CS/ECE 4613
Computer Architecture

Course Description
This course covers basic concepts of computer system design and communication between components, along with current and historical examples of computer architecture.

Course Focus
This course focuses on the design aspects of computer architecture, and considers how the architecture impacts software development.

Prerequisite
ECE 3223 or CS 2613. Any student who has not completed at least one of these prerequisite courses (as stated in the University of Oklahoma catalog) will be subject to administrative withdrawal at any time before final grades are released. ECE students should only enroll in ECE 4613; CS students should only enroll in CS 4613.

Texts and References
- Lecture notes and additional reference materials will be available online at http://learn.ou.edu/ under the CS 4613 section of the course. (ECE students have online access to both ECE 4613 and CS 4613; however, only the CS 4613 section on http://learn.ou.edu/ contains course content.)

Topics to be covered
- Machine level representation of programs
  - Program encoding
  - Data formats
  - Assembly instructions – data movement, arithmetic and logic, control, procedures, array allocation
- Processor architecture
  - Y86 Instruction set architecture
  - x86-64 Instruction set architecture
  - Hardware control language
  - Design and implementation of sequential processor systems
  - Design and implementation of pipelined systems
  - Pipelining hazards and issues
- Optimizing program performance
  - Applying optimizing techniques – increasing loop efficiency, procedure calls, memory references
  - Modern processor optimization techniques
- Memory hierarchy
  - Locality of reference
  - Cache memory
  - Writing cache friendly code
  - Improve cache performance
- Program performance and efficiency
  - Determine performance
  - Apply performance measures
- Virtual memory system
  - Address space, page tables, page faults, hits and misses
  - Memory management
  - Address translation
  - Pentium/Linux memory system
- Advanced computer system design issues
Computer Usage
The course will use Linux OS and C programming language. Access to a computer is required for this class.

Student Expectations
Each student is expected to spend at least 6 hours per week preparing for class. Lecture attendance is crucial in this course. Each student will take a midterm exam, a comprehensive final exam, and possibly short quizzes covering material assigned for homework. Each student will also submit several projects. All submitted work must reflect each student's understanding, and all documents including programs must be developed independently.

Course Evaluation
Projects, homework, quizzes, and exams will be used to assess each student's progress towards meeting the course goals. Percentage points will be distributed as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projects, Homework, Quizzes</td>
<td>55%</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>20%</td>
</tr>
<tr>
<td>Comprehensive Final Exam</td>
<td>25%</td>
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</tbody>
</table>

Course Schedule
This course meets in DEH 130 on MWF from 8:30 – 9:20 a.m.

Office Hours
Dr. Antonio is available during office hours in DEH 232, **Monday through Thursday, 9:30 – 10:30 a.m.** (or by appointment, antonio@ou.edu, 325-4397)

ABET Student Outcomes to be addressed
B: An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
C: An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
I: An ability to use current techniques, skills, and tools necessary for computing practice

Students with Disabilities
Any student in this course who has a disability that may prevent him or her from fully demonstrating his or her abilities should contact the instructor as soon as possible so we can discuss accommodations necessary to ensure full participation and facilitate your educational opportunities.

Religious Holidays
It is the policy of the University to excuse the absences of students that result from religious observances and to provide without penalty for the rescheduling of examinations and additional required class work that may fall on religious holidays. Any student in this course who plans to observe a religious holiday that might conflict with course requirements should contact the instructor personally as soon as possible so we can make appropriate arrangements.

Academic Integrity
The Provost’s web pages include information on expectations for academic integrity. Please review the material at [http://integrity.ou.edu/students_guide.html](http://integrity.ou.edu/students_guide.html). The statement above on Student Expectations gives additional clarification for this class.