The University of Western Ontario
London, Ontario, Canada
Department of Computer Science

CS 2208b - Introduction to Computer Organization and Architecture
Course Outline - Winter (January--April) 2022

This course uses the *Online Western's Learning (OWL)* system (https://owl.uwo.ca)

Welcome to the CS2208B course outline (a.k.a. syllabus). It is a legally binding document that communicates essential information and subject matter about the course, such as instructor's information, course description and topics, course material and a full schedule, as well as the course expectations and grading structures.

Table of Contents:

A: Instructor

- Professor Mahmoud El-Sakka
  Middlesex College, Room 419
  Phone: 661-2111 x86996

Email: elsakka <at> csd.uwo.ca (*preferred communication method*)
Students must use their Western (@uwo.ca) email addresses when contacting the instructor.

Office hours: Tuesday from 1:30 pm to 2:15 pm
Office hours: Thursday from 1:30 pm to 2:15 pm

B: Teaching Assistant(s)

- Haoze Yuan
  Email: hyuan46 <at> uwo.ca

- Rongji He
  Email: rhe25 <at> uwo.ca

Teaching Assistant(s)' Office hours: *By appointment after marking the programing assignments (assignments 5 and 6)*

C: Lectures and Tutorials Schedule/Location

- Lectures Time & Place
  Tuesday 11:30 am - 1:30 pm at NSC-1
  Thursday 11:30 am - 12:30 pm at NSC-1

- Tutorials Time & Place
  Thursday 12:30 am - 1:30 pm at NSC-1

- For Course delivery and assessment with respect to the COVID-19 pandemic, see [Section R](#)

D: Course Description

The course covers the internal representation of various data types, including characters, integers, and floating-points. It also covers the addition and subtraction operations and how they are internally performed.

The course focuses on the architectural components of digital computers, how these components are interconnected, and the nature of the information flow between them. Assembly language is used to reinforce these issues.

The main purpose of this course is to give students an understanding of *how a computer works (organization)* and *what a computer does (architecture)*.

E: Course Topics

The course will address the following topics:

- Introduction to Computer Systems Architecture and Organization
- Computer Arithmetic
- Floating Point Numbers
- Computer Digital Logic

- ARM Instruction Set Architecture
- ARM Assembly Language
- ARM Data Processing

- ARM Flow Control and Branching
- ARM Addressing Modes

- Subroutine Call and Return
- Data Storage and the Stack
- Data Processing and Data Movement

F: Prerequisites

- Computer Science 1027a/b or 1037a/b with a grade of at least 65%
  OR
- Integrated Science 1001X with a grade of at least 60%.

Unless you have either the stated requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course, and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

Students are assumed to be familiar with a high-level programming language and data structures such as stacks and queues.

G: Textbook

- Alan Clements, *Computer Organization & Architecture: Themes and Variations*, Cengage Learning, 2014, ISBN: 978-1-111-98704-6. https://bookstore.uwo.ca/textbook-search?campus=UWO&term=W2021B&courses%5B0%5D=001_UW/CSC2208B

H: Course Website

The CS 2208b course uses the Online Western's Learning (OWL) system (https://owl.uwo.ca)

Class information and course material will be posted on this website, including lecture notes, tutorial notes, quizzes, assignments, and labs. Students should check OWL (http://owl.uwo.ca) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class. Students are responsible for checking OWL on a regular basis.

Forums for the CS2208b will be maintained at the course OWL site, where the instructor will reply to these forum posts.

If students need OWL-related assistance, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be reached by phone at 519-661-3800 or ext. 83800.

I: Material Accessibility Statement

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Accessible Education--formerly SSD--(http://academicsupport.uwo.ca/accessible_education/index.html) at 661-2111 x82147 for any specific question regarding an accommodation.

J: Technical Requirements

During this course, students are required to download (from the course website on OWL) and install a Windows-based simulator software.

This software is also available on Western MyVLab (myvlab.uwo.ca) using VMware Horizon Client to run it on your computer (Windows, MAC, Linux).

K: Email Contact

In accordance with policy, http://www.uwo.ca/its/identity/activatenonstudent.html, the centrally administered email account provided to students will be considered the individual's official university email address. It is the responsibility of the account holder to ensure that the email received from the University at their official university address is attended to in a timely manner.

Losing emails is not an acceptable excuse for not knowing about the information that was sent.

L: Quiz Conduct

- There will be 8 equally weighted weekly online quizzes.

- Quizzes schedule

Quiz no.	To be posted on	Due by date/time
1	Thursday, Jan. 13	Saturday, Jan. 15 @ 11:55 pm
2	Thursday, Jan. 20	Saturday, Jan. 22 @ 11:55 pm
3	Thursday, Jan. 27	Saturday, Jan. 29 @ 11:55 pm
4	Thursday, Feb. 10	Saturday, Feb. 12 @ 11:55 pm
5	Thursday, March 03	Saturday, March 05 @ 11:55 pm
6	Thursday, March 17	Saturday, March 19 @ 11:55 pm
7	Thursday, March 24	Saturday, March 26 @ 11:55 pm
8	Thursday, March 31	Saturday, April 02 @ 11:55 pm

- Quizzes will be posted on the course website by the dates listed above.

- Any changes, updates, and clarifications to quizzes will also be posted on the website. It is your responsibility to monitor these pages closely.

- All submissions will be submitted electronically. We reserve the right to use similarity detection software to detect possible cheating cases.

- Late quizzes are strongly discouraged.
  - 10% will be deducted from a late quiz (up to 24 hours after the due date/time)
  - After 24 hours from the due date/time, late quizzes will receive a zero grade.

- Quizzes will be marked automatically.

- You can send your related questions directly to the instructor.

- A request for an adjustment in a quiz mark must be made within two weeks following the quiz due date.
- All quiz marks are considered to be final after two weeks following the quiz week.

M: Lab Conduct

- There will be 7 equally weighted labs.

- Labs schedule

Lab no.	To be posted on	Section 11 on Tuesday 1:30--2:30 pm SSC-1032	Section 9 on Wednesday 9:30--10:30 am SSC-1032	Section 6 on Wednesday 1:30--2:30 pm HSB-13	Section 10 on Wednesday 3:30--4:30 pm SSC-1032	Section 4 on Thursday 1:30--2:30 pm SSC-1032	Section 5 on Thursday 3:30--4:30 pm SSC-1032
1	Thursday, Feb. 10	Feb. 15	Feb. 16	Feb. 16	Feb. 16	Feb. 17	Feb. 17
2	Thursday, Feb. 17	Mar. 01	Mar. 02	Mar. 02	Mar. 02	Mar. 03	Mar. 03
3	Thursday, Mar. 03	Mar. 08	Mar. 09	Mar. 09	Mar. 09	Mar. 10	Mar. 10
4	Thursday, Mar. 10	Mar. 15	Mar. 16	Mar. 16	Mar. 16	Mar. 17	Mar. 17
5	Thursday, Mar. 17	Mar. 22	Mar. 23	Mar. 23	Mar. 23	Mar. 24	Mar. 24
6	Thursday, Mar. 24	Mar. 29	Mar. 30	Mar. 30	Mar. 30	Mar. 31	Mar. 31
7	Thursday, Mar. 31	Apr. 05	Apr. 06	Apr. 06	Apr. 06	Apr. 07	Apr. 07

- Students will submit an online lab report for each lab session.

Lab no.	Due by date/time
1	Friday, Feb. 18 @ 5:55 pm
2	Friday, Mar. 04 @ 5:55 pm
3	Friday, Mar. 11 @ 5:55 pm
4	Friday, Mar. 18 @ 5:55 pm
5	Friday, Mar. 25 @ 5:55 pm
6	Friday, Apr. 01 @ 5:55 pm
7	Friday, Apr. 08 @ 5:55 pm

- Lab descriptions will be posted on the course website before the dates listed above.

- Any changes, updates, and clarifications to labs will also be posted on the website. It is your responsibility to monitor these pages closely.

- All submissions will be submitted electronically. We reserve the right to use similarity detection software to detect possible cheating cases.

- Late labs are strongly discouraged.
  - 10% will be deducted from a late lab (up to 24 hours after the due date/time)
  - After 24 hours from the due date/time, late labs will receive a zero grade.

- Labs will be marked automatically.

- A request for an adjustment in a lab mark must be made within two weeks following the lab due date.
- All lab marks are considered to be final after two weeks following the lab week.

N: Assignment Conduct

- There will be 6 equally weighted assignments.

- Assignment schedule

Assignment no.	To be posted on	Due in	Due by
1	Thursday, Jan. 13	5 days	Tuesday, Jan. 18 @ 11:55 pm
2	Thursday, Jan. 20	5 days	Tuesday, Jan. 25 @ 11:55 pm
3	Thursday, Jan. 27	5 days	Tuesday, Feb. 01 @ 11:55 pm
4	Thursday, Feb. 17	12 days	Tuesday, Mar. 01 @ 11:55 pm
5	Thursday, Mar. 03	12 days	Tuesday, Mar. 15 @ 11:55 pm
6	Thursday, Mar. 24	12 days	Tuesday, Apr. 05 @ 11:55 pm

- Assignment descriptions will be posted on the course website by the dates listed above.

- Any changes, updates, and clarifications to assignments will also be posted on the website. It is your responsibility to monitor these pages closely.

- All submissions will be submitted electronically. We reserve the right to use similarity detection software to detect possible cheating cases.

- Late assignments are strongly discouraged.
  - 10% will be deducted from a late assignment (up to 24 hours after the due date/time)
  - After 24 hours from the due date/time, late assignments will receive a zero grade.

- Assignments may involve concept questions (non-programming) related to the course material and Assembly programming.

- A program that produces the correct output is not necessarily a *working* program; it must also satisfy the specifications given in the assignment description. Other criteria for which an assignment will be evaluated include coding style, comments, and efficiency.

- Your assignment solutions are expected to be your own individual work, not the products of a group effort.

- It is your responsibility to keep up-to-date backups of assignment disk files in case of system crashes or inadvertently erased files. Retain disk copies of all material handed in, as well as the actual graded assignment to guard against the possibility of lost assignments or errors in recording marks. You should keep these materials at least until you are satisfied that your final mark for the course has been appropriately computed.

- Assignments will be marked either automatically or by the Teaching Assistant(s), who follow marking schemes provided by the instructor.

- Every effort will be made to have assignments marked and handed back within three weeks after the hand-in date, preferably sooner.

- When marking an assignment is completed, you will be informed via the course website and/or email.

- For assignments that are marked by the Teaching Assistant(s), you should direct any questions about marking in the first instance to your Teaching Assistant. If your discussion with the Teaching Assistant is not satisfactory, you may want to further discuss the issue with the course instructor.

  For assignments that are automatically marked, you can send your related questions directly to the instructor.

- A request for an adjustment in an assignment mark must be made within two weeks following the first handed-back day.
- All assignment marks are considered to be final after two weeks following the first handed-back day.

O: Ethical Conduct

Scholastic offences are taken seriously, and students are strongly encouraged to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Students must write their essays and assignments in their own words. Whenever students take an idea or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence.

All assignments are individual. You may discuss approaches to problems; however, the actual details of the work (assignment coding, answers to concept questions, etc.) must be an individual effort.

Assignments that are judged to be the result of academic dishonesty will, for the student's first offence, be given a mark of zero with an additional penalty equal to the weight of the assignment also being applied.

Computer-marked multiple-choice tests and/or exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

Students are responsible for reading and respecting the Computer Science Department's policy on Scholastic Offences and Rules of Ethical Conduct.

P: Midterm Tests and Final Exam

- First midterm test
  - Date: Friday, February 04, 2022
  - Time: from 7:00 pm to 8:30 pm
  - Location: NSC-1 and NSC-7

- Second midterm test
  - Date: Friday, March 11, 2022
  - Time: from 7:00 pm to 8:30 pm
  - Location: NSC-1 and NSC-7

Every effort will be made to have the marks of midterm tests available within two weeks of the test, preferably sooner.

If a student misses a midterm test with an approved valid reason, the makeup test will be held on <em style="color:green">Friday February 11 (for the first midterm test) and <em style="color:green">Friday March 18 (for the 2nd midterm test).

If a student misses a midterm makeup test with an approved valid reason, this student will be given the opportunity to write the test with the next offering of the course. In which case the student will receive a grade of Incomplete (INC) and their maximum course load may be reduced during the term in which they complete their course requirements.

- Final exam
    - Date: During April final exam period
    - Time: TBA (tentatively--three hours long)

- Calculators of any kind are NOT allowed during tests and examinations.

Q: Methods of Evaluation

- The overall course grade will be calculated as listed below
    - Assignments worth a total of 12%
    - Weekly quizzes worth a total of 9%
    - Labs worth a total of 7.5%
    - First midterm test worth 15.5%
    - Second midterm test worth 20%
    - Final exam worth 36%

- When calculating a student assignments grade average, the best 5 assignments (out of 6) will only be considered.

- If an assignment has to be cancelled for any reason, the remaining assignment weights will be prorated (scaled) to add up to the total of assignments worth.

- When calculating a student quizzes grade average, the best 7 quizzes (out of 8) will only be considered.

- If a quiz has to be cancelled for any reason, the remaining quiz weights will be prorated (scaled) to add up to the total of quizzes worth.

- When calculating a student labs grade average, the best 6 labs (out of 7) will only be considered.

- If a lab has to be cancelled for any reason, the remaining lab weights will be prorated (scaled) to add up to the total of labs worth.

- To be eligible to receive a passing grade in the course, your total marks on the two midterm tests and the final exam must be at least 50%.

- To be eligible to receive a grade of C (60%) or higher (i.e., to be eligible for Honors Programs), your total marks on the two midterm tests and the final exam must be at least 60%.

R: Course Delivery and Assessment with Respect to the COVID-19 Pandemic

Although the intent is for this course to be delivered in-person to the extent possible, the changing COVID-19 landscape may necessitate some or all of the course to be delivered online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience), as deemed most appropriate by the instructor. The grading scheme will not change. Any assessments affected will be conducted online as determined by the course instructor.

When deemed necessary, tests and examinations in this course will be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledging that you will be required to provide personal information (including some biometric data) and that the session will be recorded. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at: https://remoteproctoring.uwo.ca.

Course Absences due to Daily COVID Screening Questionnaire
Missed assessments (e.g., presentations, essays, quizzes, tests, midterms, etc.) require formal academic considerations (typically self-reported absences and/or academic counselling). See https://www.uwo.ca/sci/counselling/procedures/academic_consideration_for_absences/index.html and Section T: Academic Accommodation for Student Absence

Students should be aware that some learning outcomes cannot be easily made up and may need to be completed in a subsequent year.

Students who demonstrate a pattern of routinely missing coursework due to self-reported COVID symptoms, and therefore do not demonstrate mastery of the learning outcomes of the course, will not receive credit for the course.

S: Accommodation Policies

Students with disabilities work with Accessible Education--formerly SSD-- (http://academicsupport.uwo.ca/accessible_education/index.html), which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The accommodation policy can be found here: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic%20Accommodation_disabilities.pdf

In this course, both midterm tests and the final exam are timed, as shown in *Section P: Midterm Tests and Final Exam*. If you are a student with a disability and require extra time accommodation, please ensure your accommodations are active on the Accommodated Exams website https://studentservices.uwo.ca/Accommodatedexamssignup/ for this course at least 10 days prior to the assessment for which you require accommodation. Recommended accommodations posted there **on time** will be applied to your assessment.

T: Academic Accommodation for Student Absence

Students will have up to two (2) opportunities during the regular academic year to use an online portal to self-report an absence during the term. The duration of the self-reported absence is a maximum of 48 hours. Students can request that the period covered include Yesterday and Today, or Today and Tomorrow. Absences start at midnight (12:00 a.m.) on the first requested day and end at 11:59 p.m. the following day. The assessment for which consideration is being sought is worth 30% or less of the student's final grade.

Once a student has an approved self-reported absence, and their assignment/lab/quiz due date falls within the self-reported absence period, this due date will be extended by 24 hours without penalty.

Students are not able to use the self-reporting option in the following circumstances:

- for exams scheduled by the Office of the Registrar (e.g., December and April exams)
- absence of a duration greater than 48 hours,
- assessments worth more than 30% of the student's final grade,
- if a student has already used the self-reporting portal twice during the academic year

If the conditions for a self-reported absence are not met, students will need to provide a Student Medical Certificate if the absence is medical, or provide appropriate documentation if there are compassionate grounds for the absence in question. Students are encouraged to contact their Faculty academic counselling office to obtain more information about the relevant documentation. Students should also note that individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds or for other reasons. **All documentation required for absences that are not covered by the self-reported absence policy must be submitted to the Academic Counselling office of a student's Home Faculty.**

For further information, please see
https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_illness.pdf.

A student requiring academic accommodation due to illness should use the Student Medical Certificate when visiting an off-campus medical facility or request a Record's Release Form (located in the Dean's office) for visits to Student Health Services. The form can be found here:
http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf.

U: Religious Accommodation

Students should consult the University's list of recognized religious holidays, and should give reasonable notice in writing, prior to the holiday, to the Instructor and an Academic Counsellor if their course requirements will be affected by a religious observance. Additional information is given in the Western Multicultural Calendar at
https://www.uwo.ca/equity/doc/multicultural_calendar_supplement.pdf.

V: Tutoring

The role of tutoring is to help students understand the course material. Tutors should **not** write assignments or tests for the students who hire them. Submitting an assignment that contains material written by a tutor is an academic offense.

Having employed the same tutor as another student is not a legitimate defense against an accusation of collusion, should two students hand in assignments judged similar beyond the possibility of coincidence.

The Computer Science Department does not have or maintain any tutoring list.

W: Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on add/drop courses, academic considerations for absences, appeals, exam conflicts, and many other academic-related matters: https://www.uwo.ca/sci/counselling/

Learning-skills counsellors at the Student Development Centre (http://www.sdc.uwo.ca) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: https://www.uwo.ca/se/digital/

Students who are in emotional/mental distress should refer to Mental Health at Western (http://www.uwo.ca/uwocom/mentalhealth) for a complete list of options about how to obtain help.

Students may refer to http://westernusc.ca/your-services for services provided by the USC.

Students may refer to http://www.registrar.uwo.ca for the Registrarial Services.