

EE 5313 Microprocessor Systems

Summer 2008, MW 6:00-7:50pm, 109 NH

Instructor:

Jason Losh, Ph.D.

jlosh@omega.uta.edu

Office Hours are before 6pm or after 7:50pm MW outside 109NH

E-mail is the quickest method of contacting me on non-class days.

Textbook:

The Intel Microprocessors – Architecture, Programming, and Interfacing by Brey, 5th ed. or later

Listserv:

Please sign up for the EE5313-L listserv to receive the latest updates (goto <http://listserv.uta.edu> to manage your subscriptions or send a message to listserv@listserv.uta.edu with no subject line and the command SUBSCRIBE EE5313-L as the message body).

Catalog Description:

5313. MICROPROCESSOR SYSTEMS (3-0). Hardware/software development techniques for microprocessors and their programmable peripherals, with emphasis on multi-byte width memory design, throughput issues including DMA controller design, coprocessor operation, interrupt-driven i/o, oscillator issues and timer peripherals, analog signal interfacing, and digital buses and interfaces. Topics include: code efficiency issues, hardware-software interactions, and design of memory systems, DMA controllers, and real-world interfacing.

Prerequisites:

Familiarity with the 8086 processor or a very good knowledge of other processors, such as the 8088 or 68000, or microcontrollers, such as the HC11 or 8051, is required. Essential background includes assembly language programming, 8086 maximum-mode architecture, memory organization and timing, basic interfacing, and interrupt operation. Also, knowledge of C or C++ is important.

Course Topics:

- Course introduction and discussion of course objectives
- Survey of microprocessor and microcontroller architectures
- Review of 8086 assembly language programming and high-level language function calls
- Review of 8086 maximum-mode architecture, interfacing, timing, and memory
- Memory: organization and interfacing (up to 64-bit widths), refresh, error correction (ECC), ROM (EPROM and flash) and RAM (SRAM, DRAM, FPM, EDO, SDRAM, DDR, DDR2)
- Data throughput issues: microprocessor block transfers and DMA
- Interrupts: software and hardware interrupts, interrupt service routines, and interrupt hooking
- Interrupts v. polling: latency, effective rates, and efficiency
- Coprocessors: FP and MMX (time permitting) interfacing and programming
- Clock issues: timers, interface reference clocks, sampling clocks, and synchronizing blocks
- I/O issues: digital and analog signal interfacing, isolation, ground loops, noise, and EMI
- I/O buses and interfaces: PCI, ISA, RS-232/422/423/485, IEEE-1284, and IEEE-1394, and USB

Additional References:

Many resources will be provided in addition to the textbook. These documents will be posted at <http://omega.uta.edu/~jlosh/>.

Digital resources:

- *Digital Logic Design Principles* by Balabanian and Carlson, 2001, ISBN 0-471-29351-2
- *An Engineering Approach to Digital Design* by Fletcher, 1980, ISBN 0-13-277699-5

80x86 software resources:

- *The Art of Assembly Language Programming* by Hyde,
<http://cs.smith.edu/~thiebaut/ArtOfAssembly/artofasm.html>
- *Intel Architecture Software Developer's Manual*, vols. 1 through 3, Intel 1999
- *The Programmer's PC Sourcebook* by Hogan, 1988, ISBN 1-55615-118-7

80x86 hardware resources:

- Intel 386™ DX Microprocessor Datasheet, Intel, 1995
- Intel Pentium® Processor with MMX Technology, Intel, 1997
- Intel Pentium 4® Processor with 512-KB L2 Cache, Intel, 2002
- Microprocessors vols. 1 and 2, Intel, 1992, ISBN 1-55512-150-0
- Microprocessors and Interfacing – Programming and Hardware, 2nd ed. by Hall, 1992, ISBN 0-07-025742-6
- The 8088 and 8086 Microprocessors – Programming, Interfacing, Software, Hardware, and Applications, 3rd ed. by Triebel and Singh, ISBN 0-13-010560-0
- Microprocessor Systems: The 8086/8088 Family, 2nd ed. by Liu and Gibson, 1986, ISBN 0-13-580499-X

Other microprocessor resources:

- PowerPC™ Microprocessor Family: The Bus Interface for 32-bit Microprocessors, Motorola, 1997
- PowerPC 603e™ RISC Microprocessor Family PID7t-603e Specification, TSPC603R, Atmel, 2002

Important Dates:

First Day of Class (Wednesday, 5/28), Census Date (Monday, 6/2), Test 1 (Wednesday, 7/2), Last Drop Date (Friday, 7/11), Project Defense Date (Monday, 8/4), Test 2 (changed to **Wednesday, 8/6 at 6pm** per <http://www3.uta.edu/registrar/FinalSummer2008.asp>).

Performance Assessment:

- Grade scale: A (90-100), B (75-89), C (60-74), D (50-59), and F (0-49)
- Grade calculation: (Test1 + Test2 + Project) / 3
- The instructor reserves the right to make reasonable changes in performance evaluation as needed.

Shared Graduate Testing Assistants:

Vishal Sanghai, vsanghai@uta.edu, assigned to EE3310
Brijesh Chauhan, brijesh.chauhan@uta.edu, assigned to EE5313

Tests (67% of Grade):

- Calculators, rulers, pencils, pens, books, and notes will be allowed during tests.
- Any device capable of compiling or emulating any 80x86 code can not be used during in-class portions of the tests.
- Take home portions of tests will be due within one week of assignment.
- No makeup will be provided for any test.
- Any request for re-grading must be submitted to the grader within one week of the return date.
- For all tests, Web students shall take exams at the same day as on-campus students.

Project (33% of Grade):

- Project teams will consist of one to three team members.
- The project is due at the beginning of the class on Monday, 8/4.
- Off campus (VCR and Web) students shall also meet this deadline for the project.

Academic Integrity:

It is the philosophy of The University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University.

"Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts." (Regents' Rules and Regulations, Series 50101, Section 2.2)

EE Department Policy requires that you sign and return a letter acknowledging the College of Engineering Ethics policy.

Americans with Disabilities Act:

The University of Texas at Arlington is on record as being committed to both the spirit and letter of federal equal opportunity legislation; reference Public Law 92-112 - The Rehabilitation Act of 1973 as amended. With the passage of federal legislation entitled Americans with Disabilities Act (ADA), pursuant to section

504 of the Rehabilitation Act, there is renewed focus on providing this population with the same opportunities enjoyed by all citizens.

As a faculty member, I am required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Student responsibility primarily rests with informing faculty of their need for accommodation and in providing authorized documentation through designated administrative channels. Information regarding specific diagnostic criteria and policies for obtaining academic accommodations can be found at www.uta.edu/disability. Also, you may visit the Office for Students with Disabilities in room 102 of University Hall or call them at (817) 272-3364.

Student Support Services:

The University of Texas at Arlington supports a variety of student success programs to help you connect with the University and achieve academic success. These programs include learning assistance, developmental education, advising and mentoring, admission and transition, and federally funded programs. Students requiring assistance academically, personally, or socially should contact the Office of Student Success Programs at 817-272-6107 for more information and appropriate referrals. (272-3670) or Mr. Jim Hayes (272-3364) for more information.