

# 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
    - 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 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](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: Fri, 1-2 PM (or by appointment) X651 (ICICS/CS)
  - Email: [sheffa@cs.ubc.ca](mailto:sheffa@cs.ubc.ca) (use Piazza for all but personal topics)

### **TAs:**

- Shayan Hoshyari, Edoardo Dominici & Chenxi Liu
  - Contact via Piazza, office hours **by appointment**

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## Course Project: Video Game

### **Project**

- 2D (or 3D)
- Basic template provided (very basic)
- Mandatory spec requirements
  - *2D transformations, basic physics, basic AI, user experience validation (testing), 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:**

- Lecture: Monday, 15PM-16PM; Friday 15PM-17PM, DMP 301
- Tutorial: Monday 16-17 DMP 301 (first three weeks - everyone) Wed 16-17 (starting late January, rotating schedule)

### **Format:**

- Regular lectures by instructor/industry speakers
- Team progress report meetings (one per milestone)
  - *Fridays (starting Jan 25)*
- Tutorials: (mostly) team meetings with Instructor/TAs
  - *All team members must be present*

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## Course Format

### **Progress report meetings**

- *One per milestone Fridays (starting Jan 25)*
- *Reports from each team (2-3min) on*
  - Progress, achievements & challenges
  - Each time given by different team member
- *Quick advice/feedback round*

### **Group meetings with Instructor/TAs**

- *Second hour Monday & Wednesday 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 18
- **Good for self-assessment**

### **3%: Game Pitch**

- Written + presented January 14
- Individual or mini-team
- **Bonus for fully formed teams (5%)**

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## Grading System

### **4%: Individual Progress Reports**

- *Each student needs to submit a progress report **For Each Milestone***
  - Summary of work completed
    - achievements & challenges
  - Feedback on team-member performance
  - (optional) Feedback on other projects

### **88%: Team Project**

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## Grading System: Team Project (88%)

- Milestones: 63% (7%, 4x14%)
  - *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

### **88% Team Project**

- Individual Grade
  - *Computed by multiplying team grade by contribution quotient Q*
    - ▶ Average contribution:  $Q=1$
    - ▶ Below average  $Q < 1$
    - ▶ Above average  $Q > 1$

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## TODOs

- Individual:
  - *"Hello game" assignment (individual)*
  - *Read through course pages*
  - *Register to Piazza*

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## TODO: TEAM ORGANIZING

- Team organizing (use piazza to connect), seek common game ideas, diversity of experience
  - *Initial teams: Jan 14*
  - *Finalize by **Jan 18***
  - **We can help...**
- Game Pitch (storyline + basic technical elements) – individual/mini-team
  - *Informal piazza pitches: ASAP*
  - *Oral pitches: **Monday Jan 14***
    - Plan on ~1-2 minutes: game idea+team
    - Register via poll on Piazza
  - *Written draft: due **Jan 14***

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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)

### **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\*/MinMax

### **Game UI/UX**

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

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## Syllabus (IV)

### **User Experience**

- Testing
- Best Practices

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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**

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

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