

Computer Graphics 1 (CS3388B) Course Outline Winter 2025 Term

1. Course Information

Course Information

The viewing pipeline; clipping and visibility problems. The graphical kernel system; picture generation and user interfaces. This course uses OpenGL as the graphics environment. The programming language to interface with it should be C/C++ or Python. But, C/C++ will be the language of choice for examples, and is encouraged for use by the students. Unity and Unreal use C# and C++ as their scripting language, respectively.

1. Introduction
 - A review of linear algebra
 - Raster Displays, Pixels
 - Overview of graphics libraries and paradigms
 - Window Systems
2. “2D” Graphics
 - Drawing Basic Shapes and Pictures
 - Plots
 - Viewports and Clipping
 - Lerps and Tweens
 - Curves and Splines
3. 3D Graphics
 - 3D transforms
 - Projective Geometry
 - Model View Projection
 - Polygon Meshes
 - Rendering Pipeline
4. Emerging Technologies (Subject to Change)
 - Unreal Engine or Unity Engine 101 (Exact Engine TBA)
 - Shading Models
 - Programmable Rendering Pipeline
 - Physical-Based Rendering
 - Ray Tracing
 - Vulkan
 - Neural Radiance Fields (NERFs).
 - Graphics for VR, AR, XR 101

List of Prerequisites

Prerequisites: Computer Science 2211A/B or (Software Engineering 2203A/B, Software Engineering 2205A/B and Software Engineering 2250A/B); and one of Mathematics 1600A/B, Numerical and Mathematical Methods 1411A/B or the former Applied Mathematics 1411A/B.

Unless you have either the 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.

2. Instructor Information

Instructors	Email	Office	Office Hours
Dr. Brent Davis	Bdavis56@uwo.ca	████████	By appointment

Students must use their Western (@uwo.ca) email addresses when contacting their instructors. For course content and assignment help, students should first contact their TA.

Teaching Assistants this year are to be announced. Students will be assigned a TA based on an alphabetical ordering. Office hours will be announced in the first or second week of class.

3. Course Syllabus, Schedule, Delivery Mode

Mondays 7:00PM – 10:00PM, ██████████

Classes begin: January 6, 2025

Fall Reading Week: February 15 – 23, 2025

Classes end: April 4, 2025

Exam period: April 7 – 30, 2025

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.

4. Course Materials

All course material will be posted to OWL: <https://westernu.brightspace.com/>

Students are responsible for checking the course OWL site (<https://westernu.brightspace.com/>) regularly for news and updates. This is the primary method by which information will be disseminated to all students in the class.

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

There is no required textbook for this course. However, suggested readings will be given from *Computer Graphics using OpenGL*, 3rd Edition, 2007, by F.S. Hill, Jr. and Stephen M. Kelley; and *Computer Graphics: Principles and Practice*, 3rd Edition, 2014, by John F. Hughes et al. Other academic papers and tutorials will be discussed as assigned during the course.

Technical Requirements

Students will require a stable internet connection to access course content. A computer which is capable of running the programs in class will be required; modern laptops will have no issues. Students believing their hardware to be insufficient should with the instructor in the first week of class. Students will be given the choice of python or c++ for the programming / OpenGL assignments; it is highly recommended that students use c++, but both are accepted. Students with “Apple Silicon” macs may have issues with some versions of OpenGL, and are encouraged to discuss with the instructor or TAs.

5. Methods of Evaluation

Assignments		62%
1	January 17	4%
2	February 1	8%
3	February 24	10%
4		10%
5	March 6	15%
6	March 19	15%
	April 2	15%
Problem Sets	Ongoing	8%
Midterm Quizzes	February 10	15%
	March 31	15%

Assignments

- Assignments are to be submitted electronically to OWL. See the OWL website.
- Assignments are due at 23:55 on the due date. Late assignments will be handled as follows.
First 48 hours after stated due date, no late penalty. At 23:56, two days after the stated deadline, 15% per day, up to a maximum of 45%, after which the assignment will be given a zero. Weekends count as one day of time.
- Plagiarism is unacceptable. It is reasonable to assume that students discuss assignments and possible solutions, however all assignments shall be independent. Similarity of code generated by generative techniques **will** be pursued as plagiarism; code should be written in the student's style such that it is distinct from any reference materials.
- Any concerns with assignment marking must be addressed *within one week* of the assessment being returned. No adjustments will be made after this time.

Problem Sets

- There are 10 problem sets to be given throughout the semester. They are good preparation for the quizzes! In addition, they will be assessed on a pass/fail basis. Problem sets which would get a mark of more than 60% will be given a mark of '1' and below will be given a mark of '0', for a total possible of 8 marks.
- Students should submit their solutions to the problem sets electronically to OWL
- Problem sets are due on the Friday (at 23:55) of the week in which they are given.
- Late submission of problem sets *will not be accepted* (solutions are posted on following Monday)
- The 8 best problem sets will be used to calculate the Problem Set portion of the student's final mark. Thus, a student may miss 2 problem sets throughout the semester without penalty. No communication with the instructor is required for the first two missed problem sets. If more than two are missed, please communicate with the professor to determine an accommodation.

Midterm Quizzes

- The quizzes will occur **in-class** during lecture.
- Quiz format will be discussed in class.
- If you miss a quiz, please contact the Academic Advising office of your Faculty of Registration as soon as you are able to do so. If your academic consideration is approved, the weight of the quiz will be moved to the other quiz. There are no makeups. This course component is designated as always needing documentation.
- Missing both quizzes will be handled on a case-by-case basis.

Student Absences

General information about missed coursework

Students must familiarize themselves with the University Policy on Academic Consideration – Undergraduate Students in First Entry Programs posted on the Academic Calendar: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf,

This policy does not apply to requests for Academic Consideration submitted for attempted or completed work, whether online or in person.

The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult Accessible Education.

For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar's webpage: https://registrar.uwo.ca/academics/academic_considerations/

All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline.

All Academic Consideration requests normally must include supporting documentation; however, recognizing that formal documentation may not be available in some extenuating circumstances, the policy allows students to make one Academic Consideration request without supporting documentation in this course. However, the following assessments are excluded from this, and therefore always require formal supporting documentation:

- Examinations scheduled during official examination periods (Defined by policy)
- Midterm Quizzes

When a student mistakenly submits their one allowed Academic Consideration request without supporting documentation for the assessments listed above or those in the Coursework with Assessment Flexibility section below, the request cannot be recalled and reapplied. This privilege is forfeited.

When a student misses the Final Exam and their Academic Consideration has been granted, they will be allowed to write the Special Examination (the name given by the University to a makeup Final Exam). See the Academic Calendar for details (under Special Examinations), especially for those who miss multiple final exams within one examination period.

Coursework with Assessment Flexibility

By policy, instructors may deny Academic Consideration requests for the following assessments with built-in flexibility:

- Problem sets (8 out of 10 count toward final grade)
- Assignments (48-hour No-Late-Penalty Period)

6. Additional Statements

Religious Accommodation

When conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request an accommodation for their absence in writing to the course instructor and/or the Academic Advising office of their Faculty of Registration. This notice should be made as early as possible but not later than two weeks prior to the writing or the examination (or one week prior to the writing of the test).

Please visit the Diversity Calendars posted on our university's EDID website for the recognized religious holidays: <https://www.edi.uwo.ca>.

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.

Mental Health

Mental and emotional well-being is highly important and should not be treated lightly. Students who are in emotional/mental distress should refer to Health and Wellness at Western for a complete list of options about how to obtain help. Students in immediate distress should contact Student Health Services, Campus Police, or Psychological Services whose contact information can be found [here](#).

7. Academic Policies

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

In accordance with policy,

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.

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:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

8. Support Services

Please visit the Science & Basic Medical Sciences Academic Advising 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. To connect with a case manager or set up an appointment, please contact 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 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 website 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/>.