

Computer Science 2211b  
**Software Tools and Systems Programming**  
Course Outline – Winter 2024

## Course Information

### Lecture Schedule

Day	Time	Location
Tuesdays	09:30 – 10:30	University College 3110
Thursdays	09:30 – 11:30	University College 3110

### Lab Schedule

Section	Day	Time	Location
002	Tuesdays	15:30 – 16:30	Middlesex College 244
003	Thursdays	16:30 – 17:30	Middlesex College 244
004	Thursdays	15:30 – 16:30	Middlesex College 244
005	Thursdays	17:30 – 18:30	Middlesex College 244
006	Tuesdays	16:30 – 17:30	Middlesex College 244
007	Tuesdays	17:30 – 18:30	Middlesex College 244

### Prerequisites

#### Either

- Computer Science 1027A/B, Computer Science 1037A/B, or the former Computer Science 2101A/B, in each case with a mark of at least 65%

#### or

- Integrated Science 1001X with at least 60%

**Note:** Unless you have either the requisites for this course or written special permission from your Dean's Designate (Department/Program Counsellors and Science Academic Counselling) 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.

## Instructor Information

Jeff Shantz

Western Science Centre 140

jeff.shantz@uwo.ca

x83553

Office Hours: TBA. Conducted via Zoom, by appointment only (arranged at least one day prior)

## Course Communication

To manage the volume of communication between students and the instructional team, we will use **OWL forums and messaging** as per the policy set out below.

- **Questions about course content and processes relevant to the whole class**
  - Must be directed to the **OWL forums** so that others can benefit from the responses
  - Please check the forums prior to posting
  - Do **NOT** post any code or assignment answers in the OWL forums
  - Students may choose to post anonymously, if desired. This hides your identity from other students, but not from the instructional team
  - **Examples:** general assignment clarifications and questions, questions about midterm content, etc.
- **Questions about individual concerns**
  - Must be sent via OWL message to members of the instructional team
  - Sending to the **Teaching Assistant Role** contacts the TAs
    - Questions about assignment marks should be directed **first** to the TA who marked them. If you are still unsatisfied, your TA will discuss the matter with the instructor
  - Sending to the **Instructor Role** contacts your instructor
  - **Examples:** assignment questions including code or answers, questions about marks received, etc.
- **Course-related communication not sent via OWL will not receive a response**
  - You can set up OWL messaging to be relayed to your Western email, if you prefer

## Course Syllabus, Schedule, Delivery Mode

### Calendar Description

An introduction to software tools and systems programming. Topics include understanding how programs execute (compilation, linking and loading); an introduction to a complex operating system (UNIX); scripting languages; the C programming language; system calls; memory management; libraries; multi-component program organization and builds; version control; debuggers and profilers.

### Course Topics

The course will address as many of the following topics as time will allow:

- **UNIX Fundamentals:** UNIX vs. Windows; logging on; files and directories; path names, and directory and file structure; editors; shells; I/O redirection; UNIX concurrency (processes); utilities; file permissions and security; regular expressions; shell programming.

- **C programming:** compiling, linking and loading; data types and operators; control structures; formatted I/O; file I/O; connections between I/O and the underlying operating system; function calls; structs; enumerations; arrays; pointers (pointer arithmetic, pointers and arrays, arrays of pointers, pointers to functions); memory management; linked lists and other dynamically allocated data structures; strings; calling C from UNIX; general libraries; standard libraries and headers; the C preprocessor; C program organization.
- **UNIX Tools:** building and managing multi-component programs; the make utility; version control and configuration management; debuggers; code performance and profiling.

## Delivery Mode

Lectures will be delivered in person.

## Key Sessional Dates

<b>Classes Begin</b>	January 8, 2024
<b>Spring Reading Week</b>	February 17, 2024 to February 25, 2024
<b>Midterm</b>	March 07, 2024
<b>Classes End</b>	April 08, 2024
<b>Exam Period</b>	April 11, 2024 to April 30, 2024

## Contingency Plan

Although the intent is for this course to be delivered in person, should any university-declared emergency require some or all of the course to be delivered online, either synchronously or asynchronously, the course will adapt accordingly. The grading scheme will **not** change. Any assessments affected will be conducted online as determined by the course instructor.

## Course Materials

### Required Textbooks

- S. Das, Your UNIX/Linux: The Ultimate Guide. McGraw-Hill: 3rd edition, 2013.
- K.N. King, C Programming: A Modern Approach. Norton: 2nd edition, 2008.

### Course Web Site

Students are responsible for checking the course OWL site (<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.

All course material will be posted to OWL at <http://owl.uwo.ca>.

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

## Lecture Notes

Most of the course notes will be available online through the course OWL web site. Students are cautioned, however, that simply reading lecture notes is not a sufficient substitute for attending lectures.

Lecture notes will be posted, at the latest, **after each lecture**. We do not guarantee that lecture notes will be posted in advance.

## Technical Requirements

Completion of this course will require you to have a reliable internet connection and a device that meets the [system requirements for Zoom](#).

## Course Consulting

Questions concerning assignments or lecture materials should be directed to the instructional staff as detailed above in the **Course Communication** section.

Member of the instructional staff (the instructor and all TAs) will each hold 1 hour of weekly office hours via Zoom throughout the course. The instructor's hours will consist of 5 weekly 12-minute private sessions (10 minutes for consulting, 2 minutes for changeover). Students must sign up for these sessions in advance and they are offered on a first-come, first-served basis. TA hours will be accessible to all and will not require sign-up.

More information on the weekly consulting schedule and a sign-up form for the instructor's weekly hour will be posted on OWL.

## Computing Facilities

An account for each student will be created on the Computer Science undergraduate network, known as GAUL. In using their GAUL accounts, students agree to abide by the Department's [Rules of Ethical Conduct](#).

If students require assistance with their GAUL accounts, they can [open a ticket](#) with Science Technology Services.

## Email Contact

All course-related communication should be directed either to the OWL forums or via OWL messaging, as set out in the **Course Communication** section.

## Online Conduct

Any remote learning sessions (lectures, consulting hours, etc.) conducted in this course may be recorded. The data captured during these recordings may include your image, voice recordings, chat logs and personal identifiers (e.g., name displayed on the screen). The recordings will be used for educational purposes related to this course, including evaluations. The recordings may be disclosed

to other individuals participating in the course for their private or group study purposes. Please contact the instructor if you have any concerns related to session recordings.

All Zoom contact will require that your video is turned on and that you can be seen by the instructor. Not only is this a simple, professional courtesy and the standard of Zoom classes, but it allows for a more positive interaction.

## Methods of Evaluation

Three components – labs, assignments, and exams – will be used for evaluation in this course. The overall course grade will be calculated as listed below:

Element	Weight
10 (out of 12) Labs	10%
5 Assignments	30%
Midterm Exam	25%
Final Exam	35%

To obtain a passing mark in the course, the weighted average of the midterm and final exam marks must be at least 45%, and weighted average of the assignment marks must be at least 45%. There will be no exceptions or waiving of this requirement for any reason or circumstance.

By the end of the term, no accommodation will be granted for either of the following cases:

- **Missed more than two of the last four assignments for any reason**
  - e.g., if, for any reason, three of the last four assignments are missed, then the student should retake the course
- **Missed all the exams for any reason**
  - e.g., if, for any reason, the midterm exam, the final exam, and the makeup final exam are all missed, then the student should retake the course

## Labs

- There will be 12 equal-weight labs (1 per week)
- Labs begin the first week of classes
- Lab descriptions will be posted on the course web site by Sunday evening each week
- You are encouraged to work on the labs ahead of time
  - Normally, content covered in the labs will have been introduced already in the lectures
  - The instructor reserves the right to post additional notes or readings that students will be expected to complete before attempting a lab. These additional materials may provide supplemental information or introduce concepts not covered in class

- To be eligible for full marks, you must participate in and complete **at least 10 out of 12 labs**
  - However, **participating in and completing all 12 labs is recommended**
- Labs do not need to be handed in, as they are not an assessment of your ability to apply the subject matter – that is the focus of the assignments
- Labs act as practice/tutorial sessions where you can solve problems and interact with the TA and other students
  - **Please feel free to collaborate with and assist others in the labs**
- **You will need to demonstrate your work to the TA**
  - The TA will mark your lab participation as complete or incomplete in OWL
- In the event that the University requires delivery to be online, all labs will be conducted via Zoom

## Examinations

There will be a midterm exam worth 25% and a final exam worth 35%.

The midterm exam will be tentatively scheduled on Thursday March 7 from 10:30AM - 12:20 PM. The location for the midterm will be announced on the course web site. Every effort will be made to have midterm exam marked within two weeks of the exam date.

The Final exam will be held in the April final examination period, as scheduled by the Office of the Registrar.

Both exams are closed book; however, students will be allowed to bring in one double-sided, 8.5" x 11" sheet of handwritten notes. No electronic devices of any kind are allowed.

- There will be no makeup midterm exam. If you miss the midterm exam for any reason, follow the [procedure for academic consideration](#)
- If accommodation is approved by your Dean's Office, your final exam mark will be reweighted to include the weight of the midterm exam. You must notify the course instructor within a week of the missed midterm exam, and documentation must be received by your Dean's Office within 2 weeks of the missed exam
- If you miss the final exam, please see the University policy outlined in the **Academic Considerations for Student Absences** section of [this page](#)
- If you miss both the final exam and the special exam, but not the midterm exam, you may get approval to take the final exam when the course is next offered

## Assignments

Students are expected to study the lecture materials and complete the lab exercises to prepare for the assignments. Once an assignment is completed, all parts of the assignment must be submitted to the student's Git repository per the submission instructions provided on the course web site. It

is the student's responsibility to ensure that all parts of each assignment are correctly uploaded and submitted via Git, to ensure that the assignment can be marked accordingly.

**Note:** Assignments emailed to the instructor or teaching assistants, or submitted via OWL, **will not be accepted** unless there are extenuating circumstances and prior approval from the instructor. Students will practice with Git in the labs and will submit a test submission. Consequently, a failure to understand how to use Git will not be accepted as a valid reason for a late or unsubmitted assignment.

The following is the tentative assignment schedule (subject to change):

Assignment	Weight	Due Date (by 11:55 PM)
1	1%	Friday January 19, 2024
2	7%	Friday February 02, 2024
3	7%	Friday February 16, 2024
4	7%	Friday March 15, 2024
5	8%	Friday April 05, 2024

The due dates of the assignments are shown in the table above. Please note that all dates are tentative. The due dates will be confirmed when the assignments are posted on OWL. The dates will coincide with the class progression on subsequent topics.

Where possible, the instructions for each assignment will be posted on the course web site at least 1 week in advance of the due date.

If, for any reason, the assignment schedule given above cannot be adhered to, the assignment marks will be pro-rated. The five (5) assignments are worth 30% of the overall mark for the course. If an assignment must be cancelled for any reason, the remaining assignment weights will be prorated to add up to 30%.

**All assignment are individual assignments.** Students may discuss approaches to assignment problems. However, actual work (answering assignment questions, coding assignment questions, etc.) must be the student's individual effort.

Assignments must be typed. We do not accept handwritten assignments. However, where an assignment asks for a written description in PDF format, it is acceptable to insert scanned, handwritten figures and diagrams as needed to aid in your discussion. However, all text and formulae must be typed.

**All code written for assignments must be able to run on compute.gaul.csd.uwo.ca**, the compute server provided by the Department for undergraduate use. This is the only platform on which we will test your programs.

The standard departmental penalty for assignments that are judged to be the result of academic dishonesty is described on the [Scholastic Offenses page](#).

You are responsible for reading and abiding by the Computer Science Department's policy on [Scholastic Offences](#) and [Rules of Ethical Conduct](#).

## Assignment Submission Policies

All assignments are submitted electronically via a private Git repository that will be provided to you. Instructions for the submission of assignments will be posted on the course web site. It is each student's responsibility to read and follow the instructions. Note that assignments are **not considered submitted** – even if code has been pushed to a student's repository – until the commit that represents the student's final submission has been properly tagged and the tag has been pushed to the student's repository, per the assignment submission instructions.

All assignments are due by 11:55PM of the due date. Late assignments will be accepted, **with penalty**, for up to two days after the due date. After that, the late work is no longer accepted and will not be marked, regardless of whether the student submits the work to their Git repository.

The late penalty in percentage of the total mark of the assignment is:

- 10% for one day late
- 25% for two days late

**Lateness is based on the time the assignment is received by the Git submission system**, not on the time it was created on the student's own computer or GAUL account, and not on the time indicated in the Git commit log.

If you have submitted an academic consideration for an assignment, you must submit a **CS 2211 Assignment Academic Consideration Form** along with your assignment submission for penalty reduction. Please see **Exceptions to the Deadline and Late Policy** below for more information.

By submitting an assignment, you declare that:

- You have read and understood the Departmental policies on Scholastic Offences
- The assignment is exclusively your own work
- You have complied with the Departmental Rules of Ethical Conduct
- You have taken all reasonable precautions to ensure that your work has not been copied by other students, including the protection of your files from access by other students

## Assignment Marking

- Assignments will be marked by a TA within two weeks of the assignment due date, where possible
- Individual marks and a detailed marking scheme will be posted once all marks are returned
- Questions regarding the marking of assignments should first be directed to the teaching assistant that graded your assignment. If your discussion with the teaching assistant was not satisfactory, then the TA will discuss the situation with the instructor



- Requests for mark adjustments will only be considered if they are made within **1 week** of receiving the assignment mark and have been first discussed with the teaching assistant who marked the assignment. **Assignment marks will be final after that date**
- Requests for mark adjustments will only be considered when they are for adjustments of **5 marks or greater**

### Late Policy for Assignments

It is expected that students budget enough time to properly submit their assignments via Git and allow for any unforeseen technological issues. **11:55 PM is a hard deadline** and no extensions or relief will be given for assignments that just miss this deadline or miss the deadline due to technological issues. Students are expected to regularly back up their assignments and submit well before any deadline. Indeed, this is the purpose of a version control system such as Git, and students are encouraged to commit and push their code to their Git repositories often.

The late penalty for assignments:

- Assignments will be accepted only up to two (2) days late
- Assignments submitted after 11:55 PM on the due date but before 11:55 PM on the day after the posted due date will be **deducted 10% of the total grade**
- Assignments submitted after 11:55 PM on the day after the due date but before 11:55 PM on the next day will be **deducted 25% of the total grade**
- Assignments submitted after 11:55 PM two days after the posted assignment due date will receive a **grade of zero (0)**
- Late assignments will have a penalty of 10% or 25% of the maximum mark for the assignment deducted based on time of submission as recorded by our Git submission system. Thus, if a student would have received 90% on an assignment based on 100%, then if it was submitted three hours late the student would receive 80%; if it was submitted twenty-five hours late, the student would receive 65%

### Exceptions to the Deadline and Late Policy

**No extensions will be given for assignments** except in the event of serious medical or compassionate grounds. A student must follow the procedure for **Academic Accommodation for Medical Illness** as given in this document.

- If your submitted academic consideration for an assignment is approved, an extension will be given according to the **number of days approved** by academic counsellors
- The policy of the course is that you must provide documentation in the CS 2211 Assignment Academic Consideration Form, downloadable from the course web site, when you submit your assignment for penalty reduction

- The documentation to provide will be the document or email from Student Services allowing the extension. The TA grading the assignment will then apply the approved extension to the grade
- If the extension is within five days, you do not need to contact the instructor and we will not reply to any such inquiry
- If the extension is more than five days, contact the instructor through his office hours to arrange an appropriate deferred due date

## **Student Absences**

If you are unable to meet a course requirement due to illness or other serious circumstances, please follow the procedures below.

### **Assessments worth less than 10% of the overall course grade**

- For labs, since we only require 10 out of 12 lab marks, there is no accommodation for the first two missed labs
- After the first two, follow the same procedure for the assessments worth 10% or more. In this case, you should complete the missed lab by yourself in written form and then present it with the accommodation document to your lab TA in the first lab after the approved days of accommodation
- For all assignments, follow the same procedure for the assessments worth 10% or more

### **Assessments worth 10% or more of the overall course grade**

By policy, academic considerations for work totalling 10% or more of the final course grade can be granted only by the student's Faculty of Registration (typically by their academic counsellors).

For work totalling 10% or more of the final course grade, you must provide valid medical or supporting documentation to the Academic Counselling Office of your Faculty of Registration as soon as possible. For further information, please consult the University's medical illness policy at

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/academic\\_consideration.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration.pdf)

The Student Medical Certificate is available at

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/medicalform.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf)

## **Absences from Final Examinations**

If you miss the final exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able to do so. They will assess your eligibility to write the Special Examination (the name given by the University to a makeup final exam).

You may also be eligible to write the Special Exam if you are in a “Multiple Exam Situation” (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period).

If a student fails to write a scheduled Special Examination, the date of the next Special Examination (if granted) normally will be the scheduled date for the final exam the next time this course is offered. The maximum course load for that term will be reduced by the credit of the course(s) for which the final examination has been deferred. See the Academic Calendar for details (under *Special Examinations*).

**Note:** missed work can *only* be excused through one of the mechanisms above. Being asked not to attend an in-person course requirement due to potential COVID-19 symptoms is **not** sufficient on its own.

## Accommodation and Accessibility

### Religious Accommodation

When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at

<https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>

### Accommodation Policies

Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/Academic\\_Accommodation\\_disabilities.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf)

## Academic Policies

The web site for Registrarial Services is <http://www.registrar.uwo.ca>.

In accordance with policy,

[https://www.uwo.ca/univsec/pdf/policies\\_procedures/section1/mapp113.pdf](https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf),

the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at their official university address is attended to in a timely manner.

No electronic devices will be permitted in exams, except those approved by Examination Services for those taking accommodated exams.

**Scholastic offences** are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_undergrad.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf)

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and [Turnitin.com](https://www.turnitin.com).

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

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 acknowledge that you will be required to provide **personal information** (including some biometric data) and 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 web site at:

<https://remoteproctoring.uwo.ca>

## Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters:

<https://www.uwo.ca/sci/counselling/>

Students who are in emotional/mental distress should refer to Mental Health@Western (<https://uwo.ca/health/>) for a complete list of options about how to obtain help.

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at

[https://www.uwo.ca/health/student\\_support/survivor\\_support/get-help.html](https://www.uwo.ca/health/student_support/survivor_support/get-help.html)

To connect with a case manager or set up an appointment, please contact [support@uwo.ca](mailto:support@uwo.ca).

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Accessible Education at

[http://academicsupport.uwo.ca/accessible\\_education/index.html](http://academicsupport.uwo.ca/accessible_education/index.html)

if you have any questions regarding accommodations.

Learning-skills counsellors at the Student Development Centre (<https://learning.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 web site to manage your academics and well-being: <https://www.uwo.ca/se/digital/>.

Additional student-run support services are offered by the USC: <https://westernusc.ca/services/>.