

# McGill University

## School of Computer Science

[www.cs.mcgill.ca](http://www.cs.mcgill.ca)

### Course Outline

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**Course Name:** Operating Systems  
COMP-310 & ECSE-427 Fall 2008

**Instructor:** Joseph Vybihal

**Contact Information:** Office: ENGMC 323  
Office Hours: Monday and Wednesday 15:35 – 16:35 (or by appointment)  
In Trottier 3<sup>rd</sup> floor labs (look for me)  
Email: Use the WebCT email tool  
Emergencies or non-course related: [jvybihal@cs.mcgill.ca](mailto:jvybihal@cs.mcgill.ca)

**Course Objectives:** Computers are machines that do not operate on their own. Actually they are not that intelligent at all. They are an assembly of complex components that individually have some impressive built-in features but, in the end, require help to coordinate themselves and to communicate with humans. This is where operating systems come in. This is an introductory course in computer operating systems. In this course we will study the theoretical and practical concepts behind modern operating systems. In Particular, we will study the basic structure of an operating system, its components, design strategies, algorithms and schemes used to design and implement different components of an operating system. Major components to be studied include: processes, inter-process communication, scheduling, memory management, virtual memory, storage management, network management, and security.

**Primary learning outcome:** To get a clear understanding of the major principles & algorithms that underlie an operating system and how they interplay with it and the hardware.

**Secondary learning outcomes:** After taking this course, you should be able to: (1) identify the core functions of operating systems and how they are architected to support these functions, (2) explain the algorithms and principles on which the core functions are built on, (3) explain the major performance issues with regard to each core function, and (4) discuss the operating system features required for a particular target application.

**Course Description:** Control and scheduling of large information processing systems. Operating system software – resource allocation, dispatching, processors, access methods, job control languages, and main storage management. Batch processing, multiprogramming, multiprocessing, time-sharing.

**Texts:** **Primary Texts:**  
OPERATING SYSTEM CONCEPTS (8<sup>th</sup> Ed.) by Silberschatz, Galvin & Gagne.  
ISBN: 978-0-470-27993-9 By John Wiley & Sons Inc.

**ECSE Additional Text:** (optional – for C and Unix background information)  
SOFTWARE SYSTEMS by Vybihal & Azar  
ISBN: 978-0-7575-5727-9 By Kendall/Hunt

**Optional Recommended Readings:**  
Operating Systems Principles; Bec & Shav; Prentice Hall; ISBN 0-13-026611-6

**Evaluation:**

Assignments	30%	4 Assignments
Midterm Exam	20%	October 16, 2008 (Location: in class)
Final Exam	50%	TBA

You will be notified in advance of assignment due dates. All assignments are due on WebCT at the indicated time and date. Late assignments will lose 5% of its grade per day late. Assignments beyond 2 days late will not be accepted. You may not submit assignments via e-mail without the permission of the instructor.

Students are responsible for all materials for the tests and exams, whether or not it is covered in class. Exams will be a combination of all types of questions based on all sources, and students may be required to integrate theoretical concepts from the text to substantiate their arguments.

No make-up tests or make-up assignments are allowed in this course. A supplemental exam is possible for 50% of the grade (to replace your final exam).

If you are not satisfied with the grading of an assignment or mid-term test, you may request a review within 7 days of return. Indicate in writing or during a meeting with the instructor where and why you feel the marks are unjustified and give it back to your instructor for re-grading. Note that the entire assignment or mid-term test will be re-graded and your grade can go up or down (or stay the same) accordingly.

**Course Requirements:** CS Students: COMP-273 (prerequisite)  
ECSE Students: ECSE-323 or COMP-273 (prerequisite)  
This course assumes you are familiar with C and Unix/Linux.

#### *Calculators*

Only non-programmable, no-tape, noiseless calculators are permitted. Calculators capable of storing text are not permitted in tests and examinations.

#### *Dictionaries*

Dictionaries are not permitted, but translation dictionaries are.

#### *Handheld Devices*

Handheld devices capable of storing text and having calculator functionality (e.g. Palm, etc.) are not permitted.

**Additional Information:** The course slides are not meant as a complete set of notes or a substitute for a textbook, but simply constitute the focus of the lecture. Important gaps are left in the slides that are filled in during class, thus lecture attendance should be considered essential.

The material covered in the classroom will be used to supplement textbook readings.

Every chapter should be read twice. The first reading should be done prior to attending class and the second reading should be done after the class discussion of the chapter. The questions at the back of each chapter follow directly from the reading. Students should be able to answer these questions after a thorough reading of the material.

**Academic Integrity:** *Code of Student Conduct*

McGill University values academic integrity. Therefore all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see [www.mcgill.ca/integrity](http://www.mcgill.ca/integrity) for more information).

L'université McGill attache une haute importance à l'honnêteté académique. Il incombe par conséquent à tous les étudiants de comprendre ce que l'on entend par

tricherie, plagiat et autres infractions académiques, ainsi que les conséquences que peuvent avoir de telles actions, selon le Code de conduite de l'étudiant et des procédures disciplinaires (pour de plus amples renseignements, veuillez consulter le site [www.mcgill.ca/integrity](http://www.mcgill.ca/integrity)).

**Final Exam Policy:**

*Regulations*

Students should not make other commitments during the final exam period. Vacation plans do not constitute valid grounds for the deferral or the rescheduling of examinations. See the Centre Calendar for the regulations governing Examinations:

<http://www.mcgill.ca/conted-students/exams/regulations/>

Students are required to present their I.D. Card (with photo) for entrance to their examination.

*Conflicts*

If you are unable to write your final examination due to scheduling conflicts, you must submit a Final Exam Conflict Form with supporting documentation at least **one month** before the start of the final examination period. Late submissions will not be accepted. For details, see

<http://www.mcgill.ca/conted-students/exams/conflicts/>

*Exam Timetable*

Examination schedules are posted at the Centre and on the following page approximately 6-8 weeks before the examination period commences

<http://www.mcgill.ca/conted-cms/exams/>

The Centre cannot provide examination dates over the telephone.

**Classroom Rules:**

All electronic devices (cell phones and beepers) must be turned off during class time.

**Assignments Pickup:**

All assignments are submitted to and picked-up from WebCT.

**Email Policy:**

E-mail is one of the official means of communication between McGill University and its students. As with all official University communications, it is the student's responsibility to ensure that time-critical e-mail is accessed, read, and acted upon in a timely fashion. If a student chooses to forward University e-mail to another e-mail mailbox, it is that student's responsibility to ensure that the alternate account is viable.

Please note that to protect the privacy of the students, the University will only reply to the students on their McGill e-mail account.

**Computing Resources:** Trottier 3<sup>rd</sup> floor.

**Students Rights and Responsibilities:**

Regulations and policies governing students at McGill University can be downloaded from the website:

<http://www.mcgill.ca/deanofstudents/rights/>

**Students Services and Resources:**

Various services and resources, such as email access, walksafe, library access, etc., are available to Continuing Education students:

<http://www.mcgill.ca/conted-students/services/>

**Minerva for Students:** <http://www.mcgill.ca/minerva-students/>

**Detailed Course Outline:**

WEEK	TOPIC	DETAILS	CHAPTERS	WORK
<b>What is an Operating System?</b>				
1	Introduction	History, different systems & environments, built-in computer structures, OS management structures.	Ch 1	
2	Basic Architecture	The user interface: command-line and windowed. The components of an operating system.	Ch 2, 3	Ass 1 – interface
<b>What is a Process?</b>				
3	The Process and communication	The process concept, process scheduling, and cooperative processes, inter-process & Client-Server communication.	Ch 4	
4	Threads	Multi-threading models/ issues/ and implementation studies.	Ch 5	Ass 2 – process
5	Process Management	CPU Scheduling and Process Synchronization	Ch 6 & 7	
6	Deadlocks	Definition and methods	Ch 8	
<b>What is Computer Memory?</b>				
7	<b>Midterm exam</b>	Review, exam, catch-up		
8	Memory Management	RAM, Secondary Storage and Virtual Memory Overview: swapping, paging, segmentation ...	Ch 9	Ass 3 – memory
9	Virtual Memory	Methods and case studies	Ch 10	
10	File Systems	Methods and implementations	Ch 11 & 12	
11	Disk Drives	Hardware issues (varia)	Ch 13 & 14	Ass 4 – files
<b>Operating System Security</b>				
12	Protection Issues	Domain, Access, Rights and implementation methods	Ch 18	
13	Security Issues (if time)	Threats and Management	Ch 19	
14	<b>Final exam</b>	Review, exam		

Tutorials:

- Introduction to Unix                      SS Instant Unix (w/o scripts)
- Introduction to Unix scripts            SS Instant Unix (w/ scripts)
- Introduction to C                            SS Instant C (first half)
- Advanced C programming                SS Instant C (second half)

(note: SS = Software Systems textbook)