

A lot of changes for 427!

- ***Waitlist overbooking***
 - *To ease your planning and team forming*
 - *Expected to go down to about 80 students (from 115)*
- ***Fewer assignments***
- ***Peer evaluation***
- ***New game themes!***

CPSC 427

Video Game Programming

Instructor:
Helge Rhodin

Previous readings
& WT2 section:
Alla Sheffer



Helge Rhodin

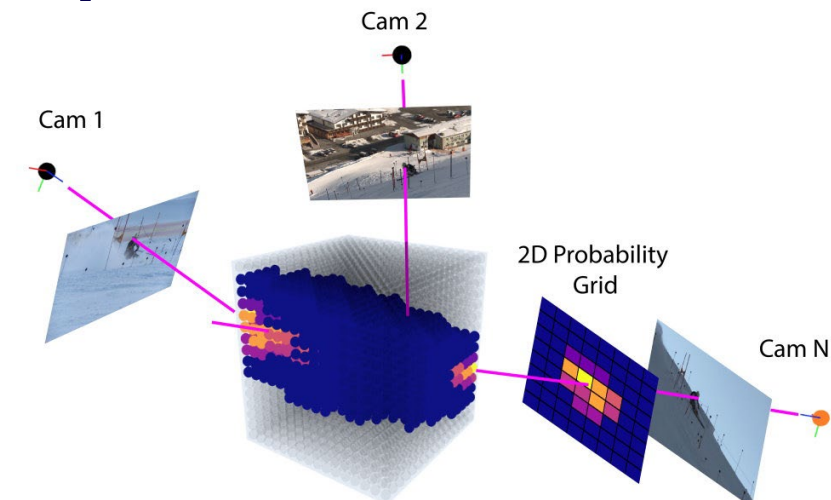
<https://www.cs.ubc.ca/~rhodin/>

- BSc and MSc at Saarland Univ., Germany
- PhD at the Max Planck Institute for Informatics
- Lecturer and postdoc at EPFL, Switzerland
- At UBC since Sep'19

Computer Graphics



Computer Vision



Course Staff

Instructor:

- Helge Rhodin
 - *Office hours: Tuesday 3-4 pm in ICCS X653 (or zoom room)*
 - *Email: rhodin@cs.ubc.ca (use Piazza for technical topics)*

TAs:

- Floria Gu, Suzuran Takikawa, Luis
 - *Contact via Slack*
 - *Office hours*
 - Suzuran: Thursdays 1:30 - 2:30 pm in ICCS X337
 - Floria: Wednesdays 1:30 - 2:30 pm in ICCS X337

What is This Course About?

- ***Basic Elements of Game Programming***

- Content

- *Graphics: Modeling, Rendering, Animation*
- *Gameplay: Situational response, User experience*
- ...

- Implementation

- *Game software design*
- *Writing and debugging **efficient & robust** (runtime/memory) code*

- Project management/Teamwork

- *Support software/Best practices*

What is This Course About?

! Writing your own game start to finish !

- Learning through experience
 - *Programming*
 - *Teamwork*
 - *User experience (UX)*

Topics NOT Covered:

Interesting but no time:

- Game design
 - *Storytelling*
 - *Game style/look*
- Deep dive into graphics, AI, UI, game engines ...
- Asset creation tools

Prerequisites

CS:

- CPSC 221

MATH:

- one of MATH 200, MATH 217, MATH 226, MATH 253
- one of MATH 152, MATH 221, MATH 223

Strong math & programming background is encouraged

No prior graphics knowledge assumed

Web Resources

- Course Page:
www.cs.ubc.ca/~rhodin/2023_2024_CPSC_427/
Read & know all the course info + policies
- Piazza discussion forum
 - *Please use for all technical questions;*
 - Use **private mode** for questions to course staff that require **posting code**
 - **Use private mode or email for personal issues**
- Slack
 - *For non-technical TA and team communication*



Mechanical TA (MTA)

Web app

<https://mta.students.cs.ubc.ca/>

enrollment code: bd4a2b0d

- Polls in class
- Participation counter (virtual raise hand)
- Peer evaluation



CPSC427WT1

In today's class, you have gained 0 + 0 bonus participations points so far.

<input type="button" value="Hand up in the Green list"/>	<input type="button" value="Hand down in the Green list"/>
<input type="button" value="Hand up in the Blue list"/>	<input type="button" value="Hand down in the Blue list"/>
<input type="button" value="Hand up in the Red list"/>	<input type="button" value="Hand down in the Red list"/>
<input type="button" value="Hand up in the Yellow list"/>	<input type="button" value="Hand down in the Yellow list"/>

Test poll - Game theme

A) Non violent games, for 'kids'

B) Randomness and surprise!

C) Time counts, 10 seconds!

Course Project: Video Game

- 2D Game
- Basic template provided (**very** basic)
- Mandatory spec requirements (details in milestone documentation)
 - *Shaders, 2D transformations, basic animation & gameplay, user experience validation (testing), efficient time/memory management*
- Combined with advanced features selected from multiple options (details in milestone documentation)
- Written in teams of 6 (in exceptional cases 5 or 7, e.g., uneven number admitted from waitlist)
- Bi-weekly milestones, dates specified on calendar
 - *Completed games demoed to peers/expert jury*

Cross Play Sessions

- Test / play the games of other teams
- In person, during tutorial slot
 - *attendance mandatory*
- Every team must provide three machines on which the game runs

Course Format

Course Hours:

- Lecture: Mo. 3 – 5 pm; Wed. 3 – 4 pm
 - *Some asynchronous content*
- Tutorial:
 - *Wed. 4-5 (first three weeks replaced by lecture)*
 - *Face2Face grading in later weeks*

Course Format – Lectures & Tutorials

Format:

- Lectures:
 - *Regular lectures by instructor*
 - *Guest lectures by industry speakers*
 - *Team progress report meetings (one per milestone)*
 - *Cross-play sessions (starting from milestone 2)*
- Tutorials:
 - *Team meetings with TAs*
 - *Face-to-Face milestone marking (Overflow during Office Hours)*
 - **All** team members must be present for marking

Course Format – Interactive sessions

Progress report meetings

- *One per milestone (the week after submission)*
- *Reports from each team (2min) on*
 - *Progress, achievements & challenges*
- *Quick feedback round*

Cross-play sessions for milestones 2, 3, 4

- *One per milestone (week after each milestone)*
- *Collect playability feedback*
- *Feedback impacts bonus component of grade*

Course Format

Tutorials

- *Each team expected to meet with a TA once a week*
 - Schedule TBD
 - Optional during marking weeks
- *Face-to-face marking*
 - Schedule TBD
 - During tutorials/office-hours
- *Mapping of teams to tutors TBD*

***Contact TAs for any changes in your schedule,
3 days in advance!***

Grading System: Team Project (78%)

- Game Pitch (1%) and Game Proposal (2%)
- Milestones: M1 19%, M2 19%, M3 19%, M4 19%
 - *Marked in face-to-face sessions with TAs*
 - Includes both demo and Q&A
 - *Includes cross-play feedback for M2-M4*
 - Up to 5% bonus based on feedback
- **Final exam replaced by **juried cross-play session for M4****
 - ***Mandatory attendance***
 - *Demo to peers/industry jury (feedback used for grading)*
 - *Extra bonus marks provided for award-winning projects*
 - based on jury/peer feedback

Grading: Team Project to Individual Grade

We expect all team members to participate in coding for ALL milestones

Individual Project Grade

- Grade computed by multiplying team grade by contribution quotient Q
 - *Average contribution: $Q=1$*
 - *Below average $Q < 1$*
 - *Above average $Q > 1$*
- Quotient determined based on self reporting, TA interaction, code repo analysis, and peer feedback

Grading System: 3 Individual Assignments (20%)

2%: peer grading A0: online at lecture start

- Entity Component System (ECS) and C++
- small but important, **NEW: no solving, just grading**

7%: Assignment 1: online at lecture start

- Basic rendering/event driven programming
 - **Good for self-assessment before drop deadline**

2%: peer grading A1 (NEW)

7%: Assignment 2:

- 2D animation and physics

2%: peer grading A2 (NEW)

!!! MUST PASS !!!

NEW: two instead of three assignments

Peer Evaluation

- ***2-3 reviews for A0, A1, A2***

***A0: you grade example solutions
(with errors from previous years)***

A1 & A2: You grade peer submissions (anonymous)

- ***Will it help learning? Seeing alternative solutions is good.***
- ***Will it reduce TA workload? We will validate peer reviews...***

Peer Eval in MTA

- A detailed rubric, you mark which tasks are correctly solved
- TAs validating individual reviews
 - diverging grades will be resolved
 - randomized checks
- You can also flag inaccurate grading
- The accuracy of your peer grading is graded (2% points)!

Grading System: Individual

Individual Progress Reports

- Each student **must** submit a progress report for **EACH** milestone
 - Summary of work completed
 - achievements & challenges
- Feedback on exceptional team-member performance

Grading System

1%: Classroom Participation

- Asking or answering a question in class via MTA.
- Answering poll question via MTA.
- Participating and providing feedback during cross-play sessions

Grading System: Individual/Team

1%: Game Pitches

- Written pitches due **in the third week**
- Individual or mini-team (up to 6 members)

TODOs: Individual

- Assignment 0 (individual, rading only)
- Read through course pages
- Register to Piazza

- Develop game ideas (not just one)
 - *Write game pitch (just one)*

- **!!!! Team organizing !!!!**
 - *Use slack to find teammates and self-register your team on Canvas*

TODO: TEAM

- Team organizing (use slack to connect), seek common game ideas, diversity of experience, *similar working hours*
 - *Initial teams: latest by the end of second week*
 - **We can help...**
- Game Pitch (storyline + basic technical elements) – individual/mini-team
 - *Informal pitches on Slack: ASAP*
 - *Oral pitches:*
 - Plan on ~1 minute: game idea + team
 - Register on doc (linked form Piazza)
 - *Written pitches:*
 - **More detailed plan on game features**

Course schedule

- ***On course webpage***
- <https://docs.google.com/document/d/e/...>

Week & Date			Content	Deadlines	Instructor
1	Mon	4-Sep	Labor day		
	Wed	6-Sep	Lecture 1: Intro and logistics Tutorial 1: Setting up your development environment and git version control		Helge Rhodin Floria & Suzuran (TAs)
2	Mon	11-Sep	Lecture 2: Entity component system (ECS)		
	Wed	13-Sep	Lecture 3: Game basics Tutorial 2: C++ for games		Helge Rhodin Floria (TA)
3	Mon	18-Sep	Lecture 4: HCI and user experience	A0 review & drop deadline	
	Wed	20-Sep	Oral project pitch Tutorial 3: Assignment 1 walkthrough & Profiling C++	Oral Proj. Pitch Written Proj. Pitch	Helge Rhodin Suzuran (TA)
4	Mon	25-Sep	Lecture 5: Transformations and rendering	Proj. Proposal	
	Wed	27-Sep	Lecture 6: Rendering pipeline and OpenGL Tutorial X: OpenGL reloaded (async. video) Tutorial: Face2Face proposal feedback		
5	Mon	2-Oct	Truth & Reconciliation		
	Wed	4-Oct	Lecture 7: Advanced OpenGL Tutorial 4: OpenGL profiling, Q&A	Assignment 1	
6	Mon	9-Oct	Thanksgiving		
	Wed	11-Oct	Lecture 7: Collisions and simple physics Tutorial: Face2Face grading A1	Peer review A1	
	Thu	12-Oct	Guest lecture (makeup Monday)	Milestone 1	

Decorum: respect your classmates

Please come on time

- We will start timely
- Hint: we will have questions near start/end that count to class participation

Respect your team members

- Allow equal talking time
- Utilize strengths, compensate weaknesses, and plan ahead

Please no open screens

- Very disruptive for folks sitting around you
- stay focussed for your own benefit!

Your expectation?

4 min get-together break

- Say Hi
- Discuss any questions you may have about the course logistics
- Why do you take this course?
- What game do you want to build?

- Designate someone to take notes and report to class

Grounding your expectation

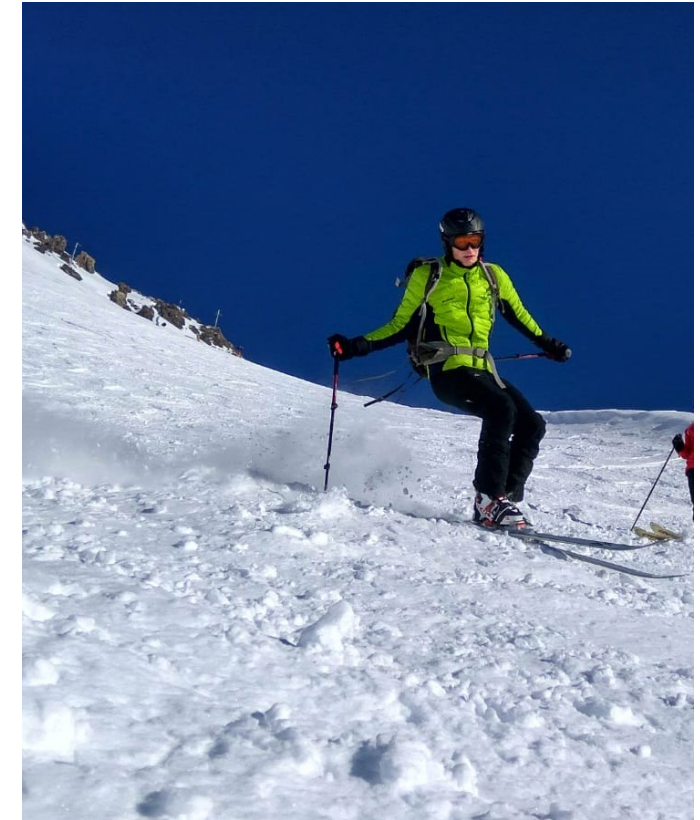
A course like any other with theory, concepts, assignments, deadlines...



not a piece of cake



90 % uphill



10 % downhill

Decide in the first week! The course is in high demand. No late drop forms



Special requirements?

Let us know about ways we can support you in a private message or office hour.

Schedule and deadlines

UBC CPSC 427

ABOUT STAFF COURSE WORK OVERVIEW **LECTURES** ASSIGNMENTS AND MILESTONES

RESOURCES/PRIOR OFFERINGS POLICIES

Check the [lecture schedule](#) for planned activities and due dates.

All lectures and corss-play sessions are also listed in [this calendar \(.ical here\)](#), embedded below:

CPSC 427

Today September 2021

Print Week Month Agenda

Sun	Mon	Tue	Wed	Thu	Fri	Sat
29	30	31	Sep 1	2	3	4
			15:00 CPSC 427 - Le 16:00 CPSC 427 - Tu		15:00 CPSC 427 - Tu	
5	6	7	8	9	10	11
			15:00 CPSC 427 - Le 16:00 CPSC 427 - Tu		15:00 CPSC 427 - Tu	
12	13	14	15	16	17	18
15:00 CPSC 427 - Le 15:30 Guest lecture		15:00 CPSC 427 - Le 15:00 Oral project pi 16:00 CPSC 427 - Tu 23:00 A0 Submissior		15:00 CPSC 427 - Tu 23:00 Project Pitch s		
19	20	21	22	23	24	25
15:00 CPSC 427 - Le 15:00 Drop deadline		15:00 CPSC 427 - Le 16:00 CPSC 427 - Tu		15:00 CPSC 427 - Tu 23:00 Project Propos		
26	27	28	29	30	Oct 1	2
15:00 CPSC 427 - Le		15:00 CPSC 427 - Le 16:00 CPSC 427 - Tu		15:00 CPSC 427 - Tu 23:00 A1 Submissior		

Events shown in time zone: Pacific Time - Vancouver

Google Calendar

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Syllabus (I)

Graphics: Rendering

- Basic Rendering: Rendering pipeline elements
- OpenGL / Event Driven Programming / Keyboard & Mouse input

Graphics: Geometry

- 2D Transformations
- Curves (in time & space)
- Meshes / Polygons

Graphics: Collision detection

Syllabus (II)

Game UI/UX

- Basics of User Interface Design
- Game interfaces/Game experience
- Testing
- Game balancing

Syllabus (III)

Game Software Design

- Entity Component Systems
- Observer Pattern

Syllabus (IV)

Gameplay Logic/AI

- State Representation
- Decision Trees

- Pathfinding (goal optimization)
- Heuristic Pathfinding/A*/MinMax

Syllabus (V)

Basic Physics

- Time stepping
- Euler integration
- Velocity & acceleration
- Particles & springs

Syllabus (VI)

Efficiency/Tools

- Debugging strategies and tools
- Profiling
- (In)efficient coding 101
- Compiler optimization
- Memory allocation
- Version control

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