THE UNIVERSITY OF WINNIPEG

APPLIED COMPUTER SCIENCE

Course Number - ACS-3931-001
Course Name – Principles of Operating Systems

Instructor Information
Instructor: Sergio G. Camorlinga   **Office:** 3D29
E-mail: s.camorlinga@uwinnipeg.ca
Instructor's home page: https://www.acs.uwinnipeg.ca/scamorlinga

Class Meeting Time:
- Every Tuesday / Thursday @ 10:00 am via Zoom. Some sessions may be pre-recorded and posted by video on demand in Nexus in lieu of online class.
- Recorded and course lectures by video on demand sessions in Nexus, weekly posted

Course Web Page: https://nexus.uwinnipeg.ca

Office Hours Info:
        Thursdays 4 pm -> 5 pm via Zoom

Zoom meeting info for class sessions and office hours together with class material will be posted on Nexus.

Important Dates
First Class: Jan 7, 2021
Reading Week (no classes)   Feb 14 - 20, 2021
Midterm Exam Quiz: Feb 23, 2021
Final Withdrawal Date w/o academic penalty: March 16, 2021
(A minimum of 20% of the work on which the final grade is based will be evaluated and available to the student before the voluntary withdrawal date)
Last Class: April 6, 2021
Final Exam (Comprehensive):   TBD

Course Objectives/Learning Outcomes

This course covers the principles and design of operating systems with a hands-on component focused on the Linux Operating System. An Operating System is system software that manages resources (hardware & software) and provide common services to computer programs. Students are introduced to principles in process management, memory management, I/O device management, file systems, and operating system security. After each principle topic, we discuss how the respective principle is applied into the Linux Operating System. Linux is a family of open-source Unix-like OS based on the Linux kernel. We will review code in 'C' language and some assembly language to get a good understanding of principles and design aspects.

Remote Learning

All course material including lecture notes, slides and videos, sample code, assignment and lab details will be available on Nexus. Students are responsible for material covered in video lectures and announcements made in the Nexus course web pages.

Students must be available via Zoom during the class, midterm, and final exam times.
- Students must display their real/full name
- Use of Video is optional.
- Participants must be muted when not speaking
- Students may interact via chat, voice, or gestures

Students can find answers to frequently asked questions related to remote learning here: https://www.uwinnipeg.ca/covid-19/remote-learning-faq.html.

Evaluation Criteria

- Assignment Labs: 30%
    - All assignment labs are to be completed individually
    - There are 6 assignment labs
        - Each can include theory, programming, testing and/or analysis exercises
    - Each assignment lab is worth 5%
    - You will have 2 weeks to complete each assignment lab
    - Assignment lab work results are submitted to the lab assistant via Nexus in one zip file
    - Due at 23:59:00 pm (Nexus clock) sharp on due dates, which are posted in Nexus
    - No late assignment will be accepted, or under special circumstances accepted with 20% off for each late day
    - Assignment lab reports are only submitted as PDF (Portable Document Format) files and code in the format requested in the assignment lab description. All together in one zip file is submitted.
    - The details of submission procedure will be stated in each assignment lab

- o Multiple submissions are not permitted. Students may submit a partially completed assignment lab, and will receive credit for those attempted problems
- o Combination of functionality, quality of design, programming style and documentations are considered for programming parts of the assignment labs
- o Problem solving and programming parts of the assignment labs are time consuming. Start early.
- o Students are responsible for maintaining backups of their work
- o Students are responsible to review their assignments before submission to make sure the correct files are attached to the email
- o Students are responsible for backing up and protecting their assignment lab work.

- Midterm: 20%
  - o The midterm is during class time

- Final Exam: 50%
  - o The final exam covers all material discussed in the course

Exam Requirements
- You are expected to write the test/exam on its given day.
- Unless an official medical certificate is provided, no accommodation is made for missed exams.
- Photo ID is required for the midterm and final exam.
- Midterm and final exams will be delivered via Nexus. Students must have video capability and be prepared to present their student ID.
- Midterm and final exams are closed book.
  - o Students are NOT PERMITTED to view any material like:
    - Class notes, slides, recordings, sample code, assignment descriptions and solutions posted by the instructor
    - Course textbook
    - Student's own course notes and assignment submissions
  - o Students may use an external tool such as a text editor or IDE to write answers to questions before entering them into the exam
  - o Students may contact the instructor to ask questions via Zoom chat
  - o External resources (or any material) are NOT PERMITTED
  - o Communication with others (except the instructor) is NOT PERMITTED
  - o All work must be entirely the students' own. Collaboration or sharing of work is NOT PERMITTED.

Final Letter Grade Assignment

Historically, numerical percentages have been converted to letter grades using the following scale. However, instructors can deviate from these values based on pedagogical nuances of a particular class, and final grades are subject to approval by the Department Review Committee.

A+	95+ - 100%	B+	75 - 79%	C	60 - 64%
A	85 - 95%	B	70 - 74%	D	50 - 59%
A-	80 - 84%	C+	65 - 69%	F	below 50%

Prerequisite and Restriction Information[*]

(This information can be found in the UW Undergraduate Academic Calendar)

- Requisite courses: ACS-2906 and ACS-2947 with a minimum grade of C

Email Communication

Emails from accounts at uwinnipeg.ca are usually not filtered by the UofW email filter. Thereby it is recommended electronic communication used for the course utilize a UofW email account to minimize the risk of filtering. Do not use the Nexus email system to communicate.

Services for Students

Students with documented disabilities, temporary or chronic medical conditions, requiring academic accommodations for tests/exams (e.g., private space) or during lectures/laboratories (e.g., note-takers) are encouraged to contact Accessibility Services (AS) at 786-9771 or https://www.uwinnipeg.ca/accessibility-services/ to discuss appropriate options. All information about a student's disability or medical condition remains confidential.

Students may choose not to attend classes or write examinations on holy days of their religion, but they must notify their instructors at least two weeks in advance. Instructors will then provide opportunity for students to make up work or examinations without penalty. A list of religious holidays can be found in the 2020-21 Undergraduate Academic Calendar

Regulations, Policies, and Academic Integrity

Academic dishonesty is a very serious offense and will be dealt in accordance with the University's policies.

Avoiding Academic Misconduct: Students are encouraged to familiarize themselves with the Academic Regulations and Policies found in the University Academic Calendar at:
https://uwinnipeg.ca/academics/calendar/docs/regulationsandpolicies.pdf
Particular attention should be given to subsections 8 (Student Discipline), 9 (Senate Appeals) and 10 (Grade Appeals). Please note, in particular, the subsection of Student Discipline pertaining to plagiarism and other forms of cheating.

Detailed information can be found at the following:

- Academic Misconduct Policy and Procedures: https://www.uwinnipeg.ca/institutional-analysis/docs/policies/academic-misconduct-policy.pdf and https://www.uwinnipeg.ca/institutional-analysis/docs/policies/academic-misconduct-procedures.pdf
- UW Library video tutorial "Avoiding Plagiarism" https://www.youtube.com/watch?v=UvFdxRU9a8g

Uploading essays and other assignments to essay vendor or trader sites (filesharing sites that are known providers of essays for use by others who submit them to instructors as their own work) involves "aiding and abetting" plagiarism. Students who do this can be charged with Academic Misconduct.

Non-academic misconduct. Students are expected to conduct themselves in a respectful manner on campus and in the learning environment irrespective of platform being used. Behaviour, communication, or acts that are inconsistent with a number of UW policies could be considered "non-academic" misconduct. More detailed information can be found here:

- Respectful Working and Learning Environment Policy https://www.uwinnipeg.ca/respect/respect-policy.html,
- Acceptable Use of Information Technology Policy https://www.uwinnipeg.ca/institutional-analysis/docs/policies/acceptable-use-of-information-technology-policy.pdf
- Non-Academic Misconduct Policy and Procedures: https://www.uwinnipeg.ca/institutional-analysis/docs/student-non-academic-misconduct-policy.pdf and https://www.uwinnipeg.ca/institutional-analysis/docs/student-non-academic-misconduct-procedures.pdf.

Copyright and Intellectual Property. Course materials are the property of the instructor who developed them. Examples of such materials are course outlines, assignment descriptions, lecture notes, test questions, and presentation slides—irrespective of format. Students who upload these materials to filesharing sites, or in any other way share these materials with others outside the class without prior permission of the instructor/presenter, are in violation of copyright law and University policy. Students must also seek prior permission of the instructor/presenter before, for example, photographing, recording, or taking screenshots of slides, presentations, lectures, and notes on the board. Students found to be in violation of an instructor's intellectual property rights could face serious consequences pursuant to the Academic Misconduct or Non-Academic Misconduct Policy; such consequences could possibly involve legal sanction under the Copyright Policy https://copyright.uwinnipeg.ca/docs/copyright_policy_2017.pdf

Privacy

Students have rights in relation of the collecting of personal data the University of Winnipeg: https://www.uwinnipeg.ca/privacy/admissions-privacy-notice.html.

More information:

- Zoom and Privacy: https://www.uwinnipeg.ca/privacy/zoom-privacy-notice.html
- Testing/Proctoring: https://www.uwinnipeg.ca/privacy/zoom-test-and-exam-proctoring.html.

Class Cancellation, Correspondence with Students and Withdrawing from Course

When it is necessary to cancel a class due to exceptional circumstances, the course instructor will make every effort to inform students via uwinnipeg email and Nexus.

Students are reminded that they have a responsibility to regularly check their uwinnipeg e-mail addresses to ensure timely receipt of correspondence from the University and/or the course instructor.

Please let course instructor know if you plan on withdrawing from the course. Note that withdrawing before the VW date does not necessarily result in a fee refund.

Text Books (Required) / Reading List / Tools

The following textbook is required for this class.

- Operating Systems, Internals and Design Principles
  Stallings, William
  Pearson, 9th Edition 2019
  ISBN 978-0-1346-7095-9

We will use the following book(s) as recommended complementary books, supplemented with some readings.

- Linux with Operating Systems Concepts
  Fox, Richard
  CRC Press, Taylor & Francis Group, 1st Edition 2015
  ISBN 978-1-4822-3590-6

- Principles of Operating Systems
  Stuart, Brian L.
  Course Technology, Cengage Learning, 1st Edition
  ISBN 978-1-4188-3769-3

Topics to be covered (Tentative)

1. Introduction
   a. Computer systems overview
   b. Operating systems overview
2. Processes
   a. Process description and control
   b. Threads
   c. Concurrency – mutual exclusion and synchronization
   d. Concurrency – deadlock and starvation
3. Memory
   a. Memory management
   b. Virtual memory
4. Scheduling
   a. Uniprocessor scheduling
   b. Multiprocessor, multicore and real-time scheduling
5. Input / Output and Files
   a. I/O management and disk scheduling
   b. File management
6. Advanced topics
   a. Operating systems security

Note that all topics listed may not be covered and may be offered in a slightly different time order.

Additional Course Related Information

1. No make-up class is scheduled.

2. A permitted or necessary change in mode of delivery may require adjustments to important aspects of course outlines, like class schedule and the number, nature, and weighting of assignments and/or exams.