THE UNIVERSITY OF WINNIPEG

APPLIED COMPUTER SCIENCE

Course Number: ACS-2906-001, 070L, 071L
Course Name: Computer Architecture and System Software
Course Webpage: https://nexus.uwinnipeg.ca/d2l/home/47973

Instructor Information

Instructor:	Camilo Valderrama		
E-mail:	c.valderrama@uwinnipeg.ca		
Office Hours:	Mondays	2:00-3:00 pm	TBD
Class meeting time:	Fridays	12:45-3:45 pm	3D01
Lab time:	L-070 Tuesdays	4:00-5:15 pm	3D03
	L-071 Wednesdays	4:00-5:15 pm	3D03

Important Dates

1. First Class: Friday, September 9, 2022
2. First Lab L-070:   Tuesday, September 13, 2022
3. First Lab L-071:   Wednesday, September 14, 2022
4. Reading Week (no classes):   October 9-15, 2022
5. Midterm Test: Friday, October 28, 2022
6. Final Withdrawal Date w/o academic penalty*:   Wednesday, November 16, 2022
7. Last Class: Wednesday, December 7, 2022
8. Last Lab L-070:   Tuesday, November 29, 2022
9. Last Lab L-071:   Wednesday, November 30, 2022
10. Final Exam (Comprehensive):   TBD
11. University closures: Truth and Reconciliation Day   Friday, September 30, 2022
                                        Thanksgiving   Monday, October 10, 2022
                                        Remembrance Day   Friday, November 11, 2022
10. Make-up classes for lectures that fall on closures: Tuesday, December 6, 2022
                                                                                         Wednesday, December 7, 2022

*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 sub-systems will be covered. Other topics include language processors, system utilities, security issues, and performance management. The course provides students a hands-on experience of programming at different levels such as high level, assembly, and machine code. ACS-2906L (Lab) must be taken concurrently.

This course introduces fundamental programming concepts using the Java programming language. Topics to be covered include primitive data types and their manipulation, control structures, classes, objects, methods, and array lists.

Evaluation Criteria

Assignments (20%)

There are 4 assignments, each worth 5% 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.

Laboratories (10%)

There will be 10 laboratories: each consisting of 1% of your final grade. Laboratories will be emailed to students on the morning of the scheduled section. 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.

Midterm Examination (20%)

There will be one midterm test.

Final Examination (50%)

The final examination is comprehensive.

Student Services and Information

Students with documented disabilities, temporary or chronic medical conditions, requiring academic accommodations for tests/exams or during lectures/laboratories are encouraged to contact Accessibility Services (AS) at 204.786.9771 or https://www.uwinnipeg.ca/accessibility-services/ to discuss appropriate options. All information about a student's disability or medical condition remains confidential.

All students, faculty and staff have the right to participate, learn, and work in an environment that is free of harassment and discrimination. The UW Respectful Working and Learning Environment Policy may be found at https://www.uwinnipeg.ca/respect/.

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.

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%

Required Textbooks
Main texts:
- 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, other material may be also distributed. For example, the assembly language component of the course is taught from supplementary material. Students are responsible for all material covered in the class.

Prerequisite Information (This information can be found in the UW General Calendar)
Requisite courses: ACS-1904 or ACS-1905 with a minimum grade of C.
ACS-2906L (lab) must be taken concurrently.

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 204.988.7611. 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.

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.

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.

Course Topics

- Representing and Manipulating Info
- Integer Arithmetic
- Floating Point Arithmetic
- Assembly Language programming
- Memory Hierarchy
- Virtual Memory

Note: not all the above topics may be covered.

Course Readings

Relevant textbook chapters and sections will be given during lectures.

Recommended Study Habits

Students who do well in this class attend lectures, take notes, submit all deliverables, regularly ask questions, and tend to spend an extra 3-5 hours per week doing the following:

- Read course notes and handouts
- Read the textbook before coming to class
- Attempt the problems and exercises at the end of the chapters
- Form study groups to study for the midterm and exam

Advice: Students who fall behind find it very hard to catch up.

Class schedule

The following class schedule is tentative. All topics listed may not be covered and may be offered in slightly different time orders.

CLASS SCHEDULE			
Course Schedule Date	Topic, Activities & Readings	Instructor	Assignments/Due Dates & Times
September 9th Lecture 1	**Introduce the course and Chapter 1** Sections 1.1-1.9	Camilo Valderrama	
September 13th and 14th Lab 1	Laboratory 1 Level of abstraction	Fatima Mouri	11:59 pm of the lab day

September 16th Lecture 2	**Representing and Manipulating information:** Information Storage and Integer representation **Chapter 2, Sections 2.1-2.2 except 2.1.7 (2nd ed.) or 2.1.6 (3rd ed.)**	Camilo Valderrama	
September 20th and 21st Lab 2	Laboratory 2 Number conversion, ASCII	Fatima Mouri	11:59 pm of the lab day
September 23rd Lecture 3	**Representing and Manipulating information:** Integer Arithmetic and Floating point **Chapter 2, Sections 2.3-2.4**	Camilo Valderrama	
September 27th and 28th Lab 3	Laboratory 3 Integer arithmetic	Fatima Mouri	11:59 pm of the lab day
October 4th and 5th Lab 4	Laboratory 4 Bit-Level Operations	Fatima Mouri	11:59 pm of the lab day
October 7th Lecture 4	Intro to Assembly 1	Camilo Valderrama	**Homework 1 due to October 9th 11:59 pm**
October 9th to 14th	NO CLASS OR LAB [READING WEEK]		
October 18th and 19th Lab 5	Laboratory 5 Assembly 1	Fatima Mouri	11:59 pm of the lab day
October 21st Lecture 5	Intro to Assembly 2	Camilo Valderrama	
October 25th and 26th	NO LABORATORY – [Midterm week]		
October 28th Midterm	**MIDTERM**	Camilo Valderrama	In class
November 1st and 2nd Lab 6	Laboratory 6 Assembly 2	Fatima Mouri	11:59 pm of the lab day
November 4th Lecture 6	Assembly language	Camilo Valderrama	**Homework 2 due to November 6th 11:59 pm**

November 8th and 9th Lab 7	Laboratory 7 Assembly 3	Fatima Mouri	11:59 pm of the lab day
November 15th and 16th Lab 8	Laboratory 8 Assembly 4	Fatima Mouri	11:59 pm of the lab day
November 18th Lecture 7	**The Memory Hierarchy:** Storage technology, Locality, The Memory Hierarchy **Chapter 6, Sections 6.1-6.3**	Camilo Valderrama	**Homework 3 due to November 20th 11:59 pm**
November 22nd and 23rd Lab 9	Laboratory 9 Recursion	Fatima Mouri	11:59 pm of the lab day
November 25th Lecture 8	**The Memory Hierarchy:** Cache memories, writing cache-friendly code, Putting it together **Chapter 6, Sections 6.4-6.6**	Camilo Valderrama	
November 29th and 30th Lab 10	Laboratory 10 Memory hierarchy	Fatima Mouri	11:59 pm of the lab day
December 2nd Lecture 9	**Exceptional Control Flow:** Exceptions and Processes **Chapter 8.1-8.2**	Camilo Valderrama	**Homework 4 due to December 4th 11:59 pm**
December 6th Lecture 10	**Virtual Memory (VM)** Physical and virtual Addressing; Address spaces; VM as tool for caching; VM as tool for memory protection; Address translation **Chapter 9 (9.1-9.6 except 9.4)**	Camilo Valderrama	
December 7th Lecture 11	Recap	Camilo Valderrama	
December 9-22	**FINAL TEST (Date: TBD)**	Camilo Valderrama	**Comprehensive test 50% of the grade**

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.