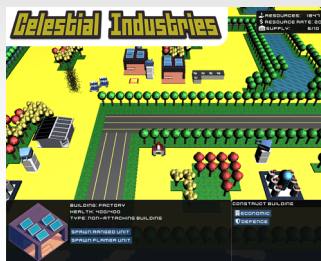


CPSC 436D Video Game Programming



Instructor:
Alla Sheffer



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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** (runtime/memory) code*
 - Project management/Teamwork
 - *Support software/Best practices*

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What is This Course About?

!!!! Writing your own game start to finish !!!!

- Learning through experience
 - *Programming*
 - *Teamwork*

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Topics NOT Covered:

Interesting but no time:

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

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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

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Web Resources

- Course Page: http://www.cs.ubc.ca/~sheffa/games_course/
 - ***Read & know all the course info + policies***
- Piazza discussion forum (link from course page)
 - ***Please use for everything except private issues***
 - ***Use private mode for questions to course staff that require posting code***
- Canvas: grade reporting

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Course Staff

Instructor:

- Alla Sheffer
 - Office hours: Fri, 2-3PM X651 (ICICS/CS)
 - Email: sheffa@cs.ubc.ca (use Piazza for all but personal topics)

TAs:

- Silver Burla, Dave Pagurek
 - Contact via Piazza
 - Office hours Mon 5-6PM, Wed 5-6PM, Fri 4-5PM, X139 (ICICS/CS)

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Course Project: Video Game

Project

- 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 (+/-)
- Bi-weekly milestones (mandatory spec bits)
- Completed games demoed to peers/expert jury

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Course Format

Course Hours:

- Lecture: Mon, 3PM-5PM; Wed 3PM-4PM, DMP 301
 - **Additional lecture hour** (Wed 4-5 first three weeks)
- Tutorial: Wed 4-5 (first three weeks replaced by lecture) Fri 3-4, DMP 101

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Course Format

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

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Course Format

Progress report meetings

- One per milestone (Wednesdays, starting Sep 25)
- Reports from each team (2-3min) on
 - Progress, achievements & challenges
- Quick feedback round

Cross-play sessions for milestones 2, 3, 4

- One per milestone (Mondays, M2 Oct 21, M3 Nov 11, **TBD for M4**)
- Collect playability feedback
- Feedback impacts bonus component of grade

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Course Format

Tutorials

- Each team expected to meet with a TA once a week
 - Schedule online - contact TAs for any changes
 - Optional during marking weeks
- Face-to-face marking
 - Schedule online - contact TAs for any changes
 - During tutorials/office-hours
- Team members should attend **same** tutorial
- Mapping of teams to tutorials (Mon or Wed) on course page
 - To change discuss with TAs

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Grading System: Team Project (78%)

- Proposal (3%)
- Milestones: M1 18%, M2 18%, M3 18%, M4 21%
 - *Marked in face-to-face sessions with TAs*
 - ▶ Includes both demo and Q&A
 - *Includes cross-play feedback for M3-M4*
 - ▶ Up to 10% 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

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Grading System: 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 TA interaction, code repo analysis, and peer feedback

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Grading System: 3 Individual Assignments

5%: Assignment 1:

- Basic rendering/event driven programming
 - *Online now/Due September 20*
 - **Good for self-assessment**

5%: Assignment 2:

- Collision processing + Game AI

5%: Assignment 3:

- 2D animation
- **Assignments 2 & 3 marked face-to-face**

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Grading System

1%: Game Pitches

- Written pitches due **Sep 13**
- Individual or mini-team
- **100% Bonus for fully formed teams**

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Grading System

3%: *Individual Progress Reports*

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

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TODOs: Individual

- Assignment 1: “Hello games” (individual)
- Read through course pages
- Register to Piazza
- !!!!Team organizing!!!!

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TODO: TEAM ORGANIZING

- Team organizing (use piazza to connect), seek common game ideas, diversity of experience
 - *Initial teams: Sep 11*
 - *Finalize by **Sep 18***
 - **We can help...**
- Game Pitch (storyline + basic technical elements) – individual/mini-team
 - *Informal piazza pitches: ASAP*
 - *Oral pitches: **Wednesday Sep 11***
 - Plan on ~1-2 minutes: game idea+team
 - Register via poll on Piazza
 - *Written pitches: **due Sep 13***

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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

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Syllabus (II)

Game UI/UX

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

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Syllabus (III)

Game Software Design

- Entity Component Systems

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Syllabus (IV)

Gameplay Logic/AI

- State representation
- Decision Trees

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

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Syllabus (V)

Basic Physics

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

Collision detection

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Syllabus (VI)

Efficiency/Tools

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

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