

CS 350 - Operating Systems

Course Outline

[Web Page for Current Term](#) : [University of Waterloo](#) : [Faculty of Mathematics](#) : [School of Computer Science](#)

Lectures

Section	Campus	Time / Days	Bldg Room	Instructor
LEC 001	UW U	04:00-05:20MW	MC 2038	Lesley Istead
LEC 002	UW U	02:30-03:50MW	MC 2038	Lesley Istead
LEC 003	UW U	04:00-05:20MW	OPT 309	Ali Mashtizadeh
LEC 004	UW U	11:30-12:50MW	MC 2035	Ali Mashtizadeh

Online Discussion Forum (Piazza)

- We will be using a system for class-related discussions and announcements called [Piazza](#).
 - Students should visit the [Piazza homepage for this course](#).
 - You will need to be added as a student to this course in Piazza before being able to access the above link. Students who are enrolled in the course when classes start may receive an e-mail inviting them to Piazza. If you do not receive this e-mail, or if you enroll after classes start, you can add yourself as a student to the course using your Waterloo e-mail.
 - You will be expected to follow the course related postings and messages on Piazza.
 - One of the first things you may want to do after logging into Piazza is adjust your account settings. Piazza can generate a large volume of e-mails, and these settings may be modified to reduce the frequency of received notifications (as well as what types of notifications are received).
 - Please post questions and comments about the course and assignments there.
 - Do not publically post code or partial solutions to assignments on Piazza. If you wish to, you can post questions that are private to the course staff (only the instructors will be able to see them) and you can also post questions and comments that are anonymous to the rest of the class (other students will see the post, but not the identity of the poster).
 - There are also Piazza apps available for iOS and Android.
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Course Personnel and Office Hours

Name	E-mail	Office Hours
Lesley Istead (Instructor)	lanortha@uwaterloo.ca (Include CS350 in subject line) Please use Piazza for general questions and comments.	Tuesdays, 2:30-4pm and 4:30-5:30pm MC 3022
Ali Mashtizadeh (Instructor)	ali.mashtizadeh@uwaterloo.ca (Include CS350 in subject line)	Tuesdays, 2-4pm DC 3602

	Please use Piazza for general questions and comments.	
Zhenyu (Tim) Bai (Instructional Apprentice)	Please use Piazza for questions and comments.	Wednesdays, 2:00-3:00PM MC 3022
Michael Honke (Instructional Apprentice)	Please use Piazza for questions and comments.	Mondays, 2:30-3:30PM MC 3022
Jade Marcoux-Ouellet (Instructional Apprentice)	jade.marcoux-ouellet@uwaterloo.ca Contact for questions regarding assignment marks.	N/A DC 3594

Grading Scheme

First, component marks will be determined as follows:

Component	Description
A0, A1, A2a, A2b, A3	Your grades on the assignments, expressed as percentages.
M	Your midterm exam grade, expressed as a percentage.
F	Your final exam grade, expressed as a percentage.

Then, we will apply the following algorithm to determine your final course grade:

```
Normal = (0.02*A0 + 0.08*A1 + 0.07*A2a + 0.08*A2b + 0.10*A3) + 0.20*M + 0.45*F
Exam   = (0.20*M + 0.45*F) / 0.65
```

```
if ( Exam < 50% ) {
    Course Grade = min (Normal, Exam)
} else {
    Course Grade = Normal
}
```

Note in particular that you must pass the weighted average of the midterm and the final exam in order to pass the course.

Instructional Support Coordinator

Name	Office Location	Contact
Gang Lu	MC 4008	glu@uwaterloo.ca, x38243

Course Description

An introduction to the fundamentals of operating system function, design, and implementation. Topics include concurrency, synchronization, processes, threads, scheduling, memory management, file systems, device management, and security.

Course Objectives

Provides an introduction to operating systems: what they do, how they are used, and how they are implemented.

Course Overview

- **Operating System Introduction (2 hours)**
The roles of an operating system. Historical overview of operating system development. Operating system architectures.
- **Multi-Programming (5 hours)**
Processes and threads, system calls, context switching. Managing processor time. Types of scheduling, scheduling algorithm.
- **Concurrency (6 hours)**
Principles of concurrency. Mutual exclusion and semaphores. Deadlock detection and prevention.
- **Memory Management (8 hours)**
Simple memory management techniques: partitioning, dynamic loading, simple segmentation. Virtual addressing and address translation. Virtual memory management: segmentation, paging, caching strategies. Load control, swapping, and thrashing.
- **Device Management (3 hours)**
Physical structure and properties of devices, device control and interaction, blocking, buffering, disk scheduling, DMA.
- **File Systems (5 hours)**
File naming, types and logical organization. Space allocation and management. File system interfaces. Implementation strategies. Case studies.
- **Interprocess Communication (5 hours)**
Terminology and issues, message passing functionality, pipes, sockets, signals, shared memory, and other communication mechanisms.

Recommended text

Operating Systems: Three Easy Pieces by R. Arpaci-Dusseau and A. Arpaci-Dusseau.

This is an on-line textbook, available as a free download in PDF format, or for purchase in hard copy. Links to the textbook are available from the [reading materials page](#).

Required Course Notes:

You are required to either buy or print the course notes and to bring them with you to class and to take notes during class. The course notes are not intended to be stand alone. Class attendance is required.

Assignments

All the assignments should be submitted electronically. Submission instructions are found in the assignment specifications.

Marked assignments can be picked up during the IA's office hours, during the first two weeks after they have been marked. After two weeks they can be picked up from the instructor's office until the end of the term. Unclaimed assignments will be shredded at the end of the term.

Assignment marking reappraisal requests:

If there is a problem with the marking your assignment, you may request that your assignment be reappraised. To do this:

- Print and fill out a [reappraisal form](#), on which you should describe (briefly) what the problem is.
- Drop your form off with the course instructor after lecture or during office hours.

For each assignment there will be a deadline for reappraisal requests.

Slip Days Policies

Each assignment has a due date and a due time, which will be posted on the course web page. Assignments use a system of "slip days" to give you some flexibility with the assignment deadlines. Each person starts the term with **five** slip days, which can be used to push back assignment deadlines. Slip days work as follows:

- Pushing an assignment deadline back by one day (24 hours) costs one slip day.
- An assignment deadline can be pushed back at most **three** days.
- Partial slip days are not allowed, e.g., it is not possible to use part of a slip day to push a deadline back by six hours.
- Slip days are not transferable from one student to another.

Assignments that are submitted late (with no slip days to cover them) will not be accepted and will receive a mark of 0%.

Academic Integrity

Academic Integrity: In order to maintain a culture of [academic integrity](#), members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. All members of the UW community are expected to hold to the highest standard of academic integrity in their studies, teaching, and research. [The Office of Academic Integrity's website](#) contains detailed information on UW policy for students and faculty. This site explains why academic integrity is important and how students can avoid academic misconduct. It also identifies resources available on campus for students and faculty to help achieve academic integrity in - and out - of the classroom.

Grievance: A student who believes that a decision affecting some aspect of his or her university life has been unfair or unreasonable may have grounds for initiating a grievance, as outlined by [Policy 70 - Student Petitions and Grievances](#). When in doubt please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes [academic integrity](#), to avoid committing an academic offence, and to take responsibility for his or her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about 'rules' for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate Associate Dean. For information on categories of offences and types of penalties, students should refer to [Policy 71 - Student Discipline](#). Students may also view the University's [Guidelines for the Assessment of Penalties](#).

Avoiding Academic Offenses: Most students are unaware of the line between acceptable and unacceptable academic behaviour, especially when discussing assignments with classmates and using the work of other students. For information on commonly misunderstood academic offenses and how to avoid them, students should refer to the Faculty of Mathematics [Cheating and Student Academic Discipline Guidelines](#).

Please Note that: If you took the course previously and wish to reuse your assignments, you may, IF:

1. you request permission, by email, of an instructor, AND
2. your previous assignments were NOT penalized for cheating previously, AND
3. you understand that we will be running anti-cheating software on your submission again AND the results may differ.

Appeals: A decision made or penalty imposed under [Policy 70 - Student Petitions and Grievances](#) (other than a petition) or [Policy 71 - Student Discipline](#) may be appealed if there is grounds to do so. A student who believes he or she has a ground for an appeal should refer to [Policy 72 - Student Appeals](#).

Note for Students with Disabilities: [AccessAbility Services](#), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with them at the beginning of each academic term.