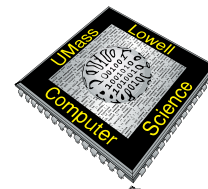




Richard A. Miner School
of Computer & Information Sciences



COMP.3080-011 Operating Systems
3 contact hours - 3 credits
Summer 2025 Syllabus

General Information

Instructor	Dr. Charles T. (Tom) Wilkes
Office	Dandeneau Hall 323
Email	Charles_Wilkes@uml.edu
Discord Server	https://discord.gg/3PCNuxSWX9
Phone	(978) 934-3634 (deprecated)
Class Time	MWTh 10:30 AM - 12:50 PM
Class Location	Olsen Hall, Room 322 Note: This is an On-Campus course, with in-person meetings. (See the Welcome Message in Discord or Blackboard for more details about this On-Campus/In-Person course.)
Office Hours	Th: 1:30-3:30 PM in Zoom meeting Zoom Meeting ID: 992 6803 3620 / Passcode: 40179382 Note: Only authenticated users can join: Sign in to Zoom via UML SSO
Teaching Assistant	N/A

Required Textbook

- [Silberschatz, Gagne, and Galvin, Operating Systems Concepts \(10th edition\)](#), “zyVersion” (interactive book) (August 2023 Release), zyBooks.
zyBook ISBN: 979-8-203-98759-4
To subscribe:
 - Sign in or create an account **using your student.uml.edu email address** at learn.zyBooks.com
 - Enter zyBook code: **UMLCOMP3080WilkesSummer2025**
 - Click Subscribe (Note: You will be asked for your Student ID during the subscription process.)
 - Access to the first chapter is free. For total access, you may purchase a subscription code from the River Hawk Shop – use the [Bookstore](#) button in the Now dashboard for this course; email bookstore@uml.edu ; or call 978-934-2623.

Supplementary Materials: Silberschatz et al. textbook’s [Companion Site](#)

Course Description

- This course presents an introduction to major operating systems and their components. Topics include processes, concurrency and synchronization, deadlock, processor allocation, memory management, I/O devices and file management, and distributed processing. Techniques in operating system design, implementation, and evaluation will be examined.

Course Prerequisites

- COMP3050 Computer Architecture

Course Category

- Required

Additional Course Information

- **Course Objectives** – This course will introduce the student to the fundamentals of concurrent programming and operating systems architecture.

At the completion of this course, the student will be able to:

- Apply the concept of separation of mechanism and policy in operating systems for a written assignment.
- Use the notions of processes and threads in order to control and exploit concurrency in a programming project assignment.
- Evaluate operating system resource scheduling policies as applied to example situations for a written assignment.
- Explain and apply memory management policies, especially virtual memory concepts, for a written assignment.
- Evaluate basic file system, security, and protection concepts as applied to example situations for a written assignment.
- (Schedule permitting) Explain and apply virtual machine and distributed operating system concepts for a written assignment.

- **Web Page** – on Blackboard

- **Software** – The Linux VM linked below is required only for a specific option in Programming Assignment 2, so you may wish to delay installing it until we have discussed other options during our first class meeting.

- [Linux virtual machine](#) (2.82 GB) provided by textbook authors Silberschatz, Galvin, and Gagne (command-line only); hosted on Oracle VM VirtualBox:
 - <http://people.westminstercollege.edu/faculty/ggagne/osc10e/vm/index.html>

(or)

- Enhanced VM with simple GUI desktop ([Xfce](#)) (7.14 GB) – download the enhanced OVA file via the Dropbox link below; then follow the instructions at the textbook authors' site (linked above), but substituting our enhanced OVA file for the authors' OVA file.
 - <https://www.dropbox.com/s/kfadcp6h1zxvn8i/OSC10e-UMLCS-Dec2020.ova?dl=0>

Methodology

Teaching methods: This course will be conducted as a “Flipped Classroom” with Before-Class, In-Class, and After-Class activities and assignments. Students are expected to do substantial preparation before class using the materials provided on the Blackboard course page and the readings in the required textbook. During class, brief presentations may be provided before continuing with In-Class activities to explore the course objectives. Assignments will consist of problem sets or other tasks to exercise and assess the student’s understanding of the course topics. Blackboard will be used extensively to post assignments, provide additional course materials, and to make general announcements.

Assessment: There will be regular Before-Class Exercises (to assess reading preparation); In-Class Exercises, performed in groups; After-Class Exercises involving practice problems; After-Class Quizzes (usually timed at 30 minutes); and Programming Projects. These exercises and quizzes will be tied to “Modules” on specified topics (see the Tentative Schedule on pages 13-15 for a list of Modules).

In-class participation will also be assessed via presentation of solutions to In-Class Exercises. **Successful participation will result in “top-off points” that will be applied to the student’s next After-Class Quiz.**

Our group work for In-Class Exercises will be organized using the “Process Oriented Guided Inquiry Learning” methodology:
<https://pogil.org/about-pogil/what-is-pogil>

Grading:

The percentage weights of the various assignments in this class are as follows:

Before-Class Exercises (in the zyBook)	20%
In-Class Exercises Average (lowest two scores dropped)	20%
After-Class Exercises Average	20%
After-Class Quizzes Average (lowest score dropped)	20%
Programming Projects Average	20%

At the end of the semester, a course average is computed for each student using the percentage weights, and the final grade is assigned using the following scale:

A	90.0-100
B+	87.0-89.9
B	83.0-86.9
B-	80.0-82.9
C+	77.0-79.9
C	73.0-76.9
C-	70.0-72.9
D+	67.0-69.9
D	60.0-66.9
F	below 60

Factors such as attendance, improvement, and class participation may be considered when making the final decision in borderline cases.

Requests for re-grading assignments may be made up to one week after the assignment is graded. The request must be submitted in writing, and include a short paragraph outlining the rationale for the re-grade. Acceptable requests include correcting errors in calculating a score, marking a correct answer incorrect, etc. (See also “Resubmission Policy” below.)

University Policies and Advising Resources

Students are expected to be familiar with the following policies from the Undergraduate Catalog:

- Academic Policies (including Academic Integrity, Grading, and Student Complaints):
<https://www.uml.edu/Catalog/Undergraduate/Policies/Academic-Policies/Academic-Policies.aspx>
- Kennedy College of Sciences Policies:
<https://www.uml.edu/Catalog/Undergraduate/Sciences/policy/default.aspx>
- Computer Science Department Policies:
<https://www.uml.edu/Catalog/Undergraduate/Sciences/policy/Continuance-appeal-dismissal.aspx>

Also, students are urged to be aware of advising resources (including Accommodations / Disability Services) and tutoring services provided by the University:

- <https://www.uml.edu/Academics/Provost-office/Faculty-success/Professional-Engagement/advising-resources.aspx>
- <https://www.uml.edu/class/tutoring/>
- Disability Services, at 978-934-4574, <https://www.uml.edu/student-services/Disability/> (See below for further information.)
- Your college's Academic Advising or Student Services Office
- Centers for Learning: <https://www.uml.edu/CLASS/>

Student Mental Health and Wellbeing

We are a campus that cares about your wellbeing and success. Your personal health and well-being are of utmost importance to faculty and campus administrators. I'm available to talk about your stresses or concerns related to your coursework in my class.

[Counseling Services](#) provide crisis intervention, assessment, referrals, short term individual counseling and group therapy. Call to book an appointment at (978) 934-6800.

[UMatter2](#) is a university-wide initiative to support students and promote mental health. They can be reached at (978) 934-6671. You will find information at that website on how to access Togetherall, an online community which is a peer-to-peer platform dedicated to mental health support.

[Centers for Learning and Academic Support Services \(CLASS\)](#) provides advising services including goal setting, course selection, SIS functions, changing majors/minors and course deletions. (978) 934-2936 or Advisement@uml.edu.

The mission of the [Office of Student Life & Wellbeing](#) is to advance the holistic concept for student success by infusing health-promoting actions and collaboration into campus culture. They can be reached at 978-934-4342 or Wellbeing@uml.edu.

Disability Services

If you are registered with Disability Services and will require course accommodations, please notify me via the Accommodate [semester request process](#) as soon as possible so that we might make appropriate arrangements. It is important that we connect to discuss the logistics of your accommodations; please speak to me during office hours or privately after class as I respect and want to protect your privacy. If you need further information or need to register for academic accommodations, please visit the [Disability Services Website](#).

Additionally, Student Disability Services supports software for ALL students (not just those registered with their office). The university has literacy software that allows you to read on-screen text aloud, research and check written work, and create study guides. You can download the software from the IT Software webpage on the [UML assistive technologies website](#).

Diversity, Inclusion, and Classroom Community Standards

UMass Lowell—and your professor—value human diversity in all its forms, whether expressed through race and ethnicity, culture, political and social views, religious and spiritual beliefs, language and geographic characteristics, gender, gender identities and sexual orientations, learning and physical abilities, age, parenting status and social or economic backgrounds. Enrich yourself by practicing respect in your interactions, and enrich one another by expressing your point of view, knowing that diversity and individual differences are respected, appreciated, and recognized as a source of strength.

[The Office of Multicultural Affairs \(OMA\)](#) supports and advocates for students while leading diversity-related programming. At the same time working to create an inclusive environment for LGBTQ+ individuals via the LGBTQ+ Resource Center. Contact (978) 934-4336 or Multicultural_Affairs@uml.edu

Credit Hour Policy

Federal definition of a credit hour requires that for every course credit awarded, a course must offer 15 hours of instructor-led course activities and 30 hours of out-of-class student work. This means that a standard 3 credit hour course requires 45 hours of instructor-led course activities and 90 hours of out-of-class student work.

University Privacy Statement

UMass Lowell recognizes the importance of mutual trust between students and faculty. Massachusetts is a two-party consent state, which means it is illegal to record someone without their permission. Recordings of classroom lectures are the intellectual property of the instructor. Instructors have the right to prohibit audio and video recording of their lectures, unless the requesting student is registered with Disabilities Services and recording of class sessions is an approved accommodation. In addition, sharing or selling recordings of classroom activity, discussions, or lectures with any other person or medium without permission of the instructor is prohibited.

Course Policies

Attendance:

Formal attendance for this [on-campus/in-person](#) course is mandatory. Students are expected to attend class regularly, as regular attendance is one of the most important contributors to student success. However, students may occasionally need to miss class due to illness, emergency, or caring for a sick family member. In such cases, you are responsible for notifying me of your absences and working with me to arrange to make up any missed work. **Do not come to class if you are ill.** I try to be very accommodating to students who are experiencing attendance challenges, but you must communicate your situation with me regularly and with as much advance notice as possible. Options will include viewing the classroom sessions in Echo360 via recording.

Likewise, if I should need to miss class, I will communicate with you via Discord and Blackboard as soon as possible with clear instructions.

If the campus is closed due to weather or other unforeseen circumstances, please check our [Discord server](#) for information on how to proceed.

Please note that each classroom session will be recorded as the semester progresses for future reference in Echo360.

Interaction Guidelines:

Participation by both the student and instructor is vital for this class to succeed. In addition to our in-person meetings, there are three other methods of communication available to us at this time. They are: **Announcements, Course Messages, and Discussion Forums.**

Announcements:

I will be posting important information applicable to all students in this course in the #general-discussion text channel in the course Discord server. You are expected to read all course announcements in a timely manner.

Course Messages:

Electronic mail should be reserved for private or personal issues. You may email me at any time, and I will try to respond within 24 hours. You may also use Direct Messages on Discord (see “Discussion Forums” below).

Discussion Forums:

The course has a default General Discussion forum (hosted in [Discord](#)), where you can post questions and/or comments throughout the semester. To access the forum, click on the Course Discussion link in the Course Menu and then click on the #general-discussion text channel. I will be checking the General Discussion forum regularly to respond as needed. Additional forum channels will be created as the need arises (e.g., for soliciting partners for projects, and for weekly topics discussion).

Please do not email me your questions (unless they are personal), because chances are, if you have a question related to Blackboard and/or the course material, someone else has the same question. Many students can benefit from your question, and subsequent answer. Also, feel free to respond to one another's questions. No need to wait for me!

Discussion Forums provide a wonderful place to interact and to share information. We all bring something valuable to the table. Let's make the most of this wonderful information sharing resource.

Netiquette

Netiquette stands for Network Etiquette. It refers to proper behavior while interacting online. The golden rule of netiquette is essentially to treat people as you would want to be treated. Please be polite and considerate. Think about whether your comment could cause hurt feelings. Be careful about how your words can come across because misunderstandings can be common online. Feel free to use emoticons to show your tone.

Academic integrity:

The practice of good ethical behavior is essential for maintaining good order in the classroom, providing an enriching learning experience for students, and as training as a practicing computing professional upon graduation. This practice is manifested in the University's Academic Integrity policy. Students are expected to strictly avoid academic dishonesty and adhere to the Academic Integrity policy as outlined in the course catalog. Violations will be dealt with as outlined therein.

As a general rule*, all work submitted for grading must be the student's own work. Students are allowed to help each other solve compiling and linking problems, and may generally discuss issues related to a student's particular program, but students may not share code, write code, or examine another student's code.

Also, as a general rule*, regarding homework and projects, students may discuss the problems (what is being asked for), appropriate material from class lectures or

the textbook or acceptable other sources. Students, however, may not share answers or the specifics of how to answer the question.

**Other policies may apply to specific assignments (e.g., group projects or homework assignments) as specified by the instructor.*

Use of material from previous classes, solution manuals, material from the Internet or other sources (e.g., parents, siblings, friends, etc.) that directly bears on the answer is strictly prohibited.

At the discretion of the instructor, students may be asked to sign a statement that they have abided by the University's Academic Integrity policy and its application to this class. This statement may appear on homework, tests, or projects.

When in doubt, consult the course professor before doing something that may result in violation of the University's Academic Integrity policy.

Application to this course:

Assignments specified as "**solo assignments**" are to be done by the student alone. No outside help is permitted. If you need help on a programming assignment you can only receive aid from the instructor of the course, teaching assistant or approved tutors.

Some assignments may be specified as "**group assignments**" with different rules as specified by the instructor.

The sanction for the first violation of the Academic Integrity policy or plagiarism policy will result in a minimum failing grade on the relevant assignment and the violation will be reported to the student's department chair. Once the final decision has been rendered and any or all appeals exhausted by any parties involved, the instructor or appropriate parties will carry out the recommended sanction.

Personal conduct:

In order to minimize distractions and interruptions, students will be expected to:

1. Arrive at class on time and fully prepared.
2. Give the instructor full and undivided attention once the lecture has begun.
3. Turn off and stow all cell phones, pagers, and any other personal electronic devices once the lecture has begun.

Failure to adhere to these policies may result in immediate dismissal from class and loss of any In-Class credit for relevant assignments or activities.

Computer use:

Students are encouraged to use their laptop computer for taking notes and other activities directly related to the course. The manner in which students use the computer in class is considered a matter of honor and professionalism. Students will adhere to the following guidelines:

1. Computer use must be for taking notes or other activities related directly to the course.
2. Computer use must be subtle and must not distract fellow classmates or the instructor.

Inappropriate use of a computer in the classroom will be viewed as disrespectful to the instructor and classmates and will be considered unprofessional. Examples of inappropriate use include, but are not limited to:

- Sending, receiving, or reading e-mail
- Instant messaging
- Web browsing
- Working on assignments
- Playing games
- Listening to music
- Watching movies

Judgments regarding the appropriateness of computer use are at the discretion of the instructor. The consequences for violating this policy are also at the discretion of the instructor, and may include loss of In-Class computer privileges, grade reduction, and so forth.

Course readings:

Reading assignments are to be completed before the class session for which they have been assigned; material covered in each reading is fair game for class discussions and quizzes.

Assignments:

Assignments will be distributed via ~~a mixture of paper and~~ electronic means. Students are responsible for managing due dates and understanding submission procedures to turn in programming assignments.

Exceptions to assignment due dates will be made only in very dire circumstances (see “Late work” below); therefore, please submit whatever you have by the due date—even if it’s only reasonable preliminary thoughts or pseudocode!—so that the instructor can give you at least some partial credit instead of a zero on the assignment.

Resubmission Policy:

Programming Assignments may be submitted an unlimited number of times **before the due date/time**; only the most recent submission will be graded. Late submissions will not be graded; therefore, you should submit whatever you have by the due date in order to receive at least partial credit.

Programming Assignments may be **resubmitted** for up to full credit, **with a deadline of one week (unless otherwise specified) after the student receives comments** regarding that assignment from the instructor or TA.

Final exam:

In lieu of a final exam this semester, we will use the assigned final exam period for an optional session in which I will present topics that were not covered during the regular semester.

Late work:

Late assignments or projects will not be accepted without prior approval. Students must consult the instructor at least one class day prior to the scheduled due date of any assignment to make alternative arrangements; however, the instructor is under no obligation to grant any such request. Penalties such as a reduced score may be applied at the instructor's discretion.

Tentative Schedule

(Note: Dates are intended as a guideline only and are subject to change.)

Day	Topic	Readings*	Assignments
1 (M 5/19)	Introduction to course; course policies and academic integrity policy. Overview of operating systems structure and operations; review of modern computer architecture and organization.	“Operating Systems Basics” video OSC Chapter 1 BB Module 1 Part 1	In-Class Exercise #1 Practice Online Quiz assigned
2 (W 5/21)	Operating system structures: mechanisms and policies; operating system architectures; system calls.	OSC Chapter 2 BB Module 1 Part 2	Module 1 Before-Class Exercise due (ZYB) In-Class Exercise #2
3 (Th 5/22)	“Catch-up Day”	No new readings	In-Class Exercise #3 Module 1 Quiz assigned Module 1 After-Class
4 (W 5/28)	Processes and Inter-Process Communication: scheduling; operations; IPC; communication in client/server systems.	OSC Chapter 3 BB Module 2 Part 1	Monday, 5/26: Memorial Day Holiday Module 2 Before-Class Exercise due (ZYB) In-Class Exercise #4
5 (Th 5/29)	Threads: multicore programming; thread models; thread libraries; implicit threading; issues; OS examples.	OSC Chapter 4 BB Module 2 Part 2	Module 1 After-Class Exercise due In-Class Exercise #5
6 (M 6/2)	“Catch-up Day”	No new readings	In-Class Exercise #6 Module 2 Quiz assigned Module 2 After-Class
7 (W 6/4)	Process synchronization: critical section problem; software and hardware solutions; mutex locks; semaphores.	OSC Chapter 6 BB Module 3 Part 1	Module 3 Before-Class Exercise due (ZYB) In-Class Exercise #7
8 (Th 6/5)	Process synchronization: classic problems; monitors; examples; alternative approaches.	OSC Chapter 7 BB Module 3 Part 2	Module 2 After-Class Exercise due In-Class Exercise #8

9 (M 6/9)	CPU scheduling: criteria; algorithms; thread scheduling; multi-processor and real-time scheduling; OS examples.	OSC Chapter 5 BB Module 4 Part 1	Module 4 Before-Class Exercise due (ZYB) In-Class Exercise #9 Module 3 Quiz assigned Module 3 After-Class
10 (W 6/11)	Deadlocks: characterization; methods for handling; detection, avoidance, and prevention; recovery from deadlock.	OSC Chapter 8 BB Module 4 Part 2	Module 3 After-Class Exercise due In-Class Exercise #10 Module 4 After-Class Exercise assigned
11 (Th 6/12)	“Catch-up Day”	No new readings	Programming Project 1 due In-Class Exercise #11 Module 4 Quiz assigned Module 4 After-Class
12 (M 6/16)	Main memory: swapping; address translation; segmentation; paging and page tables; Intel and ARM examples.	OSC Chapter 9 BB Module 5 Part 1	Programming Project 2 assigned Module 5 Before-Class Exercise due (ZYB) In-Class Exercise #12
13 (W 6/18)	Virtual memory: mechanisms and policies; demand paging; copy on write; page replacement; frame allocation; thrashing; memory-mapped files; kernel memory allocation; OS examples.	OSC Chapter 10 BB Module 5 Part 2	Module 4 After-Class Exercise due In-Class Exercise #13 Thursday, 6/19: Juneteenth Holiday
14 (M 6/23)	“Catch-up Day”	No new readings	In-Class Exercise #14 Module 5 Quiz assigned Module 5 After-Class Exercise assigned
15 (W 6/25)	Storage management: mass storage structure; I/O systems.	OSC Chapters 11 & 12 BB Module 6 Part 1 BB Module 6 Supplements	Module 6 Before-Class Exercise due (ZYB) In-Class Exercise #15
16 (Th 6/26)	Storage management: file-system interface; file-system implementation; file-system internals.	OSC Chapters 13, 14, & 15 BB Module 6 Part 2	Module 5 After-Class Exercise due In-Class Exercise #16

17 (M 6/30)	Protection: principles; domains; access matrix; access control; capability-based systems. Security: program threats; system and network threats; cryptography; authentication; classifications.	OSC Chapter 16 BB Module 7 Part 1 OSC Chapter 17 BB Module 7 Part 2	Programming Project 2 due In-Class Exercise #17 Module 6 Quiz assigned (No After-Class exercise for Module 6)
18 (W 7/2) Extra Topics (Time Permitting!)	Virtual Machines: benefits and features; building blocks; virtualization of OS components. Distributed Systems: advantages; types; network structure; communication structure; protocols; robustness; design issues; distributed file systems.	OSC Chapter 18 BB Module 7 Part 3 OSC Chapter 19 BB Module 7 Part 4	In-Class Exercise #18 (No quiz or After-Class exercise for Module 7)

* Readings key:

- “OSC” refers to the “zyVersion” of the textbook by Silberschatz et al. (required)
- “CS” refers to the OSC textbook’s [Companion Site](#)
- “BB” refers to the Blackboard handout content area for this course