THE UNIVERSITY OF WINNIPEG

APPLIED COMPUTER SCIENCE

Course Number: ACS-2906-050, 072L, 073L
Course Name: Computer Architecture and System Software
Course Webpage: https://nexus.uwinnipeg.ca/d2l/home/75767

Instructor Information

Instructor: David Bosc
Office: Zoom (Details to follow on Nexus)
E-mail: da.bosc@uwinnipeg.ca

Office Hours: Wednesdays 12:00 pm – 1:00 pm

Class meeting time:	Mondays	6:00 pm – 9:00 pm	2D12
Lab time:	L-072 Fridays	1:30 pm – 2:30 pm	3C13
	L-073 Fridays	2:30 pm – 3:30 pm	3C13

Important Dates

1. First Class:		Monday, January 5, 2026
2. First Lab:		Friday, January 9, 2026
3. Midterm Test:		Monday, February 9, 2026
4. Reading Week (no classes):		February 15-21, 2026
5. Final Withdrawal Date w/o academic penalty*:		Friday, March 13, 2026
6. Last Class:		Monday, March 30, 2026
7. Last Lab:		Monday, April 6, 2026
8. Final Exam:		*TBD*
9. Final Exam Period:		April 9-22, 2026
10. University closures:	Louis Riel Day	Monday, February 16, 2026
	Good Friday	Friday, April 3, 2026
11. Make-up classes/labs on holiday closures:		Monday, April 6, 2026

*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.

Course Objectives / Learning Outcomes

The course begins with discussions of the architecture of computer hardware and progresses to an examination of system software, including its relationship to the hardware, its structure and design, and its impact on application software, system developers, and end-users. Operating system concepts such as memory management, process management, and I/O subsystems will be covered. Students will also gain hands-on experience in assembly programming language during laboratories and on assignments. Other topics include language processors, system utilities, security issues, performance management, program optimization, and GPU programming.

Evaluation Criteria

1. Assignments (16%)

- There are 4 assignments, each worth 4% of your total grade. Submission instructions will be provided with each assignment. The late penalty is 15% per day (for a maximum of 3 days). Multiple submissions are not permitted. All submissions must be typed, and all source code must be commented and compile, or no credit will be given.

2. Laboratories (10%)

- There will be 10 laboratories: each consisting of 1% of your final grade. Submission instructions will be given with each assignment. Multiple submissions are not permitted. All work submitted for evaluation must be typed, and all source code must be commented and compile, or no credit will be given. Late submissions will not be accepted.

3. Midterm Examination (24%)

- There will be one midterm test, during class time (see Important Dates)

4. Final Examination (50%)

- The final examination is comprehensive.

Note: 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.

Test / Exam Requirements

- Photo ID is required for the final exam.

- The use of computers, calculators, phones, or other electronic devices is not permitted during exams.
- Midterm and final exams are closed-book.

Students should contact the instructor as soon as possible if extenuating circumstances require missing a lab, assignment, test or examination. A medical certificate from a practicing physician may be required before any adjustments are considered.

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 204-786-9771 or accessibilityservices@uwinnipeg.ca to discuss appropriate options. All information about a student's disability or medical condition remains confidential.
https://www.uwinnipeg.ca/accessibility-services

Students with accommodations that include more time for assignments must explicitly request extensions to deadlines as they are not granted implicitly for AS-registered students.

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 examinations without penalty. A list of religious holidays can be found in the 2025-26 Undergraduate Academic Calendar online at http://uwinnipeg.ca/academics/calendar/docs/important-notes.pdf

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+	90 – 100%	B+	75 – 79%	C	60 – 64%
A	85 – 89 %	B	70 – 74%	D	50 – 59%
A-	80 – 84%	C+	65 – 69%	F	below 50%

NOTE: Final grades require departmental/program approval and may be subject to change.

Required Text Book / Reading List

- Computer Systems: A Programmer's Perspective; 3rd Edition; Randel E. Bryant, David R. O'Hallaron; Prentice Hall 2010, ISBN: 978-0134092669.

Besides the information contained in the main texts and course notes, I may also distribute papers, and discuss appropriate material and examples from other sources. For example, the

assembly language component of the course is taught from supplementary material. Students are responsible for all material covered in the class.

Relevant textbook chapters and sections will be given during lectures.

- Class Notes will be available on Nexus

Prerequisite Information

- Requisite courses: ACS-1904 or ACS-1905 with a minimum grade of C.
- ACS-2906L (lab) must be taken concurrently.

Regulations, Policies, and Academic Integrity

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).

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

Detailed information can be found at the following:

- Academic Misconduct Policy and Procedures: https://www.uwinnipeg.ca/policies/docs/policies/academic-misconduct-policy.pdf and https://www.uwinnipeg.ca/policies/docs/procedures/academic-misconduct-procedures.pdf
- About Academic Integrity and Misconduct, Resources and FAQs: https://library.uwinnipeg.ca/use-the-library/help-with-research/academic-integrity.html

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.

Academic Integrity and AI Text-generating Tools: Students must follow principles of academic integrity (e.g., honesty, respect, fairness, and responsibility) in their use of material obtained through AI text-generating tools (e.g., ChatGPT, Bing, Notion AI). Suspected misuse of AI may result in a report to the Senate Academic Standards and Misconduct Committee. If AI tools are used, students must cite them. According to the MLA (https://style.mla.org/citing-generative-ai/), "you should

a. cite a generative AI tool whenever you paraphrase, quote, or incorporate into your own work any content (whether text, image, data, or other) that was created by it

b. acknowledge all functional uses of the tool (like editing your prose or translating words) in a note, your text, or another suitable location

c. take care to vet the secondary sources it cites."

AI tools are permitted for study purposes, however, are prohibited for answering questions, i.e., copying and pasting answers directly from AI tools is prohibited. Students may be asked to review their work with the instructor to show their understanding on submitted work.

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/policies/docs/policies/acceptable-use-of-information-technology-policy.pdf
- Non-Academic Misconduct Policy and Procedures: https://www.uwinnipeg.ca/policies/docs/policies/student-non-academic-misconduct-policy.pdf and https://www.uwinnipeg.ca/policies/docs/procedures/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/basics/copyright-policy.html

Privacy

Students have rights in relation of the collecting of personal data the University of Winnipeg

- Student Privacy: https://www.uwinnipeg.ca/privacy/admissions-privacy-notice.html

- Zoom Privacy: https://www.uwinnipeg.ca/privacy/zoom-privacy-notice.html
- Exam and 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 the 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.

Student Wellness

The University of Winnipeg affirms the importance of student mental health and our commitment to providing accessible, culturally appropriate, and effective services for students. Students who are seeking mental health supports are encouraged to reach out to the Wellness Centre at studentwellness@uwinnipeg.ca or 204-258-3809. For community-based mental health resources and supports, students are encouraged to dial 2-1-1. This program of United Way is available 24/7 in 150 languages. Other resources and contact information can be found at the following link: https://www.uwinnipeg.ca/student-wellness/contact-us.html.

Sexual Violence and Human Rights Advisor (SVHRA)

Students who have experienced Sexual Violence can access support from the SVHRA. The SVHRA receives disclosures and can support students with on and off-campus reporting. In collaboration with the Sexual Violence Response Team (SVRT), the SVHRA also provides fast-track referrals to Student Wellness, academic accommodations, security support, and other on and off campus supports. The SVHRA and SVRT operate within a confidential, survivor-centered, and trauma-informed framework. https://www.uwinnipeg.ca/respect/sexual-violence/

Disclosures may be made in-person, email, by text, by phone, or Zoom/Teams.

5Ri55, 5th Floor (Rice Centre)
204.230.6660 – call or text (confidential line)
svrt@uwinnipeg.ca

Topics to be covered (tentative)

1. Representing and Manipulating Info
2. Integer Arithmetic
3. Floating Point Arithmetic
4. Assembly Language programming
5. Memory Hierarchy
6. Virtual Memory
7. GPUs

A permitted or necessary change in the 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.

In order to ensure a safe and comfortable learning environment for everyone, we kindly ask that all students refrain from wearing or using scented products while attending class