

CPSC 436D

Video Game Programming



Alla Sheffer



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What is This Course About?



- **Basic Elements of Game Programming**
 - Content
 - *Graphics: Modeling, Rendering, Animation*
 - *Gameplay Logic: situational response*
 - ...
 - Implementation
 - *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, ...
- Asset creation tools
- Game engines

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Prerequisites

CS:

- CPSC 221 or (CPSC 260 and EECE 320)

MATH:

- one of MATH 200, 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/Vjan18
 - ***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: Mon, 2-3 PM (or by appointment) X651 (ICICS/CS)
 - Email: sheffa@cs.ubc.ca (use Piazza for all but personal topics)

TAs:

- Edoardo Dominici & Chrystiano Araujo
 - Contact via Piazza, office hours by appointment

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Course Project: Video Game

Project

- 2D (or 3D)
- Basic template provided (very basic)
- Has mandatory spec requirements
 - *2D transformations, basic physics, basic AI, collision processing, sound, colors and textures, efficient time/memory management, documentation*
- Beyond that up to you
- Written in teams of 6 (+/-)
- Bi-weekly milestones (mandatory spec bits)
- Final projects demoed to peers/expert jury

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Course Format

Course Hours:

- Wednesday, Friday, 15PM-17PM, ORCH 3018

Format is mix of

- Regular lectures by instructor/TAs
 - *More early in the term (e.g. four hours this week)*
- Agile progress report meetings
 - *First hour Wednesday (starting week two)*
- Group meetings with Instructor/TAs
 - *One or two hours Friday (starting week three)*

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Course Format

Agile progress report meetings

- *An hour a week (first hour Wednesday, starting week two)*
- *Reports from each team (3-4min) on*
 - Progress, achievements & challenges
 - Each time given by different team member
- *Quick advice/feedback round*

Group meetings with Instructor/TAs

- *Second hour Friday starting week three*
 - More hours toward end of term (if needed)
- *10-15 min team meeting with instructor or TA*
 - Typically meet each once in two weeks

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Grading System

5%: Intro Assignment

- Online now
- Due January 12
- **Good for self-assessment**

3%: Game Pitch

- Written + presented January 10
- Individual or mini-team

92% Team Project

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Grading System: Team Project (92%)

- Bi-weekly project progress assessments: 52% (8%, 4x11%)
 - *Marked in face-to-face sessions with TAs*
 - Includes both demo and Q&A
 - *Includes cross-play feedback (once games can be played)*
- Final project assessment: 25%
 - *Marked in face-to-face session with Instructor & TAs*
 - Includes both demo and Q&A
 - *Demo to peers/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

95% Team Project

- Weekly reports: 5%
 - *Each student needs to submit a weekly progress report*
 - ▶ Summary of work completed, achievements & challenges
 - ▶ Feedback on team-member performance
 - ▶ (optional) Feedback on other projects
- Leadership and teamwork assessment: 10%
 - *Based on peer feedback and presentation at progress report meetings*

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TODOs

- “Hello game” assignment (individual)
- Read through course pages
- Register to Piazza
- Game Pitch (storyline + technical elements) – individual/mini-team
 - *Oral pitch: next Wed, Jan 10*
 - Plan on ~1-2 minutes
 - Register via poll on Piazza
 - *Pitch write-ups due Jan 12 (share on Piazza Jan 13)*
- Start team organizing (use piazza)
 - *Advertise your team*
 - *Advertise your game idea (don't be a copycat)*

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Syllabus (I)

Graphics

- Basic Rendering: Rendering pipeline elements
- OpenGL/Event Driven Programming/keyboard & mouse input
- 2D Transformations
- Curves (in time & space)

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Syllabus (II)

Basic Software Management

- Version control (how & why)
- Debugging strategies and tools

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Syllabus (III)

Gameplay Logic/AI

- State representation
- Decision Trees
- Pathfinding (goal optimization)
- Heuristic pathfinding/A*

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Syllabus (IV)

Basic Physics

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

- **Collision detection**

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Syllabus (V)

Signal processing

- Sound
- Color/texture
- Quantization

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Syllabus (VI)

Efficiency

- Profiling
- (In)efficient coding 101
- Compiler optimization
- Memory allocation
- Multi-threading

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