ACADEMIC YEAR: 2021-2022

Course Number COMP376	**Course Title** Introduction to Game Development	
Instructor		
Kaustubha Mendhurwar	**Lecture Sessions** Thu 17:45-20:15 in FGB060 Appointment via email	**Email** kaustubha.mendhurwar@concordia.ca **Office** ER1101 **Office Hours** Thu: 16:40-17:40
Teaching Assistant 1. Daniel Rinaldi ta.danielrinaldi@gmail.com		

Schedule

A-X	-T-----	15:40 to 17:30	Lab	Daniel Rinaldi	H-831
B-X	-T-----	20:30 to 22:20	Lab	Daniel Rinaldi	H-831
C-X	---J---	15:40 to 17:30	Lab	Daniel Rinaldi	H-831
D-X	----F--	20:30 to 22:20	Lab	Daniel Rinaldi	H-831

Please consult the room numbers at the link below in case of any change:
https://www.concordia.ca/ginacody/students/course-schedules/fall-2020-2021.html

COURSE PREREQUISITES

COMP 371

PRIMARY TEXT (RECOMMENDED; NOT REQUIRED)

Creating Games: Mechanics, Content, and Technology by Morgan McGuire and Odest Chadwicke Jenkins, AK Peters/CRC Press, 2008, ISBN-10: 1568813058. Available as an eText from www.vitalsource.com

Optional Reading Material for Programming Assignments and Project:

- ✓ *"Fundamentals of Game Design"* 3/e by Ernest Adams. 2013, ISBN-10: 0321929675
- ✓ *"Beginning 3D Game Development with Unity 4: All-in-one, multi-platform game development "* 2/e by Sue Blackman, 2013, ISBN-10: 1430248998
- ✓ *"Game Development with Unity"* by Michelle Menard, 2011, ISBN-10: 1435456580
- ✓ *"Unity 4.X Game Development by Example"* by Ryan Creighton, 2013, ISBN-10: 1849695261

Additions Links (tutorials, programming, etc.) may be added as the course progresses.

COURSE WEBSITE:

Please click on "My Moodle Courses" from the MyConcordia portal and then click on COMP-376-2212-XX course link. The website will host ALL documents related to this course and for all course related activities. You MUST visit this web site regularly.

Electronic Submission: For this course only electronic submissions will be accepted. You have to upload these into the course website through Moodle. Hard copies will be neither accepted nor evaluated. In case of difficulty in electronic submission (e.g., Moodle has a size limit for submissions), please contact the instructor.

COURSE CALENDAR DESCRIPTION

COMP 376 ***Introduction to Game Development*** (4 credits)
Introduction to design and implementation aspects of computer gaming: basic game design, storytelling and narratives, and game genres. Virtual environments, 2D & 3D game engines, as well as game development tools. Character development, gameplay strategies, level design in games, and user interfaces. Architecture of game consoles, analog and digital controllers, and the incorporation of graphics, sound, and music in game implementations.
Lectures: two and half hours per week. Laboratory: two hours per week.

COURSE DESCRIPTION

Game development is a multi-disciplinary activity. This 4-credit course establishes the Computer Science foundations of game development. It assumes that the students already have a background in basic 3D graphics programming. By participating in this course students will be introduced to the following development aspects of Computer/ Video Games:

Basic game design	Algorithms, and probability
Game worlds and mechanics	Gameplay and balancing
Game development process	3D modeling and rendering in games
2D and 3D game programming	User interfaces.

LEARNING OUTCOMES

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

- Effectively execute the design, implement, and testing development cycle for Computer Games.
- Propose, design, and develop a computer game as part of the development team.
- Implement a variety of types of computer games using the Unity game engine.
- Constructively critique, in writing, the game designs of other development teams.
- Build games that are "fun" using gameplay concepts such as difficulty levels, balance, and fairness.
- Document the game development process using a Game Design Document.

TEACHING METHOD

The course comprises of weekly lectures and practical training; both in the form of labs and individual assignments. The topic of game design is covered using the Game Creator's Odyssey, online course material developed by Ubisoft and Knowledge-One. On

successful completion of this online course, each student will get a certificate from Ubisoft. All the other topics will be covered by the instructor. ***It is emphasized that the participation in lectures and labs is mandatory for learning and performing well in this course.***

LABS

During the lab time, lab instructors will be available to help you with programming, in particular, with Unity. During lab, you will also be demonstrating your programming assignments (A2 and A3). Moreover, material on critical aspects of game programming will be presented, using sample programs, in the lab. It is strongly recommended that you attend all the labs. Labs begin on the second week of classes.

Bonus marks: Based on the material presented in labs, you may have an opportunity to complete some specific programming tasks based on this material which you will then submit on Moodle. These will be marked by the lab instructor and will count as bonus marks (up to a total of 5% of course mark) toward your final course mark (they will not count toward your individual component mark).

BACKGROUND KNOWLEDGE AND TECHNOLOGY:

The course assumes knowledge of the basic concepts of computer graphics and also some experience in 3D graphics programming, say, using OpenGL programming.

The software/game engine that you will use is Unity and C#. Students are expected to acquire the skills of using Unity and C# as needed. Students will use this software framework to create games in C#. Lab sessions conducted by the Lab instructor will be devoted to learning and practicing the skills of using Unity and C#.

STRUCTURE:

This is a "**learn-by-doing**" course. There are a set of lectures by the instructor covering game development fundamentals. The GCO game design component must be completed online in the first 5 weeks. In parallel there will be several short sessions for introducing Unity & C# programming. The main "doing" includes the following:

1. One game development proposal for the most recent video game which you have played several times. This is to be done individually and forms assignment 1 (A1).
2. Develop one 2D game assigned by the instructor. This forms assignment 2 (A2).
3. Develop and design one 3D game assigned by the instructor. Game development MUST make use of GCO game design patterns. This forms assignment 3 (A3).
4. One complete game from idea to implementation which is to be developed by a team of 4-6 students to run on a desktop or a device of your choice. Game development MUST make use of GCO game design patterns. This game is to be demonstrated to instructor and lab instructors. This project will comprise of a design, develop, prototype, test, document cycle.

GCO COURSE STRUCTURE

Ubisoft's Rational Game Design course is divided into 6 chapters, 16 missions, 5 design practices, 1 final activity, and 1 final exam.

In each chapter, you will have to complete trials and final challenges in order to gain XP (Experience Points). The XP will allow you to unlock your next missions, as well as earn keys. The keys will allow you to unlock different types of rewards: Mini-Games and Expert Videos.

Earning XP will also allow you to level up in the Leaderboard. Students who reach the top of the Leaderboard will also be viewed as a reference to the other students. It is part of your responsibility to help and answer questions from your fellow game creators in the Q2A (Question to Answer) portion of your Odyssey.

As you progress through this course, you will discover the epic story of Nagato, a Shinobi Warrior. Just like him, you will practice your skills and challenge your knowledge to progress through the first part of the Odyssey. The story of our hero will evolve along with your own learning journey.

GCO COURSE OBJECTIVES

Upon completion of this course, you will be able to:

- ✓ Adopt rational game design to create fun and innovative games
- ✓ Improve productivity from conception to production
- ✓ Use your gained knowledge of rational game design and create your very own game concept
- ✓ Share a common vocabulary with their community of practice
- ✓ Learn to define design principles and terminologies currently used by Ubisoft's developers
- ✓ Share new ideas and explore different design methods
- ✓ Realize the importance to communicate your ideas with your game development community by giving them measurable values

GCO COURSE CERTIFICATE

In order to complete the Rational Game Design course and get your completion certificate, you will have to complete the following requirements:

- ✓ Obtain a minimum of 12000 XP
- ✓ Complete your final exam with a grade of 60% or more
- ✓ Complete your final activity

ASSIGNMENTS A2 AND A3:

Both assignments must be developed using Unity and C#. They are to be developed **individually** by the student for running on the desktop, or a device of your choice, and demonstrated in the lab to the Lab Instructor for your assigned section. Development of A3 MUST make use of GCO game design patterns. If you do not demo your assignment to your Lab instructor, you will not get a mark for that assignment. Submission must include complete source code and all other digital assets required to compile and create an executable game. You will be asked to make a small modification on the spot in order to demonstrate that you wrote your code on your own, *etc.*, as part of the assignment demo.

Late submissions:

You may submit your assignments up to three days late with a flat penalty of 20%.

TEAM PROJECT:

The main purpose of the group project is to develop a computer game of reasonable size and complexity as a **team** effort, using the design perspectives as well as techniques discussed in this course. This project is designed to give you experience in:

- the stages of the game development process (with in-class deliverables).
- various issues in game design.
- issues and trade-offs in game implementation.

You have the freedom to explore the game development process in a manner that best suits your own background and interests. Consequently, it is up to you to decide:

- the genre of game you wish to create.
- gameplay which your game should have.
- distinguishing features your game should include, *etc.*

The project game will be developed using Unity. Game design must follow the GCO guidelines and make use of GCO game design patterns. Lab instructors' assistance will be available for Unity. Also, it is mandatory to submit the complete project artifacts, including all source files and other game assets (your game has to compile and be executable by the instructor and/or lab instructor, using Unity, before a final grade will be assigned). During final project evaluation, teams will be asked to make minor changes to the game.

As your game development progresses, your team has to make three presentations (P1, P2, P3). P1 and P2 are made in class to the instructor, lab instructor(s) and the rest of the class. You need to submit your P1 and P2 presentations to the instructor immediately after your presentation. P3 consists of a demonstration of your final delivered project and will take place in the lab during the final week of term.

In addition, each student will be assigned the task of critiquing the game development carried out by two other teams (these two teams will be assigned to you by the instructor). Written critiques have to be submitted for each of the two games. The first two critiques are due about a week after the first team presentation and the second two (on the same projects) are due about a week after the second presentation. Hence participation in class during the presentations by various teams is mandatory.

The overall mark breakdown for the team project: 6 marks for proposal/progress presentations, and 29 marks for game design, implementation, and game design documentation. A more detailed breakdown will be posted on the course webpage.

Peer evaluation will used as part of the marking of the team project. More details will be posted on course webpage. Start forming your teams as soon as possible during the first week.

BORROWING CODE:

Using referenced resources from Internet (or elsewhere) is permitted. It should not however form a substantial part of your submission or your project documentation/ implementation.

COMPUTING FACILITIES:

You have access to the multi-core desktops in the Gaming Labs, H-831. All these PCs have MS Windows, Visual Studio and Unity Pro 5 software (the free version of Unity is sufficient for assignments and project).

GRADING SCHEME

There is no final examination; there is a quiz and a team project. Evaluation is based on student carrying out the tasks listed below. Assignments must be demonstrated in the lab, and projects have to be presented in class and demonstrated in the lab.

Components	%
Assignments (x3)	34% (A1: 4%; A2: 15%; A3: 15%)
GCO Certificate	10%
Quiz	15%
Team Project	35%
Written Critiques	6%

Requirements to get a passing grade: you must obtain passing marks for all the ***components*** (assignments, quiz, and written critiques) and for the ***overall*** course mark. You must obtain the Ubisoft certificate (https://training.gamecreatorodyssey.com/) for GCO in order to pass this course.

Note: Please note that there is no linear relationship between total points scored and the final letter grades given in this course, except that the letter grade allotted to a higher score will not result in a grade lower than that that allotted to one with a lower score.

GRADUATE ATTRIBUTES:

This course emphasizes and helps develop CEAB (Canadian Engineering Accreditation Board) graduate attributes of *design, use of engineering tools*, *individual and team work,* and *a knowledge base for engineering*. Graduate attributes used by the Canadian Information Processing Society (CIPS) Computer Science Accreditation Council (CSAC) are consistent with the CEAB attributes. The attributes relevant for this course are defined by CEAB as follows:

> **Design:** An ability to design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, economic, environmental, cultural and societal considerations.
>
> **Use of engineering tools:** An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations.
>
> **Individual and team work:** An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting.
>
> **A knowledge base for engineering:** Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.

Through lectures and more specifically your game design project, both design and team work attributes are emphasized and developed by activities of game development, project presentations and written critiques. Use of engineering tools is emphasized and developed through instruction on Unity game engine as well as the game programming assignments and project.

COURSE SCHEDULE

The list below provides a summary of the material that will be covered in this course as well as a tentative schedule. Tutorials will support the topics covered in the lectures and will provide hands-on exercises.

Class #	Game development concepts	Game programming technology	Deliverables / Notes
Sept 09	Key Components and Processes in Game Development + GCO and Course overview		
Sept 16	Idea to Game: Main issues and Game critiquing + Introduction to Unity	GCO Act I: Chapter 1	4 favorite games / **Form Teams**
Sept 23	Game design and game technology overview + 2D in Unity	GCO Act I: Chapter 2	Assignment 1; DNE Deadline
Sept 30	Strategic Game Playing and Probability Techniques + Advanced 2D in Unity	GCO Act I: Chapter 3	
Oct 07	Team game project proposal presentations (P1) + GCO Act I: Chapter 4		Team Proposal
Oct 14	Game worlds and aesthetics, and Level Design + 3D in Unity	GCO Act I: Chapters5&6	Assignment 2; 2 Critiques
Oct 21	Game balancing and mechanics; Playtesting	Advanced 3D in Unity	GCO Final Quiz
Oct 28	User Input and basic AI		
Nov 04	Team game project progress presentations (P2) – must include a working prototype		"Working" Game Design Document
Nov 11	3D modeling and rendering	Game Improvements in Unity	Assignment 3, 2 Critiques; DISC deadline
Nov 18	Physics		
Nov 25	Quiz (in class)		
Dec 02	Final Project Presentations (P3), Demos/Evaluations (in lab) during class/lab times (see online schedule that will be put up)		Team Project Deliverables

Please note: In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.

Plagiarism: The most common offense under the Academic Code of Conduct is plagiarism which the Code defines as **"the presentation of the work of another person as one's own or without proper acknowledgement."**

This could be Material copied word for word from books, journals, internet sites, course notes, etc.

- Material that is paraphrased but closely resembles the original source.
- Work of a fellow student, e.g., an answer on a quiz, data for a lab report, or
- Assignment completed by another student.
- A solution or a code purchased through one of the many available sources.

Plagiarism does not refer to words alone - it can also refer to copying images, graphs, tables, and ideas. "Presentation" is not limited to written work. It also includes oral presentations, computer assignments and artistic works. Finally, if you translate the work of another person into French or English and do not cite the source, this is also plagiarism.

Simple Words: ***Do not copy, paraphrase or translate anything from anywhere without saying where you obtained it!***
(Source: The Academic Integrity
Website:http://provost.concordia.ca/academicintegrity/plagiarism/)

Conditions Specific to Remote Teaching and Assessment

1. All students are expected to have access to a computer with

   a. reliable internet connection

   b. camera (optional) and microphone (your computer and/or cellphone)

2. All students should install VPN for remote desktop access to Concordia University computer labs https://www.concordia.ca/it/support/connect-from-home.html

   Once you have VPN connection to Concordia University, you can access to all available software in Gina Cody School labs by following the process described in: https://www.concordia.ca/ginacody/aits/support/faq/connect-from-home.html

3. Course specific software: You should install the Unity software. Details on installation process will be available on the course Moodle web site.

4. All students are required to do online, timed exam

   a. Exams will be done through Moodle

   b. The exams will take place during the lecture time period on dates that will be announced on Moodle at least a week in advance.

   c. You will be responsible for ensuring appropriate, properly functioning technology (webcam (optional), a microphone, appropriate browser and an ability to download any necessary software, as well as a reliable internet connection with a minimum of a 3G connection).

d. You will need a quiet place within which to take the exam. Earplugs or noise-cancelling headphones that are not connected to a device may also be used to allow you to focus for the duration of the exam.

e. Course instructor reserves the right to conduct an individual oral examination to verify student's response to online exam questions

5. Academic Integrity

Violation of the Academic Code of Conduct in any form will be severely dealt with. This includes copying (even with modifications) of program segments. You must demonstrate independent thought through your submitted work. The Academic Code of Conduct of Concordia University is available at:
https://www.concordia.ca/conduct/academic-integrity.html

It is expected that during class discussions, in the online forums and in your written assignments you will communicate constructively and respectfully. Sexist, racist, homophobic, ageist, and ablest expressions will not be tolerated.

All students must read and sign the Expectations of Originality form and submit the signed copy with their projects and assignments.