Instructor: Dr. Mircea Nicolescu  
E-mail: mircea@cse.unr.edu  
Phone: (775) 784-4356  
Office: SEM 232  
Office hours: Tu: 9:00am-12:00pm

Class webpage: http://www.cse.unr.edu/~mircea/Teaching/cpe411_611

Teaching Assistant: TBA  
E-mail: TBA  
Office: TBA  
Office hours: TBA

Lectures:  
Monday, Wednesday: 9:30am-10:45am, SEM 261

Labs:  
none

Important Notes and Dates:  
• Final Exam: TBA

Required Textbook:  

Supplemental Books:  
• none

Course Description:  
The course examines the fundamental principles of computer organization and architecture, focusing on the critical role of performance in driving computer design, and on practical techniques for designing balanced systems that maximize utilization of all computer components.

Prerequisites:  
Courses:  
• CPE 301 (Microprocessor System Design).

Course Objective:  
Students will demonstrate a thorough understanding of the fundamental principles underlying architectural and organizational design issues in modern computer systems, and the ability to assess their performance.
**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. All CSE Student Outcomes are listed in the next subsection and those relevant to this course are identified in the following Table.

<table>
<thead>
<tr>
<th>CSE Student Outcomes</th>
<th>Course Outcomes</th>
<th>Assessment Methods/Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Students demonstrate a thorough understanding of fundamental architectural design issues of computer systems – instruction sets, data representation, I/O mechanisms, techniques for memory addressing.</td>
<td>Specific problems in homework assignments and examinations.</td>
</tr>
<tr>
<td>3</td>
<td>Students are capable to understand the computer organization design issues that realize the architectural specifications in modern computer systems – control signals, interfaces between computer and peripherals, memory and peripheral technologies.</td>
<td>Specific problems in homework assignments and examinations.</td>
</tr>
<tr>
<td>2</td>
<td>Students are capable to analyze the performance of various architectural and organization design solutions in modern computer systems.</td>
<td>Specific problems in homework assignments and examinations.</td>
</tr>
<tr>
<td>9</td>
<td>Students should emerge better prepared to choose a research topic in computer engineering, review the body of relevant literature, assess the strengths and weaknesses of previous work, and explore new directions of research.</td>
<td>Specific problems in homework assignments and examinations.</td>
</tr>
<tr>
<td></td>
<td>Students demonstrate the ability to present information on relevant techniques in computer system design.</td>
<td>Paper reviews, reports on the scientific merits and experimental results presented in relevant publications, comparisons between methods.</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.

**CSE Program Educational Objectives:**
Within 3 to 5 years of graduation our graduates will:
1. be employed as computer science and engineering professionals beyond entry level positions or be making satisfactory progress in graduate programs.
2. have peer-recognized expertise together with the ability to articulate that expertise as computer science and engineering professionals.
3. apply good analytic, design, and implementation skills required to formulate and solve computer science and engineering problems.
4. demonstrate that they can function, communicate, collaborate and continue to learn effectively as ethically and socially responsible computer science and engineering professionals.

**Course Topics:**
- Introduction – Computer Organization and Architecture
- Computer Evolution and Performance
- Computer Function and Interconnection
• Cache Memory
• Internal Memory
• External Memory
• Input/Output
• Operating System Support
• Computer Arithmetic
• Instruction Sets: Characteristics and Functions
• Instruction Sets: Addressing Modes and Formats
• Processor Structure and Function
• RISC
• Instruction-Level Parallelism and Superscalar Processors
• The IA-64 Architecture
• Control Unit Operation
• Microprogrammed Control
• Parallel Processing

Course Policies:
• 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.
• Students are expected to turn in all assigned materials in a timely manner.
• 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.
• The instructor reserves 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 the case that this occurs, all students will be notified in advance of the implementation of the new and/or modified policy.

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.

Assignments, Examinations and Grading:

Homework Assignments:
• There will be a number of homework assignments and/or quizzes. The homework assignments and their due dates will be posted on the course web page. Homework assignments are due on the specified date at the beginning of the class.

Late Submission Policy:
• No late assignments will be accepted.
Exams:
- There will be one midterm exam and one final exam. Both exams will be closed books, closed notes. Permissions to take exams on other dates than scheduled will not be given, except for extreme medical emergencies.

Grading Structure:
- The final score will be computed as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework assignments and quizzes</td>
<td>40%</td>
</tr>
<tr>
<td>Midterm exam</td>
<td>25%</td>
</tr>
<tr>
<td>Final exam</td>
<td>30%</td>
</tr>
<tr>
<td>Attendance and class participation</td>
<td>5%</td>
</tr>
</tbody>
</table>

Letter Grades:
- The letter grade will be computed according to the following table. Some upward adjustment may occur, but do not count on it.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Score Range</th>
<th>Letter Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-</td>
<td>88-100</td>
<td>A</td>
</tr>
<tr>
<td>B-</td>
<td>75-87</td>
<td>B-</td>
</tr>
<tr>
<td>B</td>
<td>75-87</td>
<td>B</td>
</tr>
<tr>
<td>B+</td>
<td>75-87</td>
<td>B+</td>
</tr>
<tr>
<td>C-</td>
<td>62-74</td>
<td>C-</td>
</tr>
<tr>
<td>C</td>
<td>62-74</td>
<td>C</td>
</tr>
<tr>
<td>C+</td>
<td>62-74</td>
<td>C+</td>
</tr>
<tr>
<td>D-</td>
<td>50-61</td>
<td>D-</td>
</tr>
<tr>
<td>D</td>
<td>50-61</td>
<td>D</td>
</tr>
<tr>
<td>D+</td>
<td>50-61</td>
<td>D+</td>
</tr>
<tr>
<td>F</td>
<td>&lt; 50</td>
<td>F</td>
</tr>
</tbody>
</table>

Academic Dishonesty:
Students are encouraged to study together, however each student must individually prepare his/her solutions. Cheating, plagiarism or otherwise obtaining grades under false pretenses constitute academic dishonesty according to the code of this university. Academic dishonesty will not be tolerated and penalties can include canceling a student's enrollment without a grade, giving an F for the course or for the assignment. For more details, see the University of Nevada, Reno General Catalog.

Disability Services:
Any student with a disability needing academic adjustments or accommodations is requested to contact the instructor or the Disability Resource Center (Thompson Building, Suite 101) as soon as possible to arrange for appropriate accommodations.

Academic Success Services:
Your student fees cover usage of the Math Center (784-443 or www.unr.edu/mathcenter), Tutoring Center (784-6801 or www.unr.edu/tutoring-center), and University Writing Center (784-6030 or http://www.unr.edu/writing-center). These centers support your classroom learning; it is your responsibility to take advantage of their services. Keep in mind that seeking help outside of class is the sign of a responsible and successful student.

Audio and Video 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.