Instructor: Dr. Arslan Munir, Scrugham Engineering and Mines 206, Email: arslan@unr.edu

Lecture Hours: Tuesday & Thursday 2:30 - 3:45 PM.

Office Hours: Tuesday & Thursday 1:45 - 2:15 PM, Tuesday & Thursday 3:45 - 4:30 PM, and by appointment, Room: SEM 206.


Supplementary Material:

Prerequisites:
- CPE 201 Digital Design or CS 202 Computer Science II

Course Description: Introduction to organization and integration of computer components. Topics include: computer abstractions and performance, arithmetic operations, instruction set architecture, assembly programming, datapath, pipelining, memory hierarchy, I/O, and parallel architectures.

Course Outline and Topics:

Introduction to Computer Organization + Computer Evolution & Performance ... Week 1
Computer Components, Functions & Interconnections ...................................... Week 2
Review of Digital Logic, Number Systems & Computer Arithmetic ................. Week 3
Instruction Sets: Characteristics & Functions .................................................. Week 4
Instruction Sets: Addressing Modes & Formats ............................................. Week 5
Processor Structure & Function ................................................................. Week 6
Assembly Language & Related Topics .......................................................... Week 7
Reduced Instruction Set Computers ............................................................. Weeks 8 - 9
Cache Memory ............................................................................................... Week 10
Internal Memory + External Memory ............................................................. Week 11
Input/Output ................................................................................................. Week 12
Operating System + Instruction-Level Parallelism & Superscalar Processors ...... Week 13
Parallel Processing + Multicore Computers .................................................. Week 14
The textbook will provide the framework for the course. The textbook material will be supplemented by the material from the reference book as needed depending on the significance of the topics.

Grading Policy:
- Exam 1: 25%
- Exam 2: 25%
- Exam 3: 25%
- Homework assignments: 25%

Grading Scale:
- A-: 87.00 - 90.99; A: 91.00 - 100
- B-: 75.00 - 79.99; B: 80.00 - 83.99; B+: 84.00 - 86.99;
- C-: 63.00 - 65.99; C: 66.00 - 70.99; C+: 71.00 - 74.99
- D-: 51.00 - 54.99; D: 55.00 - 58.99; D+: 59.00 - 62.99
- F: 0 - 50.99 (or caught cheating)

Course Policies:
- All course materials will be posted on the WebCampus.
- Unless instructed otherwise, use of electronic devices including laptops and cell phones is not allowed during lectures.
- Students are expected to demonstrate professionalism and courtesy by either silencing or turning off all cell phones and/or other alarm or audible indicator devices.
- No pets are allowed in the classroom.
- There will be three exams for this course. Students should plan on taking the exams on the scheduled times. Permission to take exams on other dates than scheduled will not be given, except for extreme medical emergencies. In case of any emergency situation, a student needs to provide a convincing documentation for it. The exams will be closed books and closed notes. The use of electronic devices such as laptops and cell phones, etc., are prohibited during exams.
- Students are expected to attend, and be on time, for every class. This demonstrates professionalism and consideration for your fellow students and your Instructor. While the course does not have an attendance policy, students who miss class and/or are late for class may experience an impact on their grade by missing classroom activities and/or quizzes.

*Course calendar is subjected to change depending on the progress of the class.
†No rounding up will be done for the final grades, no exceptions (i.e., 90.99 is still an A-, 86.99 is still B+ and so on). Students will have one week to appeal for their grades after the graded assignments/exams are returned if they think there is a problem/issue with the grading.
• Students are expected to turn in all assigned materials in a timely manner.
• The Instructors reserve the right to add to, and/or modify any of the above policies as needed to maintain an appropriate and effective educational atmosphere in the classroom. In case of any change in the course policy, all students will be notified in advance of the new and/or modified policy.

Important Dates:

First Day of Classes ............................................January 20
Add Deadline (without permission from instructor) ........January 26
Add Deadline (with permission from instructor) ..........January 29
Spring Break ..................................................March 14 - 22
Drop Deadline (with “W” received) .......................March 31
Final class meeting week begins .............................May 7
Final grades available to students in MyNevada ..........May 20

Academic Integrity: Students are encouraged to study together, however each student must individually prepare his/her solutions. Cheating or plagiarism is not permitted and will be sanctioned according to the UNR policy on Academic Standards. Students should carefully read the section on Academic Dishonesty found in the UNR Student Handbook.

Homework Policy: Late homework will be accepted for at most 70% credit. Students are encouraged to study together, but each person must prepare his or her solutions and have a firm understanding of any work turned in. When you put your name on your homework, you are stating that it is your own work and not the work of another person. As a reminder of UNR academic standards, please read UNR policies and guidelines. Specifically, the following: “Plagiarism is defined as submitting the language, ideas, thoughts or work of another as one’s own; or assisting in the act of plagiarism by allowing one’s work to be used in this fashion.” This means that if another student asks to borrow your work to copy - JUST SAY NO - or you are participating in plagiarism.

Learning Outcomes: Learning Outcome A: Students will be able to describe the structure and functioning of a digital computer, including its overall system architecture, operating system, and digital components. Learning Outcome B: Students will be able to explain the generic principles that underlie the building of a digital computer, including data representation, digital logic and processor programming. Learning Outcome C: Students will be able to apply some fundamental coding schemes. Learning Outcome D: Students will be able to present and discuss simple examples of assembly language appropriate for an introductory course.

Student Outcomes and Course Outcomes: The course outcomes are skills and abilities students should have acquired by the end of the course. These outcomes determine how the general CSE Student Outcomes apply specifically to this course. These outcomes are defined in terms of the ABET Accreditation Criterion 3: Student Outcomes. All CSE Student Outcomes are listed in the next subsection and those relevant to this course are identified in Table 1.

1Please check UNR academic calendar to verify these dates.
Table 1: Student outcomes and course outcomes for CS 219

<table>
<thead>
<tr>
<th>CSE Student Outcomes</th>
<th>Course Outcomes</th>
<th>Course Strategies and Assessment Methods/Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Students demonstrate a thorough understanding of computer organization</td>
<td>Homework assignments &amp; examinations</td>
</tr>
<tr>
<td>3</td>
<td>Students demonstrate that they understand the building blocks of modern computers, including the feature trade-offs involved with different modern architectures</td>
<td>Study of both Princeton and Harvard architectures. Examination of components within the CPU. Homework and exam questions covering these topics</td>
</tr>
<tr>
<td>9</td>
<td>Students demonstrate that they understand how computer architectures change and evolve as the technology and market change</td>
<td>Study of how different CPU features support different computer applications</td>
</tr>
<tr>
<td>10</td>
<td>Students demonstrate that they can learn the assembly language for more than a single CPU architecture</td>
<td>Examination of assembly language for both Intel 8086 CISC and ARM 7 RISC processors</td>
</tr>
</tbody>
</table>

CSE Student Outcomes:

1. an ability to apply knowledge of computing, mathematics, science, and engineering.
2. an ability to design and conduct experiments, as well as to analyze and interpret data.
3. an ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs, within realistic constraints specific to the field.
4. an ability to function effectively on multi-disciplinary teams.
5. an ability to analyze a problem, and identify, formulate and use the appropriate computing and engineering requirements for obtaining its solution.
6. an understanding of professional, ethical, legal, security and social issues and responsibilities.
7. an ability to communicate effectively with a range of audiences.
8. the broad education necessary to analyze the local and global impact of computing and engineering solutions on individuals, organizations, and society.
9. a recognition of the need for, and an ability to engage in continuing professional development and life-long learning.
10. a knowledge of contemporary issues.
11. an ability to use current techniques, skills, and tools necessary for computing and engineering practice.
12. an ability to apply mathematical foundations, algorithmic principles, and computer science and engineering theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.
13. an ability to apply design and development principles in the construction of software systems or computer systems of varying complexity.

**UNR Athletics:** If you are involved with any university-sponsored athletic activities that will have an impact on your attendance, please provide your Instructor with a letter from your coach and/or the UNR Athletic Department as soon as possible, but no later than the end of the second week of classes. This should include the official schedule of your activities which will impact your attendance throughout the semester.

**Academic Success Services:** Your student fees cover usage of the Math Center, Tutoring Center, and University Writing Center. These centers support your classroom learning; it is your responsibility to take advantage of their services. Please keep in mind that seeking help outside of class is the sign of a responsible and successful student.

**Disability Statement:** If you have a disability for which you will need to request accommodations, please contact me or someone at the Disability Resource Center (Thompson Building, Suite 101), as soon as possible to arrange for appropriate accommodations.

**Class Recording:** Surreptitious or covert video-taping of class or unauthorized audio recording of class is prohibited by law and by Board of Regents policy. This class may be videotaped or audio recorded only with the written permission of the instructor. In order to accommodate students with disabilities, some students may have been given permission to record class lectures and discussions. Therefore, students should understand that their comments during class may be recorded.