

ITK 225 – Section 001
Computer organization
Spring 2008

Instructor: Kyoungwon (Ben) Suh

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Office Hours: Tuesday/Wednesday 2:00PM to 4:00PM or by appointment

Course Web Site: We will use my personal web site for ITK 225 (<http://www.itk.ilstu.edu/faculty/kwsuh/courses/itk225spring08>) tentatively. In a few weeks, the course web site will be migrated to <http://blackboard.ilstu.edu>

Prerequisites (from catalog): a C or better in ITK179, CS major/minor, formerly ITK325

Section 1
Time: TTR 11:00AM-12:15 PM
Location: Stevenson Hall 108

Course Description

Hardware and software topics in computer organization: instructions, modalities, control units, memories, data path, uniprocessor, and multiprocessor. The main goal of this course is to teach the basic software and hardware components of a computer system and the interactions between them. Students will learn different levels of computer organizations, such as digital logic, micro-architecture, instruction set architecture, and operating system. Students will also learn the internal representations of instructions and data, interaction mechanisms between components, and parallel computer structures. This course is to help students build the basic foundation of major computer systems and related fields.

Course Objectives

Upon completion of ITK 225, student will be able to:

1. Explain internal data (integer, character, and floating point) representations.

2. Develop simple digital logical timing structure.
3. Produce a small program using an assembly language.
4. Explain the different operations for each computer organization level.
5. Compare the major functions and mechanisms for each component of a computer system.
6. Implement the assembly process on a variety of programs.
7. Discuss different structures of parallel processors and their communication mechanisms.

Textbooks and Class Materials

Required Textbooks

Andrew S. Tanenbaum, *Structured Computer Organization* (Fifth Edition), Prentice Hall, ISBN 0-13-148521-0

Materials

The instructor may assign additional readings.

Course Requirements

Exams:

There will be two in-class mid-term examinations in addition to the final, which will be comprehensive. If you are unable to attend an exam due to illness or another valid reason, you must notify your instructor **prior to** the exam to make arrangements for making up the exam. If you are unable to reach your instructor personally, email your instructor or leave a message either in the ITK department office (Old Union 202) or on your instructor's voice mail. **No makeup examination will be administered without the instructor's notification and validation of the excuse before the exam date.** You should make arrangements **now** to attend the exams.

- Exam 1: first 1/3 of course
- Exam 2: second 1/3 of course
- Final exam: 50% on final 1/3 of course and 50% over first 2/3s of course

Homework: There will be 6 to 8 homeworks.

Programming projects:

There will be 2 to 3 programming assignments. You are expected to use SUN Unix system work on your programming assignments. In the programming assignments, you will be asked to implement microcode and assembly program using IJVM/Mic-1 and/or SPARC assembly languages. The CD-ROM which comes with your textbook has detailed

instructions on how to install and execute Mic-1 MMV simulator. The manuals for SPARC assembly language and debugger will be provided by the instructor.

Programming assignments are individual unless specified otherwise. You should complete them with your own effort. If you need help, you should come to my office hours. You may discuss concepts with others in the class, but not assignment specifics.

Other

You are expected to attend class regularly, read the assigned reading before class, and participate in class discussions. Borderline grades (within 1% range) will take into consideration of attendance and participation in class, effort shown in completing class assignments, and results from subsequent exams. There will be several pop quizzes in the class covering topics previously covered in lecture or in your readings.

Plagiarism and other forms of cheating

- Knowingly turning in work that you did not do is plagiarism, the most common form of cheating. It is unacceptable in this course and a foolish way to try to get through the course.
- Do not work with anyone else on programs and other assignments unless you have been told that it is acceptable by your instructor for the specific assignment.
- Do not work together on individual programming assignments.
- Do not discuss specifics of individual assignments, including programming assignments, with people other than your instructor.
- Do not use code downloaded from the web on individual programming assignments
- Do not show someone your completed program or parts of it, even if the person claims not to intend to cheat.
- Any case of cheating will result in a minimum penalty of a zero on the assignment.
- This applies to both the person who did the work and made it available and the person who copied.
- The maximum penalty will be an F in the course and pursuit of further disciplinary action.
- **All** cheating will be reported to SDRS as required by university policy (see your student handbook).

From the Illinois State University Code of Student Conduct
http://www.crr.ilstu.edu/downloads/Code_of_Student_Conduct.pdf

1. Academic Dishonesty. Including but not limited to:

Students are expected to be honest in all academic work. A student's placement of his or her name on any academic exercise shall be regarded as assurance that the work is the result of the student's own thought, effort, and study.

Students shall not:

- a. possess or utilize any means of assistance (books, notes, papers, articles, etc.) in an attempt to succeed at any quiz or examination unless specifically authorized by the instructor.
- b. take any action with intent to deceive the person in charge as to the student's acting without honesty to complete an assignment, such as falsifying data or sources, providing false information, etc. Students are prohibited from conversation or other communication in examinations except as authorized by the instructor.
- c. appropriate without acknowledgement and authorization another's computer program, or the results of the program (in whole or part) for a computer-related exercise or assignment.
- d. plagiarize. For the purpose of this policy, plagiarism is the unacknowledged appropriation of another's work, words, or ideas in any themes, outlines, papers, reports, speeches, or other academic work. Students must ascertain from the instructor in each course the appropriate means of documentation.
- e. submit the same paper for more than one University course without the prior approval of the instructors.
- f. willfully give or receive unauthorized or unacknowledged assistance on any assignment. This may include the reproduction and/or dissemination of test materials. Both parties to such collusion are considered responsible.
- g. substitute for another student in any quiz or examination.
- h. be involved in the advertisement, solicitation, or sale of term papers or research papers.

Disability Concerns

Any student needing to arrange a reasonable accommodation for a documented disability should contact Disability Concerns at 350 Fell Hall, 438-5853 (voice), 438-8620 (TDD).

Evaluation

Your grade will be determined based on the following distribution:

2 midterm exams:	30% (15% each)
Final exam:	30%
Programming assignments	20%

Homework/quizzes	20%
Total	100%

Your grade is computed as a *weighted average* based on the percentages above. It is **not** your total points divided by the total number of points possible in the course. You may end up with far more points for quizzes or homework than for programs, but your program average will count two and a half times as much as your quiz and homework average.

The grading scale for this course is:

A 90-100

B 80- 89

C 70- 79

D 60- 69

F Below 60

Lab Facilities

Scheduled laboratory sessions will be held in Old Union. Homework and programming activities may be completed in Old Union 133 and any other labs in Old Union when they are not in use. You will use your ISU ID card to get into the labs.

Important Dates

Monday, January 28: Last day to withdraw without a WX

Friday, February 8: Last day to withdraw with a WX

Saturday, May 3: Last day of classes

Monday, May 5: Final Exam

Section 1: 10:00 AM to 12:00 PM

Tentative schedule

(Please refer to our course homepage for the most up-to-date schedule)

<i>wk</i>	<i>Mon.</i>	<i>Day</i>	<i>Topic</i>	<i>Reading</i> Chapter.Section	<i>Assignment</i>
1	Jan	15	Introduction	1 (All)	
		17	- Processor - Primary memory	2.1 2.2	Assignment 1 given
2		22	- Secondary memory - Input/Output	2.3 2.4	
		24	- Number Systems: binary numbers	Appendix A	
3		29	- Number Systems: floating-point numbers	Appendix B	Assignment 1 due Assignment 2 given
		31	- Gate and Boolean algebra - Digital logic circuits	3.1 3.2	
4	Feb	5	- Memory	3.3	
		7	- CPU chips and Buses	3.4, 3.5	Assignment 2 due Assignment 3 given
5		12	- Interfacing - Data path, timing	3.7 4.1, 4.2	
		14	- Memory operations	4.3	
6		19	- Memory operations (cont')	4.3	Assignment 3 due Assignment 4 given
	Feb	21	Microinstruction	4.4	Program#1 given
7		26	<u>First midterm</u>		
		28	Performance	4.5	Assignment 4 due Assignment 5 given

<i>wk</i>	<i>Mon.</i>	<i>Day</i>	<i>Topic</i>	<i>Reading</i> Chapter.Section	<i>Assignment</i>
8	Mar	4	Instruction set architecture Properties, Formats	5.1-5.3	
		6	Instruction set architecture Properties, Formats (cont')	5.1-5.3	
			Spring Break (Mar 8 – 16)		Assignment 5 due Assignment 6 given
9		18	ISA – addressing, instruction types	5.4, 5.5	Program#1 due Program#2 given
10		20	ISA – addressing, instruction types (cont')		
		25	ISA – flow control	5.6	Assignment 6 due Assignment 7 given
11		27	Virtual memory	6.1	
	Apr	1	Virtual memory (cont') Virtual I/O instructions	6.1 6.2	
12		3	Virtual instructions for parallel processing	6.3	Assignment 7 due
		8	<u>Second midterm</u>		
13		10	Intro. To assembly language	7.1, 7.2	Assignment 8 given
		15	Assembly language (cont')		Program#2 due Program#3 given
		17	Assembly process, linking and loading	7.3, 7.4	
14		22	Assembly linking and loading (cont') Parallel computer architecture	7.4 8	
		24	Parallel computer architecture (cont')		Assignment 8 due
15		29	Advanced topics		
	May	1	Review		Program#3 due

<i>wk</i>	<i>Mon.</i>	<i>Day</i>	<i>Topic</i>	<i>Reading</i> Chapter.Section	<i>Assignment</i>
16	May	5	Final Exam (May 5: Monday) Section 1: 10:00AM		