Course Outline

Instructor
- Prof. Ken Ferens, P.Eng.
  E1–544 EITC
  (204) 474–8517
  Ken.Ferens@umanitoba.ca

Office Hours
- By appointment

Teaching Assistant
- Abolfazl Babaei
  babaeia@myumanitoba.ca
- Andrew Kozar
  kozara@myumanitoba.ca
- Nima Sheibani
  sheibani@myumanitoba.ca

Contact Hours
- 4 credit hours
- Lectures: 3 hours x 13 weeks = 39 hours
- Laboratories: 3 hours x 5 weeks = 15 hours

Prerequisites:
- ECE 2220 Digital Logic

Course Website:
http://ece.eng.umanitoba.ca/undergraduate/ECE3610/

Important Dates
- **Term Test**
  Tuesday, March 5th, 2019
  6:00PM–8:00PM
  E2–105 EITC (A–K)
  E2–110 EITC (L–Z)
- **Project Due**
  Tuesday, April 2nd, 2019
- **Voluntary Withdrawal Deadline**
  March 20th, 2019
- **Spring Break**
  February 18th–22nd, 2019
  No classes or examinations

ECE 3610 – Microprocessor Systems

Winter 2019

Course Objectives
This course introduces the student to fundamentals of microprocessors and microcomputers. The topics include: data flow, machine programming, architectures and instructions sets, stacks, subroutines, I/O and interrupts, interfacing fundamentals, and designing with microprocessors.

Course Content
The following topics will be covered:
- Review of number systems, logical operations, and digital circuits
- Verilog design of a tiny operation set computer
- A basic 8-bit microprocessor
- Macro/micro-instruction programmability and animation
- Condition code register
- Assembly language programming
- Addressing modes
- Program writing methodology
- Examples of assembly language program structure and flow
- Computer decisions and branch instructions
- Transfer, arithmetic, and logic instruction
- The stack and subroutines
- Assemblers
- Integrated development environment
- Basic microprocessor interfacing
- Address decoding in memory mapped systems
- Memory mapped I/O and interrupts
- Multiple sources of IRQs and interrupt priority
- Peripheral interface adapter
- Memory accessing techniques and direct memory access
- Design examples.

Textbook
*Microprocessing Systems* - Ken Ferens (available in the UofM Bookstore).

Other Resources
- *68000 Family Assembly Language*, by Alan Clements
- *Using Microprocessors and Microcomputers: The Motorola Family*, by Greenfield and Wray
- *The 68HC11 Microcontroller*, by J. D. Greenfield
- *The Motorola MC68000*, by Jean Bacon
- *Microprocessor Systems Design*, by A. Clements
- *Microcontroller Technology, the 68HC11*, by Peter Spasov

Academic Integrity
Students are expected to conduct themselves in accordance with the highest ethical standards of the Profession of Engineering and evince academic integrity in all their pursuits and activities at the university. As such, in accordance with the *General Academic Regulations on Academic Integrity*, students are reminded that plagiarism or any other form of cheating in examinations, term tests, assignments, projects, or laboratory reports is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university). A student found guilty of contributing to cheating by another student is also subject to serious academic penalty.
Learning Outcomes
1. Ability to design a simple microprocessing system.
2. Develop assembly language programs.
3. Identify, define, and describe the components of basic microprocessor architecture.
4. Apply interrupts and polling for I/O.
5. Create micro-operations for new macro-instructions.

Expected Competency Levels

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Evaluation
The final course grade is determined by the student’s performance on a design project, in laboratories, and on examinations. Students must complete all the laboratories in order to be eligible to receive a passing grade. Students must pass the final exam to be eligible to receive a passing grade.

Component | Value (%) | Method of Feedback | Learning Outcomes Evaluated
--- | --- | --- | ---
Assignments/Project | 20 | F, S | 1, 2, 3, 4
Laboratories | 10 | F, S | 2, 4
Term Test | 20 | F, S | 2, 4, 5
Final Examination | 50 | S | 1, 2, 3, 4

* Method of Feedback: F - Formative (written comments and/or oral discussion), S - summative (numerical grade)

Retention of Student Work
Students are advised that copies of their work submitted in completing course requirements (i.e. assignments, laboratory reports, project reports, test papers, examination papers, etc.) may be retained by the instructor and/or the department for the purpose of student assessment and grading, and to support the ongoing accreditation of each Engineering program. This material shall be handled in accordance with the University’s Intellectual Property Policy and the protection of privacy provisions of The Freedom of Information and Protection of Privacy Act (Manitoba). Students who do not wish to have their work retained must inform the Head of Department, in writing, at their earliest opportunity.

Requirements/Regulations
- Attendance at lectures and laboratories is essential for successful completion of this course. Students must satisfy each evaluation component in the course to receive a final grade.
- It is the responsibility of each student to contact the instructor in a timely manner if he or she is uncertain about his or her standing in the course and about his or her potential for receiving a failing grade. Students should also familiarize themselves with the University’s General Academic Regulations, as well as Section 3 of the Faculty of Engineering Academic Regulations dealing with incomplete term work, deferred examinations, attendance and withdrawal.
- No programmable devices or systems (such as calculators, PDAs, iPods, iPads, cell phones, smart watches, wireless communication or data storage devices) are allowed in examinations unless approved by the course instructor.
- Students should be aware that they have access to an extensive range of resources and support organizations. These include Academic Resources, Counselling, Advocacy and Accessibility Offices as well as documentation of key University policies e.g. Academic Integrity, Respectful Behaviour, Examinations and related matters.

Supplemental Information