Course Overview
Overview of Scrum

This lecture is based on two SCRUM presentations:
*Agile Software Development with SCRUM* by Shveta Mehtani (http://www.scribd.com/doc/6578688/SCRUMAEG)
*What is Scrum?* by Richard Fennell (http://www.slideshare.net/businessquests/black-marble-introduction-to-scrum)
… as adapted by Michael Mateas
Class mechanics

- Syllabus online at
  - courses.soe.ucsc.edu/courses/cmps171/Winter14/01
- Piazza
  - https://piazza.com/class/hltqfmpzr1mmf?cid=161
The year-long game design studio sequence

- **CS 170**
  - Exposure to a variety of alternative game designs
    - Indie, serious games, political games, art games, etc.
  - Individual concept development
  - Team formation and game design

- **CS 171**
  - The heart of making the game
  - Course is process-based, providing a series of milestones for completing game
  - Some game design work will continue
  - Focus on software engineering issues

- **CS 172**
  - Emergency design revisions (the “oh my god” moment)
  - Build out game content (level design)
  - Final playtesting and tuning
  - Finish game
  - Win awards at indie game competitions
Organization of Game Design Studio II

- 1 week of team, release, and sprint organization
- Core Loop Release (5 weeks)
  - Sprint 1 – 3 weeks
  - Sprint 2 – 2 weeks
  - Evaluation of games at end of this release for whether they should continue
- First Playable Release (4 weeks)
  - Sprint 3 – 2 weeks
  - Sprint 4 – 2 weeks
  - Evaluation of games at end of this release (end of the quarter) for whether they should continue
Release Goals: Core Loop

- Core Loop release
  - Demonstrates the core gameplay loop of the game
  - Should allow evaluation of game feel
  - A playtest can be performed
  - Player avatar in final art style
  - Environment should have some art in final art style
  - Control scheme for player avatar is working
  - Some music and sound effects in game, consistent with direction
  - Expectation that game will be incomplete in many respects
Release Goals: First Playable

- First Playable Goals
  - It must be possible to play the game and evaluate the potential of the game as an enjoyable entertainment experience
  - Player avatar fully defined
  - Enemy/obstacle behavior fully defined
  - Basic technology done
  - Two complete levels at near final state
    - Includes final art, music and sound effects
  - Game records some gameplay metrics
I expect some games to be cut

- Any game that is not executing at a level that will result in a high quality game at the end of Spring will be cut.

- Many factors might lead a game to be cut:
  - Not working, or overall poor to horrible experience
  - Insufficient art, or art direction or execution that is very poor
  - Poor technical execution (large numbers of serious bugs, significant systems not working properly, etc.)
  - Significant unresolved questions in game design
  - Game not sufficiently complete or substantially fails to meet release goals
Everyone is a coder

- Everyone is a coder
  - You are being trained as game developers, and you need to have this as a core competency
  - Any other role is enhanced when you have strong coding skills
  - Every week, each team member is expected to be contributing code to the project. Your individual performance grade depends on this.
  - Code contributions will be tracked via your configuration management tool.
    - If you’re not checking in code, as far as we’re concerned, you’re not coding.
Grading Criteria

- A combination of individual and group performance
- **Individual (Sprint) project performance – 45%**
  - Pre-sprint planning activities, release planning – 5%
  - Sprint I – 10%
  - Sprint II – 10%
  - Sprint III – 10%
  - Sprint IV – 10%
- **Team project performance – 55%**
  - Pre-sprint planning – 5%
  - Sprint I – 5%
  - Sprint II – 5%
  - Sprint III – 5%
  - Sprint IV – 5%
  - **Core Loop release performance – 15%**
  - **First Playable release performance – 15%**
- Ungraded, but required to pass:
  - Game website
Team firing process

- A team member can be fired from a team for lack of performance, or poor interactions with the rest of the team ("bad apple" behavior)
- Detailed firing process is on course website
- Briefly, two step process:
  - Remediation
    - Identify and try to fix the problem.
    - Letter describes concrete steps and timeline for improved behavior
  - Removal
    - 2/3 vote of CS 171 members of team will fire team member
- Fired team member has two weeks to find a new team, or fails the class
Learning Goals

- **Scrum software development process**
  - Release and Sprint planning
  - Experience performing several Sprints and one Release
  - Project management using Scrum (burndown charts, task boards, daily scrums)
  - Hands-on experience in the Scrum Master role
  - "Bad apple" behavior and how it affects teams
  - Coordination with artists and musicians

- **Software design**
  - Unified modeling language (UML)
  - UML structure and sequence diagrams
  - Experience using UML to represent software designs

- **Game testing**
  - Game playtesting, concept and application
  - Gameplay metrics

- **Software testing**
  - Unit testing
  - Black box and white box testing
  - Different classes of code test coverage (all paths, def-use, etc.)
Sammy Awards

- Sammy Awards
  - Friday, June 13
  - Rio Theater

- This is the last day of finals week, after all finals are done.
- School of Engineering graduation is most likely on Sunday, June 15.

- Please plan on attending the Sammy Awards. Your family is very welcome to attend.
  - It is not too early to think about travel and restaurant planning.
Your TA – Brandon Tearse

- Ace TA for the class

- Need to set up time to have Brandon be present during one scrum meeting each week
  - Part of Sprint 1 plan document
Artists, Musicians, etc. Independent Study

- Most artists should be taking companion class in Art Department
  - But, there might be some artists who are unable to take this class
  - Musicians may need to take an independent study, if they want credit
- Filling out independent study form
Photos

- On Friday, January 10, Brandon will be taking photos of each team during class.
- Please invite your artists and musical team members to come to class that day, if they can, to be part of the team photo.
- Photos will be posted on the class website, along with your name.
  - Very useful for putting names to faces
  - Let me know if you do not want to be part of the team photo, and/or have your name online
Professor meetings

- I will be meeting with each team weekly, for 45 minutes

- On Friday, Brandon will match teams to available timeslots.

- As preparation, your team needs to collect schedules from every team member, and find time blocks where most of the team can meet.

- I don’t expect that every team member will be able to make the meeting with me.
Upcoming deadlines

- **Thursday (Jan. 9): Project Organization assignment due**
  - Due by 11:59pm
  - See website for information and template

- **Friday (Jan. 10): Release Plan due**
  - A big effort. Start now.
  - Due by 11:59pm
  - See website for information and template

- **Friday (Jan. 10): Team assessment report due**
  - Due by 11:59pm
  - See website for information and template

- **Monday (Jan. 13): Sprint 1 Plan due**
  - Due by 11:59pm
  - See website for information and template

- **Monday (Jan. 13): Sprint 1 begins**
Upcoming deadlines

- **Friday (Jan. 11): team status reporting**
  - Due by 11:59pm
  - Report on team activities this week

- **Friday (Jan. 17): Technical design document due**
  - UML diagrams describing the technical design of your game
  - A big task, need to spin 2-3 people up on this by end of the week
Project Organization Assignment

- Assignment of team members to roles
  - Exclusive roles – a given person can only have one
    - Lead designer
    - Lead producer
    - Lead developer
  - Non-exclusive roles – a given person can have such a role, in addition to other roles
    - Artist coordinator
    - Lead tester
    - User test coordinator

- Listing artists

- Team coordination
  - How your team will communicate
Software configuration management
- Need to pick a technology, and sign up for a hosting service
- Git and GitHub are recommended
- Need to learn chosen technology

Preliminary platform choice
- Which game making technology will you be using, if any?
- Examples: Unity, Corona, XNA, etc.
Review of Scrum
Release

- A **release** is a major milestone in the development of a software project
- A release contains a series of product **features**
- Features are expressed in the form of **user stories**

The goal of **release planning** is to determine which user stories (features) will be included. This involves:

- Taking the game concept and **decomposing** it into user stories
- **Estimating** the time required to perform each user story (using story points)
- **Prioritizing** the user stories
- The release plan forms the input into the Sprint planning process
User stories

- A product feature is expressed in the form of a user story.
  - This can be viewed as a specific technique for eliciting and writing software requirements.
  - A user story is a software requirement

- User story format
  - As a {user role}, I want {goal} [so that {reason}]
  - Examples:
    - As a player, I need control over a laser pointer so that the cat will follow it.
    - As a player, I need to pick up gameworld objects so that I can collect food and ammunition.
    - As a playtest manager, I need automated collection of gameplay metrics so that levels can be analyzed for areas that are too difficult.

- Class exercise developing a few user stories for your game
Estimating size of user stories

- The relative size (implementation effort) of each user story is estimated using measure known as story points.

- **Story points are unitless**
  - Are not person-months, meters, hours, etc.
  - Key idea is to focus estimating effort on **relative** size
  - Use of unitless numbers avoids arguments
    - “That won’t take a week to implement – that’s easily a week and two days”
    - … but the point is trying to determine which tasks are $O(\text{days})$, $O(\text{weeks})$, and $O(\text{months})$ – +/- a few days doesn’t matter!

- **Story points are linear**
  - A user story requiring 0.5 story points takes half the time to complete as one requiring 1 story point
  - Similarly, a user story requiring 3 story points is the same size as one requiring 1 story point and another requiring 2 story points
story point ranges

- when estimating, teams typically use a range of story points, as follows:
  - 0 points – freebie, item already implemented, or ultra-trivial to do
  - ½ point - trivial
  - 1 – extra small
  - 2 – small
  - 3 – medium
  - 5 – large
  - 8 – extra large
  - 13 – double extra large (even though it’s not really double ;-) 
  - 20 – huge
  - 40 – exceptionally large
  - 100 – ginormous
  - ∞ - no conditions under which this is possible, technically impossible

- these values aren’t magic, and can be altered to fit a team’s needs
  - however, it is conventional to use these values
- main value: spreads apart choices at high end, to avoid +/- 1 (or 2) kind of arguments
- the point range should agree with your planning poker deck (next slide)
Planning Poker

- A technique for teams to estimate sizes as a group activity
- Original article by James Grenning in 2002:
  - renaissancesoftware.net/files/articles/PlanningPoker-v1.1.pdf

Here’s how it works:

- Every team member is given a deck of cards with story point range
  - So, for range on previous slide, each person would have 12 cards
- The Product Owner picks a user story, and explains it to the team
- Team then discusses what is involved in implementing this item
- After discussion, each team member *privately* estimates the size of the item
  - Without making any assumptions about who might implement the item
  - Once estimate is done, take the card with the closest value, and place it *face down* on the table.
- Once everyone has played a card, they are all turned over *at the same time*
- If the estimates differ, the team members with the widest separation of estimates (low estimate, high estimate) *explain their reasoning*.
- All cards are returned, and the team plays another round.
  - Each person’s estimate may have changed, based on seeing the other estimates and listening to the rationale of the high and low estimates
- Repeat until *estimates converge*
  - Decision making rule is consensus; team should be comfortable with the estimate
Calibrating estimates

- Estimating user stories is difficult, especially when a team is inexperienced
  - Accuracy improves over time, once many estimates have been performed, and a team can observe how well they have done
- For a team’s first estimate:
  - Pick a user story that all can agree is small, and estimate that first
  - Alternately, pick one that is small, large, and medium in size, and estimate those first, to get a sense of the range
- Once the team has estimated three or more items
  - Revisit the estimates, to ensure the team agrees with the relative size of the estimates of the items
  - This helps calibrate the scale used by the team
- Note that different teams might have different scales
  - That’s OK, so long as each team is internally consistent
Output of Release Planning

- At the end of release planning:
  - A **prioritized list** of **user stories**, with implementation time estimated in **story points**, organized into **Sprints**.

### Plan for Release #1

<table>
<thead>
<tr>
<th>Priority</th>
<th>User Story</th>
<th>Story Points</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sprint 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>As {role} I …</td>
<td>5</td>
</tr>
<tr>
<td>2.</td>
<td>As {role} I …</td>
<td>2</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sprint 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N.</td>
<td>As {role} I …</td>
<td>15</td>
</tr>
<tr>
<td>N+1.</td>
<td>As {role} I …</td>
<td>1</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Sprint planning

- Team re-evaluates user stories from the release plan and product backlog they can commit to completing
- Sprint backlog is created
  - User stories are subdivided into tasks
  - Tasks are identified and each is estimated (~8 hours)
  - Collaboratively, not done alone by the ScrumMaster
- High-level design is considered

As a vacation planner, I want to see photos of the hotels so I can have a better idea of facilities

Priority 4 [10 Story Points]

Code the middle tier (8 hours)
Code the user interface (4)
Write test fixtures (4)
Code the foo class (6)
Update performance tests (4)
Sprint planning (2)

- Task estimation
  - Performed as a group, using Planning Poker
  - Here, units of estimation are “ideal work hours”
    - The amount of work you can get done under ideal conditions
      - Full knowledge, no interruptions
    - Actual hours elapsed will be greater than ideal hours
  - Task estimates are a **commitment** to accomplish a development task in a certain period of time

- How many ideal work hours can each person perform?
  - Good question – so far, your group has no track record on this
  - For now, pick a conservative figure, such as 10-12 ideal hours/week
  - So, each group member can do 30-36 ideal hours of work per Sprint
Output of Sprint planning (for CS 171)

- Task listing (with time estimate), organized by user story (prioritized)
  - User story 1:
    Task 1 (time estimate)
    Task 2 (time estimate)
    ...
  - User story 2:
    Task 1 (time estimate)
    Task 2 (time estimate)
    ...
- Team roles
  - Team member 1: role
  - Team member 2: role
  - ...
- Initial task assignments
  - For each person, what is the first task they are working on?
- Initial task burndown chart
- Initial scrum board set up
- Schedule of Scrum meetings
  - When/where for 3 weekly face-to-face scrum meetings
Scrum Master in CS 171

- The team’s lead producer acts as the Scrum Master
  - This role lasts for the entire project

- Scrum Master is responsible for:
  - Maintaining scrum (task) board
    - Ensure that team members are putting their tasks on the board, moving them when complete, etc.
  - Maintaining sprint burndown chart
  - Ensuring team follows correct Scrum practice
Project Management During Sprints
Key project management challenges

- Awareness of the work of others
- Awareness of the current status of the project
- Clarity on what is your current task, and what is your next task
- Awareness of whether current sprint activity is completing tasks fast enough to meet sprint goals
- Making mid-course corrections if implementation activity is too fast or too slow.

Tools for addressing challenges:
- Scrum meetings
- Scrum board
- Burndown chart
The daily scrum

- Parameters
  - Daily
  - 15-minutes
    - Strictly timeboxed
    - Can follow-up after meeting on bigger issues
  - Stand-up
    - Not for problem solving
      - Whole world is invited
      - Only team members, ScrumMaster, product owner, can talk
  - Helps avoid other unnecessary meetings
Everyone answers 3 questions

1. What did you do yesterday?
2. What will you do today?
3. Is anything in your way?

These are *not* status for the ScrumMaster
- They are commitments in front of peers
Scrum pitfalls

- Being late, missing the meeting
  - If you’re not present, the team doesn’t know what you’re doing
    - This is demoralizing – people assume nothing is happening
  - If someone needs information from you to move forward, they’re stuck
  - Disrespectful of other team members

- Grandstanding
  - Going into excessive levels of detail to make it seem like you’ve done more than you have (especially in front of TA)

- Going over time
  - Scrums are strictly 15 minutes, timeboxed.
  - Big issues are discussed by involved parties after the Scrum.
    - The Scrum just identifies the issues

- Failure to commit to work items
- Failure to update Scrum board

The scrum board

- A visual representation of all work that needs to be performed during the sprint
- Allows team members to clearly see tasks remaining
- Either put up on a wall, or put online (using a web-based scrum tool)
- A big chart
  - Rows are user stories and associated tasks
  - Columns are current status of tasks (To Do, In Progress, Done)
  - Tasks written on index cards or post-it notes

[joshuahoover.com/2009/03/22/bitter-scrum-a-task-board-gone-wrong/](joshuahoover.com/2009/03/22/bitter-scrum-a-task-board-gone-wrong/)
Sample task board
Updating the Scrum board

- During the scrum meeting, tasks are updated.
- If a task is completed, it is moved from “In Progress” to “Done”.
- If a task was “In Progress” at the last meeting, and is still “In Progress”, the time estimate for the task needs to be updated with remaining time.
  - As well, if there is anything preventing completion of the task, this should be the answer to question #3 (“Is anything in your way?”)
- If a new task is assigned:
  - The name of the person working on the task is added to the task card.
  - The task is moved from “To Do” to “In Progress”.
- If a task is blocked (no further progress possible):
  - Move it back to “To Do” but mark it as obviously blocked (e.g., change the color of the card, add a sticker, etc.)

joshuahoover.com/2009/03/22/bitter-scrum-a-task-board-gone-wrong/
Keeping Scrum board up to date

- The primary value of the Scrum board comes from it being an accurate, up-to-date representation of the work of the team.
- If it is not kept current, its value diminishes quickly.
- It is the job of the Scrum Master to ensure the Scrum board is up-to-date.
  - The grade they receive for their role performance depends on this.
  - If someone misses a Scrum meeting, they need to proactively contact that person to find out what they have been doing, and update the board.
  - Scrum master also needs to ensure team updates task cards during daily Scrum.
Sprint burndown chart

- Burndown chart represents the total amount of work remaining in the sprint.
- As the sprint progresses, the remaining work should trend to zero.
- Typically posted on scrum board.
- Scrum Master maintains the burndown chart.

  - After each Scrum meeting, a new chart is created.
  - Sum the estimated time for all remaining tasks.
    - This is the data point (y-value) for that day (x-value).

- Ideal burndown trend.
  - Rate at which work is ideally performed so that all tasks are completed in sprint.

aydsoftware.blogspot.com/2009_01_01_archive.html
Sample burndown chart
Sample burndown chart
When sprints go bad

- The burndown chart gives you early warning that your sprint will not achieve its objectives
  - Tasks clearly taking too long to complete, consistently
  - Need to take action

How to adjust

- Identify root cause
  - Under-estimation?
  - Impediments?
  - Flaky team members?
- Get help
  - Contact TA/Professor
- Reduce scope
  - Reduce number of user stories
  - Re-estimate tasks to ensure estimates reflect reality

scalingsoftwareagility.wordpress.com/2008/10/19/jeff-sutherland's-sprint-emergency-landing-procedure/