Instructor:

Professor Greg Franks,
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Course Description and Objectives:

To develop an understanding of the design, implementation and use of operating systems in the context of concurrent, real-time systems. The intent is to study real-time issues relevant to operating systems, not the applications that use the operating systems.

A note on the interpretation of “real-time”: In this course, the applications of interest are embedded systems. These systems do not have a general-purpose operating system (i.e. operating systems like Windows and UNIX/Linux are NOT of interest). The systems of interest are (often) built on top of a simple kernel that provides priority pre-emptive multitasking (NOT time sharing/slicing).

Prerequisites:

1. Some previous exposure to concurrent processes, for example, through an undergraduate-level operating system course or work experience.
2. Some low-level programming experience with an assembly language and interrupts.
3. Programming experience with a high-level language (preferably C or C++).

Textbook:

None. Reading material will be suggested to augment lecture content. Several years ago, the course used the text:

Course Web Site: cuLearn

Students registered in SYSC 5701 will automatically be added to the course in cuLearn. University of Ottawa students must follow this procedure to obtain access to cuLearn: http://carleton.ca/ccs/all-services/accounts-and-passwords/student-computing-account/sca-for-u-of-o-students/
Grading Scheme:

- **Assignments** 40%  
  4 assignments worth a total of 40%
- **Term Project** 40%  
  projects (due December 7)
- **Final Exam** 20%  
  in last class (December 7)

The assignments and project require programming on a Tiva C Series TM4C123G LaunchPad Evaluation Kit (http://www.ti.com/tool/ek-tm4c123gxl). Students are responsible for obtaining their own Evaluation Kit to be used in the course.

Students may work in teams of two for the Assignments and Project.

All work submitted in this course must be original – plagiarism will result in a grade of F, and will be reported to the Dean of Graduate Studies for further consideration.

**Topics:**

- **Week 1 – 2:** Introduction to Concurrency and Real-Time Systems
- **Week 3 – 5:** Kernel, IPC and Scheduling Methods
- **Week 6 – 8:** Hard real-time methods
- **Week 9 – 10:** Concurrent languages/environments
- **Week 11 – 12:** Distributed methods (as time permits)
- **Week 13:** Final exam

**Accommodation:** You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

- **Parental obligation:** write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website http://www.carleton.ca/equity/accommodation/

- **Religious obligation:** write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for
accommodation is known to exist. For more details visit the Equity Services website
http://www.carleton.ca/equity/accommodation/

**Academic Accommodations for Students with Disabilities**: The Paul Menton Centre for
Students with Disabilities (PMC) provides services to students with Learning Disabilities
(LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder
(ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments
in mobility, hearing, and vision. If you have a disability requiring academic
accommodations in this course, please contact PMC at 613-520-6608 or
pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC,
contact your PMC coordinator to send me your *Letter of Accommodation* at the
beginning of the term, and no later than two weeks before the first in-class scheduled
test or exam requiring accommodation (*if applicable*). After requesting accommodation
from PMC, meet with me to ensure accommodation arrangements are made. Please
consult the [PMC website](http://www.sce.carleton.ca/courses/health-and-safety.pdf) for the deadline to request accommodations for the formally-
scheduled exam (*if applicable*).

Health and Safety:
Every student should have a copy of our Health and Safety Manual. An electronic
version of the manual can be found at: