Lecture 1

Course Overview
Welcome to CS/INFO 5/4152

- Course is **mostly full**
  - Had 100 applications for 72 (8x9) spots
  - Even more than last year.
  - Increased groups to 10 people meet demand

- Still a few possibilities if you are waiting
  - Not everyone has responded to an invite
  - Need to shore up some teams based on skills

- If not in the class, talk to me afterwards
CS/INFO 4152: Advanced Topics

- Sequel to CS/INFO 3152
  - Prereq unless a non-Cornell grad (or exempt)
  - Similar format and structure as Intro Game Design
  - Covers topics not touched in Intro Game Design

- Single semester long game project
  - At least 50% of your final grade
  - Interdisciplinary teams of 8-9 people

- Also design documents
CS/INFO 5152: Master’s Version

- **Game Labs**: Similar to introductory course
  - Done outside of class for first three weeks
  - Special labs for programming or design
  - Complete according to your project role
  - Only INFO has a choice; CS is programming only

- **Mastery**: Must have major indv. contribution
  - Could be a leadership role (see Assignment 1)
  - Could be development of important subsystem
  - Will be graded separately on this contribution
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4152 students do also; but work is not graded

4152 can take the leadership roles too
Game Development

- Uses familiar the **milestone** schedule
  - Deliverables every two weeks (after week 3)
  - One extra prototype beyond 3152 schedule
  - Details on course website:
    - http://www.cs.cornell.edu/courses/cs5152

- Games demonstrated at **Showcase**
  - Once again, will open it up to the public
  - Public reaction is part of your grade
  - Submissions posted on the GDIAC website
Course Structure

- Most things happen during the “lecture” section
  - Meets three days a week (M, W, F) 11:20-12:10
  - Mixture of lectures, presentation, and discussions
  - Course is a bit more interactive than CS/INFO 3152

- **Lectures**: Common in first half of course
  - Advanced game development topics unique to course
    (this is not going to replace a graphics course)

- **Design Focus**: mechanics, user interfaces and testing

- **Technical Focus**: mobile platforms, memory management
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  • Advanced game development topics specific to course (this is not a graphics course)
  • Design Focus: mechanics, user interfaces and testing
  • Technical Focus: mobile platforms, memory management

There are NO C++ lectures. Learn online and in the labs.
Course Structure

- **Presentations:** Every two weeks
  - In-class critique of your game by your peers
  - Part of your participation grade comes from this
  - Because of class size, held over three sessions

- **Playtesting:** Follows every single deliverable
  - Handled just as in the introductory class
  - Will expect user-test scripts for alpha and onward

- **Critiques:** Ungraded, less formal presentations
  - **Example:** The pitch session next week
The Discussion Sections

- Discussion time was biggest request a few years ago
  - Like communication lab from CS/INFO 3152
  - Time to work on Assignments *already assigned*

- We have organized you into sections
  - Groups 1-5 meet Wednesday 12:25-1:15 in Phillips 203
  - Groups 6-9 meet Wednesday 2:40-3:30 in Snee 1120

- **Undergrads**: You must enroll in ENGRC 4152
  - Extra credit hour for work you are already doing
  - This is *required*; it is not optional
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**ENGRC does not apply to grad students in 5152**
Game Requirements

• Should be **mobile game** on iOS or Android
  • Develop cross-platform, but graded only on one
  • Exceptions for 3D must have 5625 alums on team

• Some form of **innovative gameplay**
  • Interface innovation for mobile
  • 3D game should leverage camera control

• Target **public distribution**
  • Mobile apps should try to get on either App Store
I Was So Close…
I Was So Close…

You are welcome to *try* Steam Deck. But you must *still* target iOS/Android.
Mobile Game Development

• Will use custom **C++ game engine: CUGL**
  • Built on top of SDL (Simple DirectMedia Layer)
  • Made to solve many problems from previous years

• We do **not** provide any hardware
  • New devices are about $200; used are cheaper
  • Just need one device for your whole group

• Either 2D or 3D is acceptable
  • Will need **OpenGL ES** in either case
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*Vulkan is close, but not there*
Choosing a Platform

- You **must** develop iOS apps on a Macintosh
  - Only XCode can load the app on to a device
  - Do not need Apple Developer membership
  - But need membership ($100) to put on store

- You can develop Android on **either platform**
  - Android Studio is fully supported and stable
  - But it is not good enough for your main IDE
  - You should target Mac/Windows for testing
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We are testing a Mac server.
Will allow iPhone from Windows.
Working in C++

• Best option for cross-platform development
  • **iOS**: Obj-C and **C++**; **Android**: Java and **C++**
  • Game developers should learn it anyway
  • See the online lectures to learn more

• You should use a **professional IDE**
  • This means XCode or Visual Studio
  • Tools for analyzing memory performance
  • Android Studio is **not** a professional C++ IDE
Cornell University Game Library

- Custom game engine “written from scratch”
  - Core set of 170 C++ classes (70k lines of code)
  - Supports input, graphics, and audio

- Layered on top of some useful libraries
  - **SDL**: SimpleDirectMedia Layer
  - **Box2D**: The definitive 2D physics library

- Compatible with any C++ library out there
  - **Example**: Bullet for 3D physics
Working With CUGL: Good News

• Supports modern(ish) C++
  • Full C++17 support
  • Heavy use of smart pointers

• Build is very light-weight
  • Engine has 200 MB footprint

• Advanced input features
  • Built-in pinch and rotation
  • Orientation detection
  • Arbitrary text input

• Modern OpenGL support
  • OpenGLES 3.1 on mobile
Working With CUGL: The Bad News

- Engine is very spartan
  - Box2D is only 3d-party library
  - No support for external editors
  - No support for rigging
- Windows is *PC only*
  - No UWP development
  - Means no Surface support
- SVG support not *quite* ready
  - Full support for *commands*
  - But did not integrate it yet
- Networking code removed
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2013: Gathering Sky

- First major GDIAC success
- On Steam and App Store
- Showed promise of mobile
- Showed need for royalty free!
- But used **LibGDX** (not great)
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Three years later…
2016: CUGL 1.0 Released

**Underhand**
- Strategic card game
- Inspired by *Reigns*
- Went viral on Reddit
- 1 mill Android downloads

**Manic Moving Mansion**
- Real time puzzler
- Reorder rooms to guide player
- **Best Student Game** at BFIG
- Beats MIT Media Lab!
2016: CUgL 1.0 Released

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Three years later…
2019: Family Style

- Multiplayer Coop game
- Front page of the App Store!
- Went viral in Thailand
- 15k actively daily users
- 2 million downloads

A CO-OP KITCHEN CLAMBER!

PASS INGREDIENTS BY SWIPEING TO YOUR NEIGHBORS!

FOR 3 to 8 PLAYERS

OVER 120 RECIPES TO DISCOVER
2019: Family Style

- Multiplayer Coop game
- Front page of the App Store!
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- 2 million downloads

Four years later…
2023: This Semester
What Should You Make?

- This course is not just CS 3152 Part 2
  - Want your games to be different in some way
  - Mobile enforces this to some degree

- We have removed (almost all) restrictions
  - Can make a narrative-heavy game
  - Not limited to single-player games

- But it still must be **feasible**!
  - 3152 alums have the experience here
Rogue-Lites are Okay!

Overview
Deck-Building Games Are NOT
What About Multiplayer?

- CUGL had networking
- Built on an unsupported lib
- Issues with Cornell WiFi
- Actively banned by Apple
- So we had to remove it
- Not in current release
What About Multiplayer?

- But found a replacement!
  - Web RTC: new technology
  - Supported by Google/Apple
  - Still integrating into CUGL
- CUGL release in 3 weeks?
  - Use at your own risk!
Your **group** retains all ownership
- You can commercialize it later
- You can make derivative works
- Individual ownership is your responsibility

But Cornell gets a non-exclusive license
- Non-commercial use of final version submitted
- We can post this version on our website
- We claim no other rights to your game
# Semester Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Task Description</th>
<th>Date</th>
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<tbody>
<tr>
<td>1</td>
<td>Team Workflow</td>
<td>1/28</td>
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<tr>
<td>2</td>
<td>Initial Proposal</td>
<td>2/4</td>
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<tr>
<td>3</td>
<td>Concept Document (Project Kickoff)</td>
<td>2/11</td>
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<tr>
<td>4</td>
<td>Nondigital Prototype Milestone Proposals</td>
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<td>2/18</td>
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<td>5</td>
<td>Gameplay Specification</td>
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<td>Gameplay Prototype</td>
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<td>7</td>
<td>Detailed Specifications</td>
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<tr>
<td>8</td>
<td>Technical Prototype</td>
<td>3/13</td>
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<tr>
<td>9</td>
<td>Document Revisions</td>
<td>3/25</td>
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<table>
<thead>
<tr>
<th>Week</th>
<th>Activity</th>
<th>Dates</th>
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<tbody>
<tr>
<td>10</td>
<td>Alpha Release</td>
<td>3/27</td>
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<tr>
<td></td>
<td><em>Spring Break</em></td>
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<tr>
<td>10</td>
<td>Code Walkthroughs</td>
<td>4/10</td>
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<td></td>
<td>App Store Page</td>
<td>4/15</td>
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<tr>
<td>11</td>
<td>Closed Beta Release (Feature Complete)</td>
<td>4/17</td>
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<tr>
<td>12</td>
<td>Document Revisions</td>
<td>4/29</td>
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<tr>
<td>13</td>
<td>Open Beta Release (Open Playtesting)</td>
<td>5/1</td>
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<tr>
<td>14</td>
<td>Postmortems</td>
<td>5/8</td>
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<td></td>
<td>Final Portfolio</td>
<td>5/10</td>
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<tr>
<td>15</td>
<td>GDIAC Showcase</td>
<td>5/10</td>
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Group Management

- Every group has a **project leader**
  - Final say in all *group management decisions*
  - Coordinates designers and programmers

- Every group has a **lead programmer**
  - Responsible for the *code architecture*
  - Delegates coding tasks to others

- Every group has a **lead designer**
  - Responsible for the *visual style and interface*
  - Ensures other designers conform to style
Group Management

- Every group has a **project leader**
  - Final say in all *group management decisions*
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- **Optional:** **lead user specialist**
  - Get the game in the hands of players
  - Record and *analyze all playtesting results*

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  - Responsible for the *visual style and interface*
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*Overview*
# Grading: 4152 vs 5152

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<tr>
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<th>5152</th>
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<tbody>
<tr>
<td><strong>Group Grades</strong></td>
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</tr>
<tr>
<td>Group Game Grade</td>
<td>25%</td>
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<tr>
<td>Course Documents</td>
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<td>15%</td>
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<tr>
<td>Presentations</td>
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<td>0%*</td>
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<td><strong>Individual Grades</strong></td>
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<td>10%</td>
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*Note: 0%* indicates a required activity or task.
Game Grade

• Group grade reflects the game quality

<table>
<thead>
<tr>
<th>Grade</th>
<th>Criteria</th>
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<tbody>
<tr>
<td>A</td>
<td>Bug-free, Fun-to-play</td>
</tr>
<tr>
<td>B</td>
<td>Complete and playable</td>
</tr>
<tr>
<td>C</td>
<td>Complete but unplayable</td>
</tr>
<tr>
<td>D/F</td>
<td>Serious delinquencies</td>
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</table>

• Individual grade represents contribution

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<tbody>
<tr>
<td>&gt; Group</td>
<td>Visionary, group MVP</td>
</tr>
<tr>
<td>= Group</td>
<td>Good attitude, hard worker</td>
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<tr>
<td>&lt; Group</td>
<td>Produce negative work</td>
</tr>
<tr>
<td>D/F</td>
<td>Abandon the group</td>
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ENGRC Grading

- ENGRC section also has a grade
  - No extra work; just time for testing/documents
  - New requirement by school of engineering

- All grades except the game grade
  - Workflow & Group Reports (13%)
  - Course Documents (77%)
  - Attendance & Presentations (10%)

- Typically higher than course grade
Using CATME for Reports

**Overview**

![CATME SMARTER Teamwork](http://www.catme.org)

Using CATME for Reports

**Overview**

**Report**

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<th>Class</th>
<th>Term</th>
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**Table:**

<table>
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<tr>
<th>Team ID</th>
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<th>Keeping on Track</th>
<th>Expect Quality</th>
<th>Adj Factor (w/ Self)</th>
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**http://www.catme.org**
This Week

- **Team Workflow** due at end of the week
  - Want rules of how you interact with each other

- **Lectures on game mechanics**
  - Reviewing what you forgot from CS/INFO 3152
  - Augmented with mobile mechanics on Friday

- **Set up your CUGL build environment**
  - Download sample project and set it up
  - Programmers start the first game lab
Next Week

- **Pitch Session** next Wednesday, Friday
  - 5-10 minute “elevator pitch” for your game
  - Practice with short, concise description
  - Provide some feedback for Concept Document

- Turn pitch into an **initial write-up**
  - Respond to feedback from pitch session
  - Chance to get even more feedback on idea

- **Concept Document** due in two weeks
  - Slightly different format from Intro course