

EE 380 Introduction to Microprocessors

The University policy about course outlines can be found in Section 23.4(2) of the University Calendar (<http://www.registrar.ualberta.ca/calendar/Regulations-and-Information/Academic-Regulation/23.4.html>).

About the instructor	
Name:	Petr Musilek
Office location:	ECERF W6-033 (6 th floor access: 8:30-12:00, 13:00-16:30)
Office hours:	M 14:00-15:00, H 11:00-12:00, or individual consultation scheduled by e-mail
Email:	Petr.Musilek@ualberta.ca (please put EE380 in the subject line)
Website:	Linked from http://www.ece.ualberta.ca/~musilek (more details provided below)

Course days, times, and locations	
Lectures:	LEC A1, MWF 13:00-13:50, ETL E2-002 (reg. code 35954)
Labs:	Lab D1–D5: M–F 14:00–16:50, ETL E4-013 (reg. codes 31426, 31428, 31430, 31432, 37482)
Last lecture:	December 8, 2011 (Wednesday)
Midterm exam:	October (TBD)
Final exam:	December 14, 2011 (Wednesday) 2:00PM – 4:00PM, room TBA (likely ETL E2-002)
No classes:	October 10 (M – Thanksgiving day), November 10-11 (H,F – Fall break & Remembrance Day)

Calendar Description

Microcomputer architecture, assembly language programming, sub-routine handling, memory and input/output system and interrupt concepts. Prerequisite: EE 280 or CMPUT 329. Credit may be obtained in only one of EE380 or CMPUT 229.

Textbook and references

There is no textbook that fits exactly the subject of this class including the microprocessor used in labs. The following are possible references you may consider (comments provided in class, or contact the instructor):

M. Bannoura, R. Bettelheim and R. Soja, *Coldfire Microprocessors and Microcontrollers*, AMT Publishing, 2007, ISBN 0-976-2973-0-2

Alan Clements, *68000 Family Assembly Language*, PWS Publishing Company, 1994, ISBN 0-534-93275-4

Alan Clements, *Principles of Computer Hardware*, Oxford University Press, 2006, ISBN 0-19-927313-8

Topics Covered in this Course

1. Fundamental Concepts: (1 week approx.) History of microprocessor technology, microcomputer components, CPU, memory, input/output, busses, microprocessor families, number systems, conversion algorithms, ASCII coding, parity coding.
2. Computer Architecture: (2 weeks approx.) ColdFire programmer's model, address and data registers, program counter, status register, memory map organization, ColdFire native data types, simple assembly language programming, basic machine instructions, program constructs, machine instruction formats, manual instruction assembly and disassembly.
3. Addressing Modes: (1 week approx.) Immediate value, data and address register direct, address register indirect, address register indirect with post-incrementing or pre-decrementing, address register indirect with displacement, address register indirect with indexing and a displacement, long and short absolute addressing, program counter relative addressing, program counter relative with indexing and an offset.
4. Instruction Set: (2 weeks approx.) Data movement instructions; integer arithmetic instructions; logical, shift and rotate instructions; bit manipulation instructions; conditional branching and program control; system control; multiprocessor communications.
5. Assembly Language Programming: (1 week approx.) Software design, structured programming, pseudo code.
6. Subroutines: (1 week approx.) User and supervisor stacks, branch and jump to subroutine instructions, parameter passing techniques, stack frames.

7. Parallel and Serial Input/Output: (2 weeks approx.) Parallel interface design and programming, the synchronous bus, serial interface design and programming.
8. Exceptions and Interrupts: (2 weeks approx.) Exceptions, interrupts, and interrupt processing.
9. System Configuration and Decoding: (1 week approx.) Address decoding, full versus partial decoding, memory system design and timing.

Relationship to Other Courses

Basic familiarity with digital logic hardware is assumed in EE 380, that is, the kind of background provided by EE 280 or an equivalent course in digital logic design. Assembly language programming receives the most emphasis in EE 380; however, fundamental concepts in computer architecture and operating systems are also covered. Experience with at least one computer programming course will be very helpful. Attention to detail, neatness, patience, and an organized approach to both problem solving and troubleshooting are the most useful skills to bring to the course, especially in the laboratory exercises. EE 401, CMPE 401, CMPE 382, and CMPE 490 build directly on the material in EE 380. Microprocessor technology and low-level programming concepts covered in EE 380 form useful background in many other courses in such areas as digital signal processing, robotics, process control, real-time control systems, and software compilers.

Course Website

Website for EE380 is provided by the University of Alberta moodle site.

This live website contains plan of lectures as well as important course material (handouts, assignments, extras) that will be updated as the term progresses. Marks obtained for individual assignments and exams will be also posted at the website. In addition, the website should serve as a forum for students to discuss course related topics and to ask question. The site will be monitored daily during week days.

Evaluation Scheme:

	Percentage	Component
1	10%	Assignments (10)
2	15%	Laboratories (4)

	Percentage	Component
3	25%	Midterm Exam
4	50%	Final Exam

Grading

As of September 2003, the University of Alberta uses a (4-point) letter-grading scheme. Grades are assigned under this system and are guided by the Faculty of Engineering's suggested distribution, which is subject to modification from time to time. The Faculty's suggested GPA range for 300-level courses is 2.5 to 3.1 with a median grade of B.

Plagiarism

The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behaviour at

http://www.uofaweb.ualberta.ca/GFCPOLICYMANUAL/content.cfm?ID_page=37633

and avoid any behaviour, which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

Lecture Recording

Recording is permitted only with the prior written consent of the professor or if recording is part of an approved accommodation plan.