**Instructors:** Prof. Stephen Brown and Prof. Jonathan Rose

<table>
<thead>
<tr>
<th>Lecture Section 1 (Brown)</th>
<th>Lecture Section 2 (Brown)</th>
<th>Lecture Section 3 (Rose)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MONDAY 13:00-14:00, MC 252</td>
<td>MONDAY 11:00-12:00, MC 254</td>
<td>TUESDAY 11:00-12:00, MC 252</td>
</tr>
<tr>
<td>TUESDAY 14:00-15:00, MC 252</td>
<td>WEDNESDAY 11:00-12:00, MC 254</td>
<td>THURSDAY 11:00-12:00, MC 252</td>
</tr>
<tr>
<td>THURSDAY 13:00-14:00, MC 252</td>
<td>THURSDAY 11:00-12:00, MC 254</td>
<td>FRIDAY 11:00-12:00, MC 252</td>
</tr>
</tbody>
</table>

**Marks:** 25% Labs, 25% Midterm, 50% Final Exam

**Midterm date:** Monday, March 2, 6:00 pm to 8:00 pm

**Exam date:** (unknown)

**Calendar Description and Learning Outcomes**

Basic computer structure. Design of central processing unit. Hardwired control. Input-output and the use of interrupts. Assembly language programming. Main memory organization and caches. Peripherals and interfacing. System design considerations. The laboratory will consist of experiments involving logic systems and microprocessors and a large open project. Design activity constitutes a major portion of laboratory work.

You will learn about processor architecture, machine instructions, assembly code, C code, memory and other topics. Basically, you will learn the fundamentals of how computers really work. The course has a major laboratory component. You are strongly encourage to solve the lab exercises on your own (although you will have a partner), because you can really only learn engineering concepts by using them in practice.

**Approximate Lecture and Lab Schedule**

Lecture topics and course outline:

**Jan 6-10:** Review of information representation

**Jan 13-17:** Review of digital logic

**Jan 20-24:** Intro to computer architecture, memory, processor datapath and control (Lab 0)
Jan 27-31: Computer architecture continued, memory access and assembly code (Lab 1)

Feb 3-7: Intro to the ARM processor, memory model, load/store and data processing instructions, machine code, condition code flags (Lab 2)

Feb 10-14: ARM instruction set, parallel ports (Lab 3)

Feb 17-21: No classes (Reading week)

Feb 24-28: Subroutine linkage, register conventions, stack, polled-IO, midterm review (Lab 4)

Mar 2-6: ARM operating modes, interrupts

Mar 9-13: Generic interrupt controller, timer interrupts (Lab 5)

Mar 16-20: Using C code, assembly and C, Video graphics and animation (Lab 6)

Mar 23-27: Memory structures and caches (Lab 7)

Mar 30-Apr 3: Other topics, such as recursive code, floating point, pipelines (Project)

Apr 6-10: Wrap-up and review (...Project)

Laboratory Exercises

Lecture Notes

Piazza Course Discussion Board Signup

(Links to an external site.)

Textbook: There is no specific textbook for this course. Recommended reading:


From [https://q.utoronto.ca/courses/132907](https://q.utoronto.ca/courses/132907)