

## CS 271 – Computer Architecture and Assembly Language

Revised: 09/26/2012

**Catalog Description:** Introduction to functional organization and operation of digital computers. Coverage of assembly language; addressing, stacks, argument passing, arithmetic operations, decisions, macros, modularization, linkers and debuggers.

**Credits:** 4    **Terms Offered:**    Ecampus: Fall

**Structure:** Ecampus: This course combines approximately 30 hours of online instruction, 10 hours of homework assignments, 20 hours of programming assignments, and 5 hours of quizzes and exams.

**Enforced Prerequisites:** CS 161    **Other Prerequisites:** CS 225 or MTH 231

**Courses that require this as a prerequisite:** CS 311

**Instructors:** Justin B. Goins

### Course Content:

- Hardware, architectures
- Internal representation of data, instructions, and addresses
- Boolean Algebra
- Elementary circuits
- Instruction set architecture, micro-programs
- Assembly language
- Debuggers

### Learning Resources:

- Irvine, Kip R., *Assembly Language for x86 Processors* (6th ed.), Prentice-Hall, 2011. (ISBN 013602212).

### Proctoring:

The midterm exam and final exam must be proctored. It is your responsibility to arrange a proctor. For more information, visit <http://ecampus.oregonstate.edu/services/proctoring/>. You will be allowed to take the midterm exam between the dates of Oct. 29<sup>th</sup> to Nov. 3<sup>rd</sup>. You may take the final exam anytime between the dates of Dec. 3<sup>rd</sup> and Dec. 7<sup>th</sup>.

### Measurable Student Learning Outcomes:

*At the completion of the course, students will be able to...*

1. **Identify** the major components of a computer architecture, and **explain** their purposes and interactions.
2. **Simulate** the internal representation of data, and **show** how data is stored and accessed in memory.
3. **Explain** the relationships between a hardware architecture and its instruction set, and **simulate** micro-programs.

4. **Create** and **simplify** circuits that produce specified output for given inputs (e.g., adders, multiplexers, etc.).
5. **Explain** the Instruction Execution Cycle.
6. **Explain** the differences and relationships among high-level, assembly, and machine languages.
7. **Write** well-modularized computer programs in an assembly language, implementing decision, repetition, and procedure structures.
8. **Use** a debugger, and **explain** register contents.
9. **Simulate** the system stack as it is used for procedure calls and parameter passing.
10. **Explain** how editors, assemblers, linkers, and operating systems enable computer programming.
11. **Explain** various mechanisms for implementing parallelism in hardware/software.

#### **Evaluation of Student Learning:**

- Weekly summary exercises (approx. 10%)
- Discussion board participation (approx. 5%)
- Programming projects (approx. 30%)
- Quizzes (approx. 15%)
- Midterm exam (approx. 18%)
- Final exam (approx. 22%)

#### **Additional Grading Information:**

In order to receive full participation points, each student must have a minimum of 5 “meaningful” posts on the Piazza Q & A discussion board (both questions and answers are counted). The word “meaningful” in this context is defined as a post that contributes relevant knowledge to the discussion. The instructor will hold the final verdict on whether a particular post should be considered “meaningful.” This 5 post minimum includes all posts submitted over the duration of the course. Students are encouraged to participate more often and not limit themselves to the minimum post threshold.

Self-check exercises and the accompanying solutions will be posted for each lecture (*these are for your own benefit and you do not have submit your work*).

Each week there will be a summary exercise in Blackboard covering material from that week’s lectures. *This summary exercise is graded based on completion and will generally be due each week on Sunday at 11:59pm. The summary exercise for week 10 will be due on Saturday, Dec. 1<sup>st</sup> at 11:59pm.*

#### **Students with Disabilities:**

Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 737-4098.

**Link to Statement of Expectations for Student Conduct**, i.e., cheating policies

<http://oregonstate.edu/admin/stucon/achon.htm>