

Carleton University
School of Computer Science
COMP 2501: Computer Game Design and Development
Winter 2022
Course Outline

Instructor Information

Instructor: Oliver van Kaick
E-mail: Oliver.vanKaick@carleton.ca

Course Delivery

Online Blended Section: lectures will be delivered live during class time and will include non-graded student participation and Q&A sessions. Attendance is recommended but not mandatory. Recordings of the lectures will be made available in Brightspace after class. Assignments and exams will be submitted through Brightspace. Tutorials will be synchronous. Students are required to attend the tutorial section in which they are registered.

Class Information

Notes and references in Brightspace: <https://brightspace.carleton.ca/d2l/home/56764>.

Class Times: Tuesdays and Thursdays, 11:35am – 12:55pm.

Classroom: the link to the Zoom meeting can be found in Brightspace.

Discord channel: the link to the Discord channel can be found in Brightspace.

Student hours: information on student hours can be found in Brightspace.

Course Description

Introduction to the practical development of computer games. The course covers a variety of mathematical concepts, algorithms, and software technologies relevant for the creation of 2D games.

Topics Covered

- Game architecture: MVC design pattern, game object management
- Mathematical foundations: vector operations, coordinate systems, and transformations
- Introduction to hardware-accelerated real-time rendering: geometry and shaders
- Introduction to OpenGL
- Physical simulation and collision detection
- Game AI and path planning

Learning Outcomes

At the end of this course, students will be able to:

- Summarize the main components necessary for the development of a computer game based on 2D graphics and physical simulation.
- Explain the principles behind the fundamental techniques used for the creation of 2D games (the topics listed above), discussing the mathematical operations and algorithms involved in these techniques.
- Identify the most suitable techniques to create specific features in a 2D computer game.
- Implement a basic 2D game in C++ with OpenGL graphics and auxiliary libraries.

Resources

We do not have an assigned textbook for the course. I recommend using *Sanjay Madhav's Game Programming: Algorithms and Techniques* as a reference for reviewing the different topics covered in the lectures. For the assignments and the course project, we will be programming in C++ and using a set of libraries that build on **OpenGL**. For detailed questions on programming with OpenGL, there are a wealth of books, websites, and online tutorials that provide information; a few recommendations are provided in the Brightspace page. You are free to make use of art assets found online provided that their license allows you to freely use the assets and you credit the source.

Evaluation

Grading scheme:

Tutorial attendance: 5%, every week.

Assignments: 30%, approximately every two weeks.

Midterm: 10%, around February.

Course project: 15%, due at the end of classes.

Final exam: 40%, scheduled centrally.

Note that you need to obtain a passing grade on the midterm + final to pass the course.

Late Assignments Policy

Assignment deadlines are strict. The following scheme is applied to late submissions (which includes assignments and the final course project):

- 3 hours late: no penalty
- 3 to 12 hours late: -10%
- 12 to 24 hours late: -20%
- More than one day late: assignment receives a grade of zero

CS Undergraduate Academic Advisor

The undergraduate advisor for the School of Computer Science is available in Room 5302C HP, by telephone at 520-2600, ext. 4364 or by email at undergraduate_advisor@scs.carleton.ca. The advisor can assist with information about prerequisites and preclusions, course substitutions/equivalencies, understanding your academic audit and the remaining requirements for graduation. The undergraduate advisor will also refer students to appropriate resources such as the Science Student Success Centre, Learning Support Services and the Writing Tutorial Services.

Centre for Student Academic Support (CSAS)

The Centre for Student Academic Support (CSAS) is a centralized collection of learning support services designed to help students achieve their goals and improve their learning both inside and outside the classroom. CSAS offers academic assistance with course content, academic writing and skills development. Visit CSAS on the 4th floor of MacOdrum Library or online at: carleton.ca/csas.

University Policies

Student Academic Integrity Policy

Every student should be familiar with the Carleton University student academic integrity policy. A student found in violation of academic integrity standards may be awarded penalties which range from a reprimand to receiving a grade of F in the course or even being expelled from the program or University. Some examples of offences are: plagiarism and unauthorized co-operation or collaboration. Information on this policy may be found in the Undergraduate Calendar.

Plagiarism

As defined by Senate, "plagiarism is presenting, whether intentional or not, the ideas, expression of ideas or work of others as one's own". Such reported offences will be reviewed by the office of the Dean of Science.

Unauthorized Co-operation or Collaboration

Senate policy states that "to ensure fairness and equity in assessment of term work, students shall not co-operate or collaborate in the completion of an academic assignment, in whole or in part, when the instructor has indicated that the assignment is to be completed on an individual basis". Please refer to the course outline statement or the instructor concerning this issue.

Requests for Academic Accommodation

You may need special arrangements to meet your academic obligations during the term. For an accommodation request, the processes are as follows:

Pregnancy Obligation

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more

details, visit the Equity Services website: carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

Religious Obligation

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website: carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

Academic Accommodations for Students with Disabilities

If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or pmc@carleton.ca for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made. carleton.ca/pmc

Survivors of Sexual Violence

As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and its survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: carleton.ca/sexual-violence-support

Accommodation for Student Activities

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. <https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf>

For more information on academic accommodation, please contact the departmental administrator or visit: students.carleton.ca/course-outline

Preliminary course outline subject to change; last updated on Thu Dec 16 2021.