CSI 3131 Winter 2014
Operating Systems

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Course Material

- Virtual Campus site:
  - Internet communications tool for managing courses
  - Course material (notes and course policies); integrated WEB site
  - Syllabus (also available via professor WEB page)
  - Discussion forums
  - Assignment management
  - Grade tool
  - Course announcements
- Access to Virtual Campus:
  - http://maestro.uottawa.ca
  - Use InfoWeb user name and password

Notes, Textbook and reading

- Course Notes:
  - Made available on Virtual Campus as PDF files
  - Complete notes available – but may be updated
- **Textbook:**
  - *Operating System Concepts/Essentials*, Silberchatz, Galvin, Gange, Wiley, 2012
  - Previous text: *Operating Systems Concept*, Silberchatz, Galvin, Gange, 8th edition, Wiley, 2009
- **Other useful books:**
  - "William Stallings, *Operating Systems: Internals and Design Principles*, 4th edition, Prentice-Hall, 2001, ISBN: 0-13-031999-6
  - *Applied Operating System Concepts*, A. Silberschatz et al., Wiley, 2000.

Schedule

- Lectures:
  - Thursday 14h30 – 16h00 LEE B163
  - Thursday 16h00 – 17h30 LEE B163
- Lab/Tutorial
  - Tutorial - Tuesday 16h00 – 17h30 LEE B163
  - Lab – Tuesday (2 sections) 17h30 – 19h00 STE 0130 & 0131
  - Tutorial starts next week, Labs start on Jan 21
- Tutorials: Theoretical exercises.
- Labs: To gain experience with tools used to complete the assignments.

Assignments and Exams

Assignments
- C-programming under Unix/Linux (process creation/IPC)
- Process synchronization using semaphores (in Java)
- Implementing parts of a basic OS in a simple simulator (in Java)
- File system implementation (Linux and Virtual PC)

Exams
- Closed book
- Diverse format: short answer questions, solve problems
- Need to know and understand concepts and algorithms, as well as being able to apply this knowledge

Midterm
- **Tuesday, February 11th,** 16h00-17h30 in LEE B163
- Tentative material, Module 1 to 5, Intro, Processes, Threads, CPU Scheduling, Process synchronization (Ch 1 to 6 in textbook).

Final
- Comprehensive, with more weight on post-midterm topics

Grading

- **3-4 Assignments (A): 25%**
- **Midterm (M): 25%**
- **Final exam (E): 50%**

You have to get at least 50% on M+E (37.5) to count A.
So:

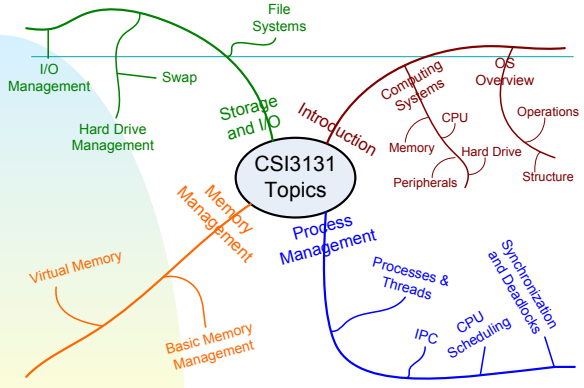
```
if M+E>=37.5, then
    final mark = A+M+E
else
    final mark = 100/75*(M+E)
```

Course Organization Questions?

Course Objectives

You are expected to

- learn basic concepts and principles behind the design of operating systems
- get exposed to the problems operating systems designers face, explore the tradeoffs and solutions to these problems
- see how are these issues solved in practice in real operating systems
- be able to apply these concepts and techniques in relevant circumstances
- get some hands-on experience programming OS type problems (process creation, inter-process-communications, process synchronization, mutual exclusion, deadlock avoidance)



Topics Covered

- What Operating Systems Do
- Computer-System Organization
- Computer-System Architecture
- Operating-System Structure
- Operating-System Operations

Background/intro

- **Process Management**
- **Memory Management**
- **Storage and I/O Management**

The main stuff

- Protection and Security
- Distributed Systems
- Special-Purpose Systems
- Computing Environments

Advanced topics, not covered

Topics Covered

Introduction/Background/Overview

- Computer systems overview
- Operating systems overview: interface, system calls, design and implementation issues, OS structure

Process Management

- Processes and threads
- Interprocess communication
- CPU scheduling – algorithms and criteria
- Process/thread synchronization – problems and solutions
- Deadlocks – prevention, avoidance, detection, recovery

Topics Covered II

Memory Management

- Basic main memory management (swapping, contiguous memory allocation, paging, segmentation)
- Virtual memory (demand paging, copy-on-write, page replacement, allocating kernel memory)

Storage Management and Input/Output

- File-System interface (files, directories, mounting file system, file sharing)
- File-System implementation
- Mass-storage structure (disk structure, scheduling, management)
- Swap space management
- I/O systems (hardware, application I/O interface, kernel I/O subsystem)