COMP 3501
Fall 2026

Instructor: David Mould	**Office Location:** 5346 Herzberg
Email: mould@scs.carleton.ca	**Class Location:** See Carleton Central
Office Hours: Monday 4:30-5:30	**Class Time:** MW 6:00-7:30pm

Course Calendar Description

Foundations of Game Programming and Computer Graphics
The theory and practice of 3D graphics for computer games. Topics include: vectors and quaternions; hierarchical transformations; camera and perspective; hardware-accelerated real-time rendering; texture and texture mapping; illumination; and particle systems. Additional topics may include rigid-body motion, character animation, shadows, and screen-space special effects. Prerequisite(s): COMP 2402 and (COMP 2404 or SYSC 3010 or SYSC 3110).

Topics Covered and Learning Outcomes

Topics to be Covered:

- Mathematical foundations: vectors, dot and cross product, quaternions, Cartesian and polar coordinate systems
- Matrix transformations: translation, rotation, scale, orbit, hierarchical transformations, perspective transformations
- Geometry and texture: mesh representations, texture coordinates, bump and normal mapping
- Illumination: diffuse, specular, ambient shading
- Elementary graphics algorithms: visibility, interpolation, intersection
- Graphics Hardware: graphics pipeline, rasterization, pixel and vertex shaders
- Special effects: particle systems, screen-space shaders, shadows

Important dates and deadlines can be found here: link, including class suspension for fall, winter breaks, and statutory holidays.

Schedule and Assessments

Important Dates
First day of class: Sept 9
Midterm date: Nov 4
Project deadline: Dec 11
Final exam date: TBA, scheduled centrally during the exam period.

Grade Breakdown

- Assignments 20% (approximately 7, weekly with some gaps)
- Midterm exam 20%
- Course project 20%
- Final exam 40%

Beyond the grade calculation given above, students must achieve a raw score of 35% or greater on the final exam (i.e., excluding bonus questions) in order to pass the course.

Late and Missed Work Policies

Late Work
Beyond a brief grace period, late work will receive a deduction of 10 percentage points per day up to three days (-30%). Work submitted more than three days late will receive a score of zero.

Missed Work
Short-term (<= 5 days): You are expected to begin work on each assignment when it is released, and to upload your progress periodically; in the event that you miss the formal deadline, late submissions are possible as described above. Accordingly, short-term accommodation for assignments is generally not available.
In the event that you miss the midterm for reasons outside your control, you can complete the academic considerations form to request accommodation:
https://carleton.ca/registrar/academic-consideration-coursework-form/.

Long-term (> 5 days):
Unavoidable longer-term absences from the course are rare, and a blanket policy cannot consider the relevant details. In the unhappy event that you experience an unavoidable disruption to your studies exceeding 5 days in duration, email your instructor to discuss potential accommodation.

Learning Materials and other Course/Lab Resources

Students are not required to purchase textbooks or other learning materials for this course. You may benefit from purchasing additional resources and textbooks; I particularly recommend Morgan McGuire's *Graphics Codex*, available at graphicscodex.com.

Undergraduate Academic Advisors
The Undergraduate Advisors for the School of Computer Science are available in Room 5302HP; or by email at scs.ug.advisor@cunet.carleton.ca. The undergraduate advisors can assist with information about prerequisites and preclusions, course substitutions/equivalencies, understanding your

academic audit and the remaining requirements for graduation. The undergraduate advisors will also refer students to appropriate resources such as the Science Student Success Centre, Learning Support Services and Writing Tutorial Services.

SCS Computer Laboratory
Students taking a COMP course can access the SCS computer labs. The lab schedule and location can be found at: https://carleton.ca/scs/tech-support/computer-laboratories/. All SCS computer lab and technical support information can be found at: https://carleton.ca/scs/tech-support/. Technical support staff may be contacted in-person or virtually, see this page for details: https://carleton.ca/scs/tech-support/contact-it-support/.

Academic Accommodations and Regulations

Carleton is committed to providing academic accessibility for all individuals. You may need special arrangements to meet your academic obligations during the term. The accommodation request processes are outlined on the Academic Accommodations website (https://students.carleton.ca/course-outline/).

Statement on ChatGPT/Generative AI usage

The assignments in this course are designed to be completed individually and without the use of AI assistance. Heavy reliance on AI-generated code will likely prevent you from achieving the assignments' learning goals . Nonetheless, use of AI is not prohibited; you can use AI to help you write code, subject to the following caveats;

- Your entire submission, including any AI-generated code, is subject to the regular code quality requirements, including thorough commenting and justification of design decisions.
- Your use of AI must be documented, including submitting a transcript of all sessions which resulted in code that you included in your submissions.
- Instructors and TAs will not assist in explaining or debugging AI-generated code.
- The assignments are intended to help you practice the material, and substantially bypassing this goal with AI assistance will result in weaker skill acquisition than doing them manually.

On device use during exams
All exams are expected to be completed individually, and without electronic aid; any communication or access of electronic devices (e.g. cellphones) during the test will be considered cheating. Use of Smart Glasses (or other similar assistive technologies) before or during a test is strictly prohibited and is considered an academic integrity violation. Even if you have prescription glasses with assistive technologies, you will not be allowed to use them during the test, so please make sure that you have acceptable prescription glasses. The proctor has the right to ask to inspect your glasses before or during the test. In addition, unless authorized with PMC accommodations, you are NOT allowed to use headphones nor ear buds during a test. Also, during a test, if you choose to wear a baseball cap, sunglasses or anything else that would prevent a proctor from monitoring where your eyes are focused during the test, you will likely be asked by a proctor to move to a different seat. You must submit your exam before leaving the examination site.

Statement on Academic Integrity

Misconduct in scholarly activity will not be tolerated and will result in consequences as outlined in Carleton University's Academic Integrity Policy (see here). A list of standard sanctions in the Faculty of Science can be found here. Additional details about this process can be found on the Faculty of Science Academic Integrity website. Students are expected to familiarize themselves with and abide by Carleton University's Academic Integrity Policy.

Student Rights and Responsibilities

Students are expected to act responsibly and engage respectfully with other students and members of the Carleton and the broader community. See the 7 Rights and Responsibilities Policy for details regarding the expectations of non-academic behaviour of students. Those who participate with another student in the commission of an infraction of this Policy will also be held liable for their actions.

Student Concerns

If you have any concerns regarding this course, your first point of contact is me. Please email me or visit office hours, and I will do my best to address your concerns. If I cannot resolve the issue, the next point of contact is the School of Computer Science at studentconcerns@scs.carleton.ca. If the concern remains unresolved, the final point of contact is the Office of the Dean of Science at ODScience@carleton.ca. Please follow this order of contact. Note: You can also bring your concerns to Ombuds services.