9/13/21[1]

Animations for Computer Games
COMP 477/6311
Fall 2021
Course Outline and Administration

1. HYBRID TEACHING

This course will be taught in a hybrid fashion alternating in-class lectures and video lectures. A schedule is provided below. In-class lectures are not mandatory.

2. TEACHING TEAM AND LOCATION

- Instructor: Prof. Tiberiu Popa, TBA, tiberiu.popa@concordia.ca https://users.encs.concordia.ca/~stpopa/
- TA: Maksym Perepichka
- Class schedule: Mon, Wed 13:15-14:30 , Room: MB S1.115 SGW
- Lab schedule: Mon, Wed 14:45-16:35, Room: H827 (lab H813 is also assigned to this course for independent work)
- Office hours during the online lectures slots[2] (https://concordia-ca.zoom.us/j/84477283909 Meeting ID: 844 7728 3909 Passcode: 602617
- Course Web: moodle
- Course Forum: discord **(please use your real name on discord, no aliases)**
- Link to the undergraduate calendar: https://www.encs.concordia.ca/resources/schedules/courses/details/?ys=20132&d=05&c=COMP477

3. COMMUNICATION

Moodle will be used to upload teaching materials such as lecture slides, assignments, etc. Discord will be used for the day-to-day communication: announcements, questions, etc. e-mail the instructor for access. I am also available for questions during in-class lectures, virtual lectures, and office hours. **All Discord users must use their real names (i.e. no aliases).**

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[1] This document might change throughout the term, please check moodle periodically and download the latest version.

[2] 1:15-1:45pm by appointment; 1:45-2:30pm is first come first serve

4. COURSE DESCRIPTION

This is a course designed to familiarize the students with the state-of-the-art techniques and algorithms use in modern game development. Topics include principles of traditional animation, production pipeline, animation hardware and software, orientation representation and interpolation, modeling physical and articulated objects, forward and inverse kinematics, face animation, motion control and capture, key-frame animation, procedural animation, camera animation.

5. COURSE LEARNING OBJECTIVES

1. Gain a solid knowledge-base of commonly used techniques needed to generate graphics for games, building on the techniques developed in previous graphics courses that you have taken.
2. Learn how to use existing state of the art tools in computer animation and game deign.
3. Learn how to design, develop, and test new computer animation components and tools based on state-of-the-art animation methods.
4. Learn how to work in a team and use computing resources to deliver a large-scale project in a timely manner.
5. Learn to prepare demonstration of as well as present your work effectively.

6. TEXTBOOK

ISBN: 9780124158429
Title: COMPUTER ANIMATION
Author: RICK PARENT
Imprint: ELSEVIER
Edition: 3
Req/Opt: Optional

7. GRADUATE ATTRIBUTES

As part of either the Computer Science or Software Engineering program curriculum, the content of this course includes material and exercises related to the teaching and evaluation of graduate attributes. Graduate attributes are skills that have been identified by the Canadian Engineering Accreditation Board (CEAB) and the Canadian Information Processing Society (CIPS) as being central to the formation of Engineers, computer scientists and information technology professionals. As such, the accreditation criteria for the Software Engineering and Computer Science programs dictate that graduate attributes are taught and evaluated as part of the courses. The following is the list of

graduate attributes covered in this course, along with a description of how these attributes are incorporated in the course.

- Attribute 1: Knowledge base

  Knowledge of the algorithms, data structures, and techniques used in modeling and animation. Topics include principles of traditional 2D animation, principles of 3D animation, production pipeline, animation hardware and software, orientation representation and interpolation, modelling physical and articulated objects, forward and inverse kinematics, motion control and capture, key-frame, procedural, and behavioural animation, free-form deformation and physics based animation.

- Attribute 4: Design

  Design and compose computer animation components involving many aspects such as stated in the course description.

- Attribute 5: Use of engineering tools

  Use of appropriate tools, languages, and libraries for the development of key frame animation and an animation related project.

- Attribute 6: Individual and Teamwork

  Work as a team in the development of computer animation software

- Attribute 7: Communication skills

  Deliver the final project as an oral presentation

8. PREREQUISITE KNOWLEDGE

You should be familiar with[3]:

- Linear algebra
- Calculus
- Basic multivariate calculus
- Basic physics
- Graphics pipeline
- C/C++

[3] Note that this course is heavy in math and physics as well as programming. If you do not think that you have the appropriate background, check with the instructor.

9. EVALUATION

You are given the choice of one of 2 evaluation tracks: A) Assignment track or B) Project track.

A) Assignment track

Component	**Percentage of the grade**
Three programming assignments (12% each)	36
In class exams (x22%)	44
State of the Art Analysis (SOAA)	20
Participation (bonus)	3

B) Project track

Component	**Percentage of the grade**
Project	50
In class exams (x15%)	30
State of the Art Analysis (SOAA)	20
Participation (bonus)	3

You need to have a passing grade in each component except the course participation. A passing grade in this course is 60%.

You need to send an e-mail to the instructor selecting your track before **September 17th, 23:59**. By default you will be assigned to the assignment track.

Note that there is no a priori range between the percentage grade and the final letter grade.

10. INTELLECTUAL PROPERTY

Your project is yours to do whatever you want with. However, you must allow the coordinator access to all project materials for the purpose of grading.

11. CHEATING/PLAGIARISM

Please be aware that cheating is the biggest academic offense, and it has very serious consequences. Please comply with the university policy and ask your instructor when in doubt. Please note that all work with the exception of the project is individual and no external material is allowed (i.e. external code, library, etc.). For the project you must document very precisely what you took from external sources (i.e. code or libraries) and clearly highlight your contribution.

12. TENTATIVE SCHEDULE

Week 1 Sept 8th	Please watch the SCA2021 keynote by Jessica Hodgings. **Conference registration is free.** **https://computeranimation.org/**	Online No labs **Register and attend SCA2021!!!!!**	
Week 2 Sept 13th	Course administration. Intro. Topics. Project info.	Regular class Video lectures 1* A3 released	
Week 2 Sept 15th	Physics based animation. Time integration. Springs.	Regular class Video lectures 5* Must decide your track by Sept 17th	
Week 3 Sept 20st	Fluid Simulation.	Online Video lectures 6* DNE deadline	
Week 3 Sept 22st		Regular class	
Week 4 Sept 27th	Cloth animation.	Online Video lectures 7*	
Week 4 Sept 29th		Regular class	
Week 5 Oct 4th	Rigid bodies	Online Video lectures 8* Video lectures 9* A3 due No labs.	
Week 5 Oct 6th	Exam recap	Regular class. No labs.	
Week 6 Oct 11th	Thanksgiving. No Lectures.	No Labs.	
Week 6 Oct 13th	In-class exam 1	Regular class No labs Note the room changes for the exam only: H 537, H 540 Should really start working on SOAA	
Week 7 Oct 18th	Rigid bodies	Regular class Labs: A3 demos	
Week 7 Oct 20th	Collision detection Contact handling	Online Labs: A3 demos	

Week 8 Oct 25th		No labs	
Week 8 Oct 27st	Keyframe animation. Articulated motion. Hierarchical Transformations. Forward kinematics.	Online Video lectures 2* Video lectures 4.1* A1 released SOAA due.	
Week 9 Nov 1st			
Week 9 Nov 3rd	Rotations. Quaternions	Video lectures 4.2*, 4.3*, 4.4* Online A2 released	
Week 10 Nov 8th		DISC Deadline	
Week 10 Nov 10th	Skinning. Inverse Kinematics	Online Video lectures 3*	
Week 11 Nov 15th			
Week 11 Nov 17th	Exam recap	A1 due No labs	
Week 12 Nov 22th	In-class exam 2	Note the room changes for the exam only: H 1070 Labs: A1 demos	
Week 12 Nov 24th	Performance Capture (MOCAP) Motion Retargeting	Online Video lectures 10* Labs: A1 demos	
Week 13 Nov 29th		A2 Due All outstanding course deliverables must be received by Monday November 29th, 23:59 No labs.	
Week 13 Dec 1st	Performance Capture (Facial animation) Game animation control (Motion Matching)	Labs: A1-3 demos	
Week 14 Dec 6th	Project demos.	Labs: A1-3 demos	
Week 14 Dec 7th	Project demos. (this is a make-up class for Thanksgiving)	No labs	

Notes:

- The topics in the empty rows are the same as the row above them.
- The schedule might change on short notice; therefore it is your responsibility to periodically check for the latest version of the outline.
- This semester the assignments are out of order: A3 comes first, followed by A1 and A2.

13. COVID-19 CONTINGENCY

We have been asked to have a contingency plan in case there will be another lockdown. If we must pivot to completely online teaching, here are the changes to this course:

- In-class lectures will change to virtual lectures over zoom
- The class will not have online exams, so if we cannot have in person exams for whatever reason, the grades from the exam will be distributed proportionally to the other components
- You will likely not have access to the lab remotely, so you must make sure that you can run the codebase of the assignments or the code for the project on your personal computer

Please check the discord server for announcements and contact me directly if you have questions or concerns.

14. ACADEMIC STRESS?

Concordia University provides services to cope with academic stress:
https://www.concordia.ca/students/counselling.html

Note that the DISC deadline is November 8th – you can always drop the course by this date with virtual no academic consequence.

If the need arises the instructor will also work with you to discuss how to better manage academically the course.