Time: 9:00-9:50 A.M. (each as a zoom meeting/lecture)

Note: item with "♦" symbol means an important item.

♦ Course Prerequisites:
CS150 (Introduction to Computing II) with a minimum grade of C or the instructor's permission. If you have not completed CS150, please talk to the instructor.

♦ Grading:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Weight</th>
<th>Final Letter Grade</th>
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<tbody>
<tr>
<td>Quizzes</td>
<td>10%</td>
<td>100-92: A</td>
</tr>
<tr>
<td>Programming projects (5+5+5%):</td>
<td>15%</td>
<td>91-82: B</td>
</tr>
<tr>
<td>Midterm Exam:</td>
<td>37.5%</td>
<td>81-72: C</td>
</tr>
<tr>
<td>Final Exam:</td>
<td>37.5%</td>
<td>71-62: D</td>
</tr>
<tr>
<td>Below 62:</td>
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<td>F</td>
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</tbody>
</table>
Exams:

- Exams will be closed textbook and closed notes.
- During an exam, everyone is required to login the exam zoom session and activate a webcam. Any exam submission from the students who did not meet these requirements will not be graded.
- Makeup exam will be offered only for medical emergency (with a signed doctor's letter). Makeups for any other reasons will not be provided (no exception).
- Absence from an exam or failing to submit your work by the end of an exam will result in zero point for the exam (except medical emergencies).
- Exams will cover reading assignments and required exercise questions.
- Any error regarding your graded exams should be reported to Dr. Fujinoki within two weeks (14 calendar days) after your attendance status is posted to the course web site.

Course Projects:

- Programming projects using assembly language for MIPS R3000 Processor (we use MIPS R3000 emulator).
- Course programming projects are all individual project (no collaboration is allowed either for designs and coding).
- The project specifications will be provided in the class.

Lecture (zoom meeting) Attendance:

- Attending the zoom meetings during 9:00 - 9:50 A.M. is required for each scheduled course lecture.
- During an exam, everyone is required to login the exam zoom session and activate a webcam.
- During each lecture (zoom meeting), some information ("attendance keys") will be provided (can be more than once in each meeting). Each attending student should send the provided information to the TA (using e-mail) of this course within a given time limit (60 seconds) for your credit. If more than one attendance key are provided (at different timings during a zoom
lecture), attendance credit for that particular lecture can be earned only if all the attendance keys in a zoom lecture are sent to the TA within the time limit.

- No penalty will be given up to two absences in a semester. For each absence beyond the second absence, -2 point penalty (in 100 scale) will be given to your next exam.
- The above penalty will not apply to your medical emergency (however, you need to provide a written proof of medical service to waive the penalty).
- Any error regarding your lecture attendance status should be reported to Dr. Fujinoki within two weeks (14 calendar days) after your attendance status is posted to the course web site.

♦ Academic Dishonesty:

Following activities (but not limited to them) will be considered academic dishonesty:

I. Exams:
   (a) Communicating (e-mails, phone calls, and texting, but not limited to them) with anyone (except the course instructor) during exams.
   (b) Using materials not allowed during exams.
   (c) Anyone committing academic misconduct above (I-(a) or (b)) will receive a failing grade for this course and reported to the department chair as well as to the dean of the school of engineering.

II. Programming Projects:
   (a) Submitting work totally or partially done by somebody else (this includes any human/electronic sources (such as web sites and even another course at SIUE)).
   (b) Submitting program source code files (for the programming projects) that are developed by collaborations with other people. This includes both program designs and implementations.
   (c) Anyone committing academic misconduct above (II-(a) or (b)) will receive a failing grade for this course and reported to the department chair as well as to the dean of the school of engineering.

♦ Required Textbook:

- The lecture notes and the PPT slides presented in the classroom are summaries of the course textbook. The course syllabus specifies the
textbook chapters/sections each student should read ideally before each lecture (at least after each lecture).

Other Requirements for this Course:
- Experience with C/C++ (UNIX environment)
- Data structure or discrete structure

Disability Support:
- Students who believe they may need accommodations in this class are encouraged to contact the office of Disability Support Services as soon as possible. It is the students' responsibility to alert the instructor to SIUE sanctioned accommodations. If anyone needs assistance from SIUE Disability Support Services, please contact them.

Technology Requirements: This course requires the following resources:
- Broadband Internet connection (for zoom meetings)
- Web camera (required for activation during each zoom and exam)

Recordings of Class Content:
Faculty recordings of lectures and/or other course materials are meant to facilitate student learning and to help facilitate a student catching up who has missed class due to illness or quarantine. As such, the recording, as well as replicating or sharing of any course content and/or course materials without the express permission of the instructor of record, is not permitted, and may be considered a violation of the University’s Student Conduct Code (3C1), linked here: https://www.siue.edu/policies/3c1.shtml.

Potential for Changes in Course Schedule or Modality:
As the COVID-19 pandemic continues, there remains a possibility that planned classroom activities will need to be adjusted. Depending on circumstances and following state-issued recommendations, potential changes include changes in course modality (e.g., transition from face-to-face to online) or in course scheduled meetings. These changes would be implemented to ensure the successful completion of the course. In these cases, students will be provided with an addendum to the class syllabus that will supersede the original version.
Other Notices:

1. This course expects each of you to work nine (9) hours other than attending lectures (this is also a policy of SIUE).

2. Each of you is expected to check "Weekly Notices" in the web site of this course at least twice in a week. The decisions regarding which course materials are posted belong to the course instructor. If any promised course material is missing in the course home, it is your responsibility to request such material to the course instructor (the course instructor will post such materials within at most one week since the request).

3. Any grading problem should be reported within two weeks (14 days) after your grades are posted to the course home or the graded materials are returned in the classroom.

4. E-mails sent to the course instructor during weekends may not be responded.

5. Any special arrangement agreed between you and the course instructor (Dr. Fujinoki) should be documented. Any promises or agreements orally made between you and the course instructor may not take effect without a documentation (it is your responsibility to document any such promises and agreements).

6. Ask your questions to the course instructor whenever you have anything you do not have a clear answer for. Please do not make your own assumptions (if you do, you are responsible for any assumptions you make when they are not correct).
**Tentative Class Schedule (subject to change):**

This schedule is tentative and subject to change. However, any change will be announced in the class or noticed in the notice page of the instructor.

This schedule is tentative and subject to change.

<table>
<thead>
<tr>
<th>Week #</th>
<th>Day</th>
<th>Topics</th>
<th>Reading Assignments</th>
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<tbody>
<tr>
<td><strong>Week 1:</strong></td>
<td>August 23 (M): Introduction to CS286, Computer Abstractions</td>
<td>Chapter 1 (1.1 through 1.5)</td>
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<td>August 25 (W): The Role of Performance (1)</td>
<td>Chapter 1 (1.6)</td>
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<td></td>
<td>August 27 (F): The Role of Performance (2)</td>
<td>Chapter 1 (1.6)</td>
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<td><strong>Week 2:</strong></td>
<td>August 30 (M): Introduction to Assembly Languages (1)</td>
<td>Chapter 2 (2.1 and 2.2)</td>
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<td></td>
<td>• Quiz #1 assigned</td>
<td>Handout #1</td>
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<td>• Project Phase #1 assigned</td>
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<td>September 1 (W): Introduction to Assembly Languages (2)</td>
<td>Chapter 2 (2.3)</td>
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<td></td>
<td>September 3 (F): Assembly Language using MIPS CPU Programming project description</td>
<td>Appendix-A</td>
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<td><strong>Week 3:</strong></td>
<td>September 6 (M): Program Control Structure</td>
<td>Chapter 2 (2.7)</td>
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<td>September 8 (W): Arithmetic for Computers (1)</td>
<td>Chapter 2 (2.4 and 2.6)</td>
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<td>• Quiz #2 assigned</td>
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<td></td>
<td>September 10 (F): Arithmetic for Computers (2)</td>
<td>Chapter 2 (2.4 and 2.6)</td>
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<td><strong>Week 4:</strong></td>
<td>September 13 (M): Arithmetic for Computers (3)</td>
<td>Chapter 3 (3.1, 3.2, 3.5)</td>
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<td>Data Path and Control (1)</td>
<td>Chapter 4 (4.1 and 4.2)</td>
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<td>September 15 (W): Data Path and Control (2)</td>
<td>Chapter 4 (4.5)</td>
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<td>• Quiz #3 assigned</td>
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<td>September 17 (F): Data Path and Control (3)</td>
<td>Chapter 4 (4.5)</td>
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<td><strong>Week 5:</strong></td>
<td>September 20 (M): Programming Project #2 discussions</td>
<td>Handout #2</td>
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<td>September 22 (W): Pipeline Data Path (1)</td>
<td>Chapter 2 (2.8 and 2.9)</td>
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<td></td>
<td>• Project Phase #1 Due (11:59:59 p.m.)</td>
<td>Chapter 4 (4.5)</td>
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<td>• Quiz #4 assigned</td>
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<td>September 24 (F): Pipeline Data Path (2)</td>
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<td><strong>Week 6:</strong></td>
<td>September 27 (M): Pipeline Data Path (3)</td>
<td>Chapter 4 (4.5)</td>
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<td>• Project #2 assigned (asynchronous)</td>
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<td>September 29 (W): Pipeline Hazards and code optimization (1)</td>
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<td>• Quiz #5 assigned</td>
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<td>October 1 (F): Pipeline Hazards and code optimization (2)</td>
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**Week 7:** October 4 (M): Pipeline Hazards and code optimization (3)  
October 6 (W): Pipeline Hazards and code optimization (4)  
  - Quiz #6 assigned  
October 8 (F): Memory sub-system (1)

**Week 8:** October 11 (M): Memory sub-system (2)  
October 13 (M): Memory sub-system (3)  
October 15 (F): Midterm Exam (synchronous: 9:00-10:00 a.m.)  

*Note: anyone who will NOT be able to take the exam for 60 minutes on 10/15, please contact Dr. Fujnoki as soon as possible.*

**Week 9:** October 18 (M): Memory basics and memory hierarchy  
  - Virtual Memory  
October 20 (W): Memory Segmentation (1)  
  - Quiz #7 assigned  
October 22 (F): Memory Segmentation (2)

**Week 10:** October 25 (M): Programming Project #3 discussions  
  - Project #2 Due (11:59:59 p.m.)  
October 27 (W): Programming Project #3 discussions  
  - Project #3 Assigned  
  - Quiz #8 assigned  
October 29 (F): I/O Subsystems (1)

**Week 11:** November 1 (M): I/O Subsystems (2)  
November 3 (W): I/O Subsystems (3)  
  - Quiz #9 assigned  
November 5 (F): I/O Subsystems (4)

**Week 12:** November 8 (M): I/O Subsystems (5)  
November 10 (W): I/O Subsystems (4)  
  - Quiz #10 assigned  
November 12 (F): Multi-processor System (1)

**Week 13:** November 15 (M): Multi-processor System (2)  
November 17 (W): Multi-processor System (3)  
  - Quiz #11 assigned

**TG Holiday Week:** November 22, 24, and 26 (M, W, and F): Thanksgiving Week

**Week 14:** November 29 (M): Topics TBA (Exercises)  
  - Project #3 Due (11:59:59 p.m.)  
December 1 (W): Topics TBA (Exercises)  
December 3 (F): Topics TBA (Exercises)
Week 15: December 6 (M): Topics TBA (Final Exam Review)  
December 8 (M): Topics TBA (Final Exam Review)  
December 10 (F): Topics TBA (Final Exam Review)  

Final Exam Week: December 16 (Thursday): 8:00-9:40 a.m.  
- The list of the reading assignment is the minimum requirement. It is expected that each student voluntarily studies not only the required sections but other related sections or materials to maximize the learning during the semester.  
- Required reading should be done before the lecture.  
- If you have any problem for the above schedule, please contact to Dr. Fujinoki as soon as possible.  
- Any question regarding this syllabus should be addressed to: hfujino@siue.edu