CEG 453/653: Design of computing systems
Spring 2000
Time: TTh 7:00-8:15 PM
Room: 406 Russ Engineering Center

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Catalog Description: Laboratory projects combine engineering hardware and computer-science software concepts in the design and implementation of small, special-purpose computer systems. 3 hours lecture, 2 hours lab.

Prerequisites: CEG320, CEG360 or equivalent courses. Prior knowledge of the following areas is required: functional organization and sequential operation of a digital computer, assembly language topics (addressing, stacks, argument passing, arithmetic operations, traps, input/output, linkers and debuggers); and digital electronics including combinatorial and sequential logic, decoders, memories, Boolean algebra, binary and hexadecimal numbers. Knowledge of the C programming language is also required.

Books:

- Microprocessor systems design, 68000 Hardware, Software and Interfacing, 3rd Ed. Alan Clemens, PWS Publishing Company, 1997, (Official textbook).
- SBC68K User's Manual 1.1, Arnewsh, Inc. (In Lab, also available at bookstore)

Course Contents:

- Lab. Preparation (User's Manual and Chapter 4 of Clements')
- Memories in Microcomputer Systems (Clements, Chapter 5)
- Exception Handling (Clements, Chapter 6)
- Microprocessor Interface (Clements, Chapters 8 and 9)
- 68000 in Larger Systems (Clements, Chapter 7)

Grading: The course grade will be the weighted sum of four grades. Grading will be straight scale (90-100 A, 80-89 B, 70-79 C, 60-69 D, below 60 F). These numeric thresholds may be lowered due to clustering, but will not be raised.

- **Tests**: There will be one midterm exam and one final exam. All tests will be closed-books, closed-notes. One double-sided, hand-written sheet (8.5 x 11") will be allowed. All tests will be comprehensive, with an emphasis on new material.

- **Laboratory**: There will be two laboratory projects. An average Laboratory grade of 75% or higher is required to pass the course. There are two laboratory sections, whose meeting times will be announced during the first week of class.

	Weight (%)
Project 1	15
Project 2	35
Lab Report	5
Lab Final Quiz	5
Midterm	15
Final Exam	25

Graduate students taking the CEG653 section will be assigned additional problems during tests and quizzes. For lab groups of two or more students, each group member must be present for the checkout of each project, and each will be questioned separately with respect to the operation of the group's hardware and software.

Laboratory rules: The following rules will be observed:

1. All Labs will be done on the PCs in Russ 339.
2. Lab reports are expected to be done professionally, both in structure and writing.
3. Lab reports are due the day of the following scheduled lab. Late submissions will NOT be accepted.
4. You are expected to bring a floppy disk to the lab. Keep all your programs on your floppy disk. Do not leave any programs on the hard drives.
5. No manuals or equipment can be taken from the lab without approval from the instructor.

Missed Tests: Missed tests can only be made up in case of emergency or work conflicts, and will require supporting documentation. Whenever possible, these issues should be discussed with the instructor prior to the conflicting date.

Collaboration vs. Academic Dishonesty: Students are encouraged to exchange ideas and form study groups to discuss the course material and prepare for tests. However, discussions regarding Laboratory assignments should be kept at the conceptual level. Unless group projects are explicitly assigned, copying or sharing code on laboratory projects will be considered a violation of the University guidelines for academic honesty. These guidelines will also be followed to evaluate student conduct during tests.

Tentative Course Schedule

	Week		Topics	Reading	Projects
Lab outline	**1**	3/28	Project I Introduction		Project 1 assigned
		3/30	Interrupts/polling in C language	Web notes	
MC68000 hardware	**2**	4/4	MC68000 hardware model	4.1	
		4/6	Memory interface	217-19, 4.1, 634-39	
	3	4/11	Minimal MC68000 system	4.4	
Memory system		4/13	Address decoding I	5.1-2	
	4	4/18	Address decoding II	5.1-2	Project 1 due Project 2 assigned
		4/20	Project II Introduction	Handout	
	5	4/25	Static and dynamic memory	5.3-4	Free-run Checkpoint
		4/27	Midterm		
Exception processing	**6**	5/2	Project II Q&A		Glue-logic Checkpoint
		5/4	Exception processing, hardware	6.1, 6.2-4	
	7	5/9	Exception processing, software	6.1, 6.2-4	ROM-RAM Checkpoint
Peripheral interfaces		5/11	6850 ACIA	9.2	
	8	5/16	Project II Q&A		ACIA Checkpoint
		5/18	6821 PIA	PIA Datasheet	
MC68000 in larger systems	**9**	5/23	Error detection and correction	7.1	
		5/25	Memory management	7.2	
	10	5/30	Cache memory	7.3	PIA Checkpoint
		6/1	Material Review		
Finals	**11**	6/6	RC406, 7:45-9:45PM		
		6/8			