COMP 4550 Real Time Systems
Winter 2012
Instructor

Jacky Baltes
EITC E2-402, University of Manitoba, Winnipeg, MB, Canada, R3T 2N2
Phone: +1 (204) 474-8838
Email: jacky@cs.umanitoba.ca
WWW: http://www.cs.umanitoba.ca/~jacky

Prerequisites: COMP 3430 (or 074.343)(C) and COMP 3370 (or 074.337) (C)

Lecture Times: Mon, Wed, Fri 10:30 - 11:20, EITC E2 304
Office Hours: Fri 9:30 - 10:30 or by prior appointment via email

Introduction
An introduction to the theory and practice of real-time systems. Topics include the design of
real-time systems, scheduling, event based processing, and real-time control.

A selection of topics covered during lectures are:
- Definition of real-time systems: Time, frequency, Hard real-time, soft real-time systems.
- Micro-controller hardware: Interrupts, timers, GPIO, buttons, PWM, AD conv., light
sensors, accelerometers.
- Scheduling: task creation and management, preemptive/cooperative multi-tasking. The
XMLK real-time OS.
- Control: PID, Fuzzy control.
- Communications: UART, SPI, I2C, Ethernet.

Grading
The course mark is determined by: (a) a final exam (50%), (b) a midterm test (20%), and (c)
practical work (30% Assignments).
Assignments (30%)
Course assessment includes a large practical component. There are three assignments covering specific topics. The assignments will use a small micro-controller which will be programmed in a mix of C and assembly language. Each assignment is worth 10%. The following list contains some sample assignment topics:
- Frequency meter to measure the frequency of specific events.
- Speech synthesis program to create automatic speech with a speaker.
- Control an inverted pendulum using simple sensor feedback.
- Implement a small network topology using the micro-controllers.
- Virtual machines for real-time systems.
- Programming languages for real-time systems.

Midterm (20%)
There will be a midterm exam worth 20%. The midterm will be held in class.

Final Exam (50%)
There will be a final exam worth 50%. The exam will be three hours long. The final exam will be held during examination period at the end of the term. Exact time and location will be determined by Student Records.

Textbook
I will use research papers describing both the background material as well as the current state of the art. Students are expected to understand the material as well as being able to implement a simple version of described algorithm.

Academic Dishonesty
Students are reminded that there are penalties for academic dishonesty. Academic dishonesty includes submitting assignments that are not entirely the student’s own work. See the UofM Calendar: Academic Dishonesty and Plagiarism and Cheating for more information.

A declaration sheet, which states that the work being submitted is completely your own, is available at [University of Manitoba Honesty Declaration](#). This sheet must be printed out, filled in, signed, and attached to every which is submitted. No assignment will be marked unless the declaration is attached.