

Course Outline – Fall 2022

CS 3305A: Operating Systems

1. General Course Information

Course Information

CS 3305A: Operating Systems

Lectures: Monday: 4:30pm – 5:30pm; Wednesday: 3:30pm – 5:30pm [in-person lectures]

Location: Health Sciences Building (HSB) 40

Prerequisites

Either (Computer Science 2208A/B and 2211A/B) or (Computer Science 2101A/B and 2208A/B) or (Computer Science 2210A/B, 2211A/B, ECE 3375A/B, and registration in the fourth year of a BESC program in Computer Engineering or Mechatronic Systems Engineering).

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course, and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

2. Instructor

Name: Dr. Anwar Haque

Office Location: Middlesex College (MC) 415

Phone Number: 519-661-2111 Ext. 87428

E-Mail: ahaque32@uwo.ca

Office Hours (Instructor): Monday and Wednesday: 11am-12pm [Zoom link will be announced on OWL].

Office hours (Teaching Assistants - TA): TA names, hours, and Zoom links will be announced on OWL.

Students must use their Western (@uwo.ca) email addresses when contacting their course instructor and TAs.

3. Course Description, schedule, and Delivery Mode

This course presents fundamental concepts related to the design and implementation of operating systems. Topics include introduction to the computer operating system, basic operating system structure, process fundamental, inter-process communication, signal, system calls, process scheduling, process and thread synchronization and concurrency, memory basics, memory management, file systems and storage servers, and if time permits a few “hot” topics.

Course Schedule: A detailed course schedule is provided below in Table 1.

Table 1: CS3305A Fall 2022 Course Schedule

Lec #	Date	Topics	Comments
1	Mon - Sept 12	Course Intro / Overview Intro to Operating Systems	
2	Wed - Sept 14	Process - I	
	Wed - Sept 14	Assignment #1 Available (Parent and Child processes)	
3	Mon - Sept 19	Process - II	
	Mon - Sept 19	QUIZ #1 [1.25%] Quiz [OWL]: starts Sept 19 th 6pm - ends Sept 25 th 11:55pm	Lecture 1-3
4	Wed - Sept 21	Process - III	
5	Mon - Sept 26	Process - IV	
	Mon - Sept 26	QUIZ #2 [1.25%] Quiz [OWL]: starts Sept 26 th 11:55pm - ends Oct 2 nd 11:55pm	Lecture 4-5
	Mon - Sept 26	Assignment #2 Available (Inter-processes communications)	
6	Wed - Sept 28	(1) Signal (2) Systems Calls	
	Wed - Sept 28	Assignment #1 is due [5%] Submission deadline: Sept 28, 11:55pm	
7	Mon - Oct 3	(1) Multiprogramming (2) Intro to Threads	
	Mon - Oct 3	QUIZ #3 [1.25%] Quiz [OWL]: starts Oct 3 rd 11:55pm - ends Oct 6 th 11:55pm	Lecture 6-7
8	Wed - Oct 5	CPU Scheduling - I	
	Wed - Oct 5	Assignment #3 Available (Process vs Threads)	
	Mon - Oct 10	No Class - Happy Thanksgiving!!	
9	Wed - Oct 12	CPU Scheduling - II	
	Wed - Oct 12	QUIZ #4 [1.25%] Quiz [OWL]: starts Oct 12 th 6pm - ends Oct 16 th 11:55pm	Lecture 8-9
	Wed - Oct 12	Assignment #2 is due [5%] Submission deadline: Oct 12, 11:55pm	
10	Mon - Oct 17	CPU Scheduling - III	
	Mon - Oct 17	Assignment #4 Available (CPU Scheduling Algorithm)	

	Mon – Oct 17	QUIZ #5 [1.25%] Quiz [OWL]: starts Oct 17 th 6pm – ends Oct 18 th 11:55pm	Lecture 10
	Wed – Oct 19	MIDTERM [15%] In-person exam (1 Hour 30 minutes)	Lecture 1 – 10
11	Mon – Oct 24	Multiprocessor	
	Tue – Oct 25	Assignment #3 is due [5%] Submission deadline: Oct 25 th 11:55pm	
12	Wed – Oct 26	Process Synchronization I	
	Wed – Oct 26	Assignment #5 Available (mutual exclusion / semaphore / critical section techniques)	
	Mon – Oct 31	Reading week – no class	
	Wed – Nov 2	Reading week – no class	
13	Mon – Nov 7	Process Synchronization II	
	Mon – Nov 7	QUIZ #6 [1.25%] Quiz [OWL]: starts Nov 7 th 6pm – ends Nov 13 th 11:55pm	Lecture 11-13
	Mon – Nov 7	Assignment #4 is due [7%] Submission deadline: Nov 7 th 11:55pm	
14	Wed – Nov 9	Process Synchronization III	
15	Mon – Nov 14	Main Memory Basics	
	Mon – Nov 14	QUIZ #7 [1.25%] Quiz [OWL]: starts Nov 14 th 6pm – ends Nov 20 th 11:55pm	Lecture 14 – 15
16	Wed – Nov 16	Memory Management I	
17	Mon – Nov 21	Memory Management II	
	Mon – Nov 21	QUIZ #8 [1.25%] Quiz [OWL]: starts Nov 21 st 6pm – ends Nov 27 th 11:55pm	Lecture 16 – 17
18	Wed – Nov 23	Memory Management III	
19	Mon – Nov 28	Memory Management IV Storage Systems I	
	Mon – Nov 28	QUIZ #9 [1.25%] Quiz [OWL]: starts Nov 28 th 6pm – ends Dec 4 th 11:55pm	Lecture 18 – 19
20	Wed – Nov 30	Storage Systems II	
	Fri – Dec 2	Assignment #5 is due [8%] Submission deadline: Dec 2 nd 11:55pm	

21	Mon - Dec 5	File Systems I	
	Mon - Dec 5	QUIZ #10 [1.25%] Quiz [OWL]: starts Dec 5 th 6pm - ends Dec 8 th 11:55pm	Lecture 20 - 22
22	Wed - Dec 7	File Systems II Course Review Discussion	
	TBA	FINAL EXAM In-person exam (3 Hours)	Lecture 9 - 22

Course Delivery Mode: The delivery mode of this course will be in-person. Lecture materials/slides will be made available on OWL prior to each lecture. The instructor's and TA office hours will be offered over Zoom. Quizzes will be conducted via OWL's Test and Quizzes. Midterm and Final exams will be in-person. Assignments submissions will be via OWL's Assignments.

Important Sessional Dates:

Classes begin: September 8, 2022
 Thanksgiving (no class): October 10, 2022
 Reading Week: October 31 - November 6, 2022
 Classes end: December 8, 2022

Contingency plan for an in-person class pivoting to 100% online learning: In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, affected course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will **not** change. Any remaining assessments will also be conducted online as determined by the course instructor.

4. Course Materials

Suggested Textbook: Following book is recommended for this course:

- A. Silberschatz, P. Galvin, and G. Gagne *Operating System Concepts (Tenth Edition)*, John Wiley & Sons. Inc, May 2018; ISBN: 978-1119456339

Lecture Notes: Lectures notes will be made available on OWL.

Students should check OWL (<https://owl.uwo.ca>) on a regular basis for news and updates. OWL will be the primary method by which information will be disseminated to all students in the class. Students are responsible for checking the course site on OWL regular basis.

If students need assistance with the course OWL site, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

5. Methods of Evaluation

There are Assignments and Exam components (Quizzes, Midterm, and Final exam) that will be used to determine a student's mark in the course:

- A final exam worth 45% of the overall mark.
- One midterm exam worth 15% of the overall mark.
- Ten Quizzes worth 10% of the overall mark (the best 8 out of 10 Quizzes will be considered).
- Five programming assignments worth 30% of the overall mark.

The following rules are designed to ensure that students meet certain minimum standards:

- To be eligible to pass the course, a student must receive at least 40% in the exam components (i.e., 40% of 70) and at least 40% in the assignments (i.e., 40% of 30).
- To be eligible to receive an overall grade of 60% or higher in the course, a student must receive at least 50% in the exam component (i.e., 50% of 70) and at least 50% in the assignments (i.e., 50% of 30).

• Quizzes / Tests / Exams

There is an in-person final exam that is scheduled by the Registrar. There is one in-person midterm (exam date: Wednesday Oct 19, 2022). There will be a total of ten quizzes, and the best 8 out of 10 quizzes will be considered. For the Quizzes, Owl's *tests and quizzes* will be used. Please refer to Table 1 for the quiz/midterm schedule.

Accommodated Evaluations

There will be no makeup for the Quizzes or the Midterm Exam. If you miss the Quiz or the Midterm Exam, follow the procedure for Academic Accommodation detailed in Section 6 below. If accommodation is approved by your Dean's office, your Final Exam mark will be reweighted to include the weight of the Quiz and Midterm Exam.

• Assignments

- Students must submit five assignments (worth 30% of the final mark) through OWL systems (details will be available on OWL). Submission instructions will be provided for each assignment. A detailed course schedule is provided in Table 1 (Section 3) of this document, where a list of topics covered on each assignment is provided.
- To be eligible for marks, assignments must run on the departmental computing equipment (details will be available on OWL). Assignments that work on your own computer but not on departmental equipment will not be eligible for marks.
- Assignments will be made available on OWL, and the students will be notified accordingly. Students are responsible for checking OWL on a regular basis.

- Assignments Due dates: Assignment 1 (Sept 28), Assignment 2 (Oct 12), Assignment 3 (Oct 25), Assignment 4 (Nov 7), and Assignment 5 (Dec 2). All assignments are due by midnight (electronically) of the due date. Late assignments may be handed in, but it will be accepted for up to two days after the due date, with a penalty of 20% a day. Weekend will be counted as a single day.
- Every effort will be made to have assignments marked and handed back within ten business days of the hand-in date, preferably sooner.

6. Student Absences

Academic Consideration for Student Absences

If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or supporting documentation to the Academic Counselling Office of your home faculty as soon as possible.

For further information, please consult the University's medical illness policy at https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf.

The Student Medical Certificate is available at https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf.

Absences from Final Examinations

If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able to do so. They will assess your eligibility to write the Special Examination (the name given by the University to a makeup Final Exam). You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period).

If a student fails to write a scheduled Special Examination, the date of the next Special Examination (if granted) normally will be the scheduled date for the final exam the next time this course is offered. The maximum course load for that term will be reduced by the credit of the course(s) for which the final examination has been deferred. See the Academic Calendar for details (under Special Examinations).

Note: missed work can *only* be excused through one of the mechanisms above. Being asked not to attend an in-person course requirement due to potential COVID-19 symptoms is **not** sufficient on its own.

7. Accommodation and Accessibility

Religious Accommodation

When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence

in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at

<https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>.

Accommodation Policies

Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at: [https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic Accommodation disabilities.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf)

8. Academic Policies

The website for Registrarial Services is <http://www.registrar.uwo.ca>

In accordance with policy, https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf, the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at their official university address is attended to in a timely manner.

Midterm and Final exams will be **closed book / closed notes** exams and **No electronic devices** will be permitted except **regular calculator**.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

Computer-marked multiple-choice tests and exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating

In the event of a pandemic lock-down and in-person exam restrictions, the tests and examinations in this course may be conducted using a remote proctoring service. Under such circumstances, by taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide **personal information** (including some biometric data) and the session will be **recorded**. Completion of this course will require you to have a reliable internet connection and a device that

meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at: <https://remoteproctoring.uwo.ca>.

9. Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: <https://www.uwo.ca/sci/counselling/>.

Students who are in emotional/mental distress should refer to Mental Health@Western (<https://uwo.ca/health/>) for a complete list of options about how to obtain help. Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at [https://www.uwo.ca/health/student support/survivor support/get-help.html](https://www.uwo.ca/health/student%20support/survivor%20support/get-help.html). To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Accessible Education at http://academicsupport.uwo.ca/accessible_education/index.html if you have any questions regarding accommodations.

Learning-skills counsellors at the Student Development Centre (<https://learning.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: <https://www.uwo.ca/se/digital/>.

Additional student-run support services are offered by the USC, <https://westernusc.ca/services/>.