THE UNIVERSITY OF WINNIPEG

APPLIED COMPUTER SCIENCE

Course Number - ACS-3931/3-001
Course Name - Principles of Operating Systems

1 Instructor Information

Instructor:	Alex Brodsky	**Office: 3D17**
E-mail:	acs3931@acs.uwinnipeg.ca	**Office Hours:** TBA
Class Meeting Time:	Tuesday and Thursday, 14:30-15:45	**Room No:** 4M39
Course Group:	Email acs3931@acs.uwinnipeg.ca to receive an invite.	
Course Homepage:	`www.soyuz.acs.uwinnipeg.ca/~abrodsky/3931`	

2 Important Dates

1. Midterm Exam: October 16, 2007
2. Final Exam: December 14, 2007, 13:30-16:30
3. Final Withdrawal Date w/o academic penalty: October 30, 2007
4. Other deadlines: Three assignments due at 5pm on October 2, October 30, and November 27.

3 Course Objectives and Learning Outcomes

This course provides students with an introduction to the principles underlying the function, design, and implementation of modern operating systems. The first part of the course introduces the fundamental abstraction of the process and the related concepts of multiprogramming and concurrency. The second part introduces two additional fundamental abstractions, files and virtual memory, and describes their function and implementation within a modern operating system.

Note to Student: This course assumes that you are comfortable with the concepts introduced in ACS-2906, and that you are fluent in Java. In order to gain first-hand experience in concurrent programming and operating system design you are expected to write a significant amount of complex code (in Java) as part of your assignments. **Frankly, if you are not comfortable with Java or squeaked by in ACS-2906 (less than a B), then this course is probably not for you.**

4 Evaluation Criteria

1. Assignments (30%)
   - Number of assignments: 3
     - Assignment 1, due October 2
     - Assignment 2, due October 30
     - Assignment 3, due November 27

- Information about assignments
  - **Late assignments will not be accepted.**
  - Assignments need to be submitted both in paper and by email.
  - All assignments are in English.

2. Midterm Exam (20% or 0%)
   - The midterm is optional.
   - If you choose not to write the midterm or do better on the final exam then your midterm will be worth 0% and your final will be worth 70%.
3. Final Exam (50% or 70%)

Note: The instructor reserves the right to adjust a student's evaluation criteria, with the student's consent, if the instructor deems than an adjustment is warranted.

5 Exam Requirements

- Photo ID is required.
- No dictionaries, notes, calculators, talking slide rulers, or other electronic aids allowed.

6 Required Text

No text book is required for this course. However the one of the following texts is strongly recommended:

Recommended : Silberschatz, Galvin, and Gagne, "Operating System Concepts with Java, 7th ed.", John Wiley & Sons Inc., 2007, ISBN 0-471-76907-X.
Recommended : Silberschatz, Galvin, and Gagne, "Operating System Concepts with Java, 6th ed.", John Wiley & Sons Inc., 2004, ISBN 0-471-48905-0.
Alternative : Silberschatz et al, "Operating System Concepts (any edition)", John Wiley & Sons Inc., (any year).
Alternative : Tanenbaum, "Modern Operating Systems (any edition)", Prentice Hall, (any year).

Additional helpful material may be found in: Bryant & O'Hallaron, "Computer Systems: A Programmers Perspective", 2003, Prentice Hall, ISBN 0-13-034074-X.

7 Prerequisite Information

A grade of at least C in ACS-2906/3 and ACS-2947/3. Note: If you just squeezed by in ACS-2906/3 or are not completely comfortable and fluent in Java, this course may not be for you.

Make sure that you have the necessary prerequisites to take this course. If you have not successfully completed the above listed courses, it is in your interest to go to the student registration office and officially drop the course. Otherwise, the registration office will do it on your behalf.

8 Misuse of Computer Facilities, Plagiarism, and Cheating

Academic dishonesty is a very serious offense and will be dealt with in accordance with the University's discipline bylaw. Be sure you have read and understood section 7a starting from page 120 in the 2007/2008 UW General Calendar.

9 Tentative List of Topics to be Covered

1. Multiprogramming
   - Processes
   - Cooperating Processes
   - Threads and Java Threads
   - Producer/Consumer Problems
2. Concurrency
   - Critical Sections and Mutual Exclusion
   - Locks, Semaphores, and Monitors
   - Interprocess Communication
   - Deadlock
3. Processes and the Operating System
   - A History of Operating Systems
   - The Kernel and its Role
   - System Calls, System Services, and Context Switches
   - Process and CPU Scheduling
4. Files
   - Files, Paths, and Directories
   - File Access Operations
   - File Handles, Open File Tables, and File Control Blocks
   - Path Translation, Soft- and Hard-links
   - File Abstractions and Input/Output
5. File Systems
   - Media and the Block Interface
   - File System Goals
   - The Unix File System
   - Caching and Performance Issues
6. Memory Management
   - Process Memory
   - Swapping
   - Contiguous Allocation
   - Paging
   - Segmentation
7. Virtual Memory
   - Virtual Addressing
   - Demand Paging
   - Page Replacement Schemes
   - Frame Allocation
   - Thrashing