

# Carleton University

Department of Systems and Computer Engineering

**SYSC 5701 Operating System Methods for Real-Time Applications**

**Winter 2014**

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## Course Outline

### Instructor:

Professor Trevor W. Pearce,  
Room 3215 V-SIM, 520-2600 ext. 4054, pearce @ sce.carleton.ca

### 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:

Real-Time Systems, Jane W. S. Liu, Prentice-Hall Inc., 2000

**Course Web Site:** <http://www.sce.carleton.ca/dept/sce.php/courses/sysc-5701>

Password to content folder will be announced in class.

### Grading Scheme:

<b>Assignments</b>	<b>40 %</b>	4 assignments worth a total of 40%
<b>Term Project</b>	<b>30 %</b>	projects (due April 8)
<b>Final Exam</b>	<b>30 %</b>	in last class (April 8)

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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:	Distributed methods (as time permits)
Week 12 – 13:	Student Term Work Presentations & Final exam

### A Note About Document Access:

All students registered in at least one course at Carleton have access to Library resources. This includes a number of electronic databases, such as ACM and IEEE. Consult the Library for details on how to access resources locally (i.e. from a computer on campus) and from off-campus (e.g. from home).

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

- **Pregnancy 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

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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](mailto: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](#) 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:

<http://www.sce.carleton.ca/courses/health-and-safety.pdf>