



## COMP-3473: Operating Systems (Fall 2024, Department of Computer Science)

### Course Information Sheet

Instructor: **Dr. Xing Tan**  
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TA: **TBD**

### 1 TIMES

	Day	Time	Location
1	Tuesday	4pm - 5:30pm	Lecture (OA2015)
2	Thursday	4pm - 5:30pm	Lecture (OA2015)
Office Hours	tbd	tbd	tbd

### 2 Course Description/Overviews

Processes and device handlers and their implementation, communication and synchronization. Synchronization primitives. Process allocation. Memory management. The software required to support a virtual memory system. Resource allocation algorithms. File system implementation. Security and protection. System implementation strategies. The evolution of computer systems: batch processing, multiprogramming, multi-processing, real-time, time-sharing, distributive systems. Each student will design and implement a module for an operating system kernel.

### 3 Course Learning Objectives

Upon completing the course, students will be able to:

- Understand computer system basics, microprocessor evolution, and memory hierarchy.
- Recognize operating system objectives, evolution, and major achievements.
- Comprehend processes, threads, and their management in operating systems.
- Explore memory management, virtual memory, and security considerations.
- Learn about uniprocessor scheduling algorithms and traditional UNIX scheduling.
- Understand multiprocessor and real-time scheduling, including Linux mechanisms.

- Explore I/O management, disk scheduling, and file organization.
- Gain insights into embedded operating systems, computer security concepts, and distributed systems.

## 4 Course Resources

- D2L

## 5 Grading

- **Attendance 10%**
- **Assignments 20%**
  - Assignment One (Due date Sep. 26th, 5%, before class)
  - Assignment Two (Due date Oct. 8th 5%, before class)
  - Assignment Three (Due date Nov. 12th, 5%, before class)
  - Assignment Four (Due date Nov. 28th, 5%, before class)
- **Midterm 30% (Date: October 10th)**
- **Final 40% (Date: TBD)**

## 6 Late Policy

Late assignments will NOT be accepted. A make-up midterm will NOT be provided. If you miss the assignments or midterm for medical reasons (with valid document provided), the weight will be added to the weight of the final exam. The final exam is to be held during the university examination period. Exact date is to be announced. It is your responsibility writing the exam at the announced time and exam room.

## 7 Textbook

- William Stallings *Operating Systems: Internals and Design Principles*. Pearson, 2017, 9th Edition.

## 8 Course Schedule (Tentative)

**Week 1 (Sep. 3rd–6th)** Introduction to OS: Overview of operating systems, importance of OS in computing.

**Week 2 (Sep. 9th–13th)** Computer System Basics: Introduction to interrupts, overview of memory hierarchy, cache memory.

**Week 3 (Sep. 16th–20th)** Understanding OS Components: Appendix on Chapter 1, Introduction to Chapter 2, multiprogramming concepts.

**Week 4 (Sep. 23rd–27th)** Processes and State Transition Diagrams: Exploration of Chapter 3, state transition diagrams for processes, Queuing diagrams, dispatcher functionality.

- Week 5 (Sep. 30th–Oct. 4th)** Mutual Exclusion and Semaphores: Semaphore introduction, mutual exclusion concepts, semaphore applications in Producer/Consumer problem.
- Week 6 (Oct. 7th–11th)** Producer/Consumer problem and monitors: bounded buffer, monitor Concept, brief overview of message passing. **Midterm on 10th.**
- Week 7 (Oct. 14th–18th)** Study Week, No Class.
- Week 8 (Oct. 21st–25th)** Process Synchronization and Deadlock: array implementation of buffer. introduction to deadlock concepts.
- Week 9 (Oct. 28th–Nov. 1st)** Introduction to Banker’s algorithm, checking the safety of a state.
- Week 10 (Nov. 4th–8th)** ] Memory management: MIPS Programs and Addressing, dynamic partitioning and buddy systems
- Week 11 (Nov. 11th–15th)** ] Paging, Segmentation, and Scheduling: completion of paging and segmentation, overview of schedulers.
- Week 12 (Nov. 18th–22nd)** CPU Scheduling: Introduction to FCFS, completion of round robin, discussion on shortest processes, estimation of service time
- Week 13 (Nov. 25th–29th)** Estimation Techniques and Queuing Analysis: Estimation of service time, SPN, SRT, HRRN scheduling algorithms, queuing Analysis and Simulation; File Management: sequential files records, blocking, and blocks B-tree.

## 9 Course Policies

In this course, regular attendance is expected, and punctuality is emphasized to ensure a focused learning environment. Active participation in class discussions is encouraged, fostering a respectful and collaborative atmosphere. Assignments must be submitted on time, and plagiarism is strictly prohibited. Group work is promoted, with equal contributions expected.

Examinations are conducted per the schedule, and any form of cheating results in disciplinary action. Safety regulations must be followed during lab sessions, and students are encouraged to attend office hours for additional assistance. Open communication is essential, with official correspondence conducted through designated channels. Overall, adherence to these policies is crucial for creating a positive and effective learning experience in the course.

## 10 Collaboration/Plagiarism Rules

In this course, collaboration on academic exercises is subject to specific rules to maintain academic integrity. While collaboration is encouraged for enhancing learning, individual understanding is crucial for assessments. All submitted work must be the result of individual effort unless explicitly stated otherwise. Collaborative efforts should be limited to discussions and brainstorming; the actual work and writing must be independent. Plagiarism, defined as using someone else’s work without proper attribution, is strictly prohibited. This includes but is not limited to copying from peers, online sources, or previous students’ submissions. Proper citation and acknowledgment of sources are required.

Any violation of these rules will result in severe consequences, ranging from a zero on the assignment to potential course failure or academic disciplinary actions. It is the responsibility of each student to be familiar with and adhere to these rules, ensuring the maintenance of academic honesty and the integrity of the learning process.

## 11 University Policies

The instructor has been requested to employ a variety of measures, tools and heuristics to identify possible breaches of academic integrity, and to immediately bring identified cases to the attention of the department’s administration for further investigation and consideration of the full range of disciplinary measures. Possible penalties for violating academic honesty policies may include zero on the test or assignment without an option to

rewrite, failure in the course, a permanent grade of record, and/or a transcript notation. Subsequent violations may result in suspension or expulsion from the University.

By taking this course and participating in its evaluation activities, you confirm that you have read and understood the above and that you will at all times adhere to the academic honesty rules and policies laid by the instructor, the Department and the University. That is, in alignment with the university's Student Code of Conduct

<https://www.lakeheadu.ca/students/student-life/student-conduct>

collaboration in this course is governed by specific rules to maintain academic integrity. The Student Code of Conduct outlines the expected behavior and ethical standards for all students. It is imperative that students adhere to these standards to foster a fair and respectful learning environment. Additionally, any form of academic misconduct, including plagiarism, is strictly prohibited. The university's policy on Academic Misconduct (link above) provides detailed information on what constitutes academic dishonesty and the consequences for such actions. It is essential for students to be aware of and adhere to these policies to uphold the values of academic honesty.

Furthermore, the university is committed to providing accommodations for students with disabilities to ensure equal access to education. The Accommodation for Students with Disabilities policy

<https://www.lakeheadu.ca/students/student-life/student-services/accessibility/resource-faculty-staff/accommodation-information>

outlines the process for requesting accommodations and the responsibilities of both students and instructors in this regard. Students with disabilities are encouraged to engage with the relevant university office to facilitate the accommodation process and enhance their learning experience. By understanding and abiding by these policies, students contribute to a positive and inclusive educational environment while upholding the highest standards of academic conduct.