Modern Computer Games
COMP 521
McGill University, Fall 2021

Course Details

Time: Tuesday, Thursday, 11:35–12:55
Place: LEA 219
Instructor: Professor Clark Verbrugge
Office: Online only via Zoom: https://mcgill.zoom.us/j/91418326588
Office hours: Wednesdays 14:00–15:30, Fridays 10:00–11:30, or by appointment.
Email: clump@cs.mcgill.ca
Teaching Assistants: TBA

Course Delivery

• Lectures: The current plan is for this course to be delivered in-person. Lectures will be recorded for those who cannot attend.

• Office hours: All office hours will be virtual, conducted through zoom.

• Exam: The exam is expected to be in-person, as a typical 3hr exam.

Please wear masks and distance as advised, and get vaccinated! If you feel in the least bit ill, whether from covid or anything else, please do not come to lectures. Some lectures may be virtual as deemed necessary for health and safety, and the nature of the exam or other aspects of the evaluation may change if advisable due to pandemic conditions, following university and faculty guidelines.

Email, Website

McGill’s MyCourses will be used for course announcements, to manage assignments and for online discussions. Students are expected to monitor their McGill email account for course-related news and information. The external course website is: http://www.sable.mcgill.ca/~clump/comp521

Pre-requisites

• COMP 251 (Algorithms and Data Structures)

• MATH 223 (Linear Algebra)

• COMP 303 (Programming Techniques) or COMP 361 (Systems Development Project)

• Ability to program.

I do assume students have all pre-requisites. Please consult the instructor if you unsure of your background.
Textbook

There is no required text for this course. Notes you take during lectures will be your primary resource. The following supplemental texts are useful references for some of the core concepts.

- Christer Ericson. “Real-time collision detection.”

Additional texts that may also be useful:

- Georgios N. Yannakakis, Julian Togelius. “Artificial Intelligence and Games.” (online, free)

Description

This course will introduce students to the core concepts and algorithms in modern computer game design. It covers a wide spectrum of game aspects, focusing on components essential to or common in popular computer game styles. Concepts are backed up by non-trivial programming tasks that allow students to gain practical experience in particular components of game implementation.

Note that computer graphics will not be covered in detail, and 3D graphics will not be covered at all. A limited knowledge of basic graphics methods and techniques will be presumed.

Evaluation

4 Assignments: 60%
Exam: 40%

Note that passing the exam (50% or better) is a necessary (but not sufficient) condition for receiving an overall course grade of C or better.

In accord with McGill University’s Charter of Students’ Rights, students in this course have the right to submit in English or in French any written work that is to be graded.

Assignment and Exam Policy: Assignments must be submitted on time. Late assignments will only be accepted in highly-exceptional circumstances and only with written permission of the instructor. No assignment submissions will be accepted after marked assignments have been returned, or after solutions have been discussed in class.

McGill University values academic integrity. Therefore all students must understand the meaning and consequences of cheating, plagiarism and other academic offenses under the Code of Student Conduct and Disciplinary Procedures (see http://www.mcgill.ca/integrity/ for more information).

More specifically, work submitted for this course must represent your own efforts. Copying assignments or tests (whether from classmates or other sources), or allowing others to copy your work, will not be tolerated.
Course Content

This page shows an approximate lecture plan. Note that lecture topics may (almost certainly will) shift dates.

Sept 2, 7, 9
- Introduction to games.
- Game genres.
- Fun.
- Player demographics and social requirements.
- Storytelling, narrative modelling and analysis.

Sept 14, 16
- Abstract terrains.
- Realistic terrains.

Sept 21, 23, 28
- Game physics.
- Collision detection.
- Collision resolution.

Sep 30, Oct 5, 7
- Basic Pathfinding.

Oct (7), 19, 21
- Geometry issues.
- Advanced pathfinding

Oct 26, 28, Nov 2
- More geometry.
- Visibility.

Nov 4, 9
- Reactive AI.
- NPCs.

Nov 11, 16
- Planning systems in depth.

Nov 18, 23
- Procedural content generation.
- Game balance, player modelling and adaptation.

Nov 25, 30, Dec 2
- Multiplayer games.
- Consistency, dead-reckoning, timing.
- Massively multiplayer games: persistence, scalability.
- Cheating.