# Mobile Game Programming

**ITP 382x (3 Units)**

**Objective**

This course provides students with an in-depth introduction to technologies and techniques used to create successful mobile games.

- At semester’s end, students will have:
  1. Implemented a smaller individual game project
  2. Implemented two larger game projects in a team environment
  3. Developed an understanding of Objective-C and Cocos2d
  4. Familiarized themselves with mobile usability and design concerns

**Concepts**


**Prerequisites**

CSCI 104 or ITP 365x

**Website**

All information, including notes and assignments, will be on Blackboard.

**Instructor**

Michael Sheehan

**Contact**

Email: msheehan@usc.edu

**Office Hours**

Posted on Blackboard

**Lab Assistant**

Adrian Swanberg (swanberg@usc.edu)

**Lecture/Lab**

M 6–9PM in OHE 540

**Course Structure**

For the first couple of weeks, students will spend the lab time working on an individual lab assignment for a simple 2D mobile game, based on the NES classic *Duck Hunt*. The intent is to familiarize students with the initial concepts covered in the first few lectures. This assignment must be completed individually.

Once the individual projects are complete, students will break into groups of 3-4 and work on programming two larger game projects, each of which will be based on an original design that the groups each devise. More information regarding the group projects is on the next page.

To engender an enhanced understanding of the mobile game industry, there will be several guest mini-lectures. Students are encouraged to ask questions.

There are two exams which are comprehensive of all topics covered.

**Textbooks**

**Required:**

*Learn Cocos2d 2: Game Development for iOS*. Steffen Itterheim. ISBN-10: 143024416X.

**Recommended:**


**Grading**

The course is graded with the following weights:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Lab Assignments</td>
<td>15%</td>
</tr>
<tr>
<td>Group Project #1</td>
<td>20%</td>
</tr>
<tr>
<td>Group Project #2</td>
<td>25%</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>20%</td>
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<tr>
<td>Final Exam</td>
<td>20%</td>
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<tr>
<td>TOTAL POSSIBLE</td>
<td>100%</td>
</tr>
</tbody>
</table>
Grading Scale

Letter grades will be assigned according to the following scale:

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>93%+</td>
<td>A</td>
</tr>
<tr>
<td>90-92%</td>
<td>A-</td>
</tr>
<tr>
<td>87-89%</td>
<td>B+</td>
</tr>
<tr>
<td>83-86%</td>
<td>B</td>
</tr>
<tr>
<td>80-82%</td>
<td>B-</td>
</tr>
<tr>
<td>77-79%</td>
<td>C+</td>
</tr>
<tr>
<td>73-76%</td>
<td>C</td>
</tr>
<tr>
<td>70-72%</td>
<td>C-</td>
</tr>
<tr>
<td>69</td>
<td>D+</td>
</tr>
<tr>
<td>67-68</td>
<td>D</td>
</tr>
<tr>
<td>66</td>
<td>D-</td>
</tr>
<tr>
<td>65 and below</td>
<td>F</td>
</tr>
</tbody>
</table>

Half percentage points will be rounded up to the next whole percentage. So for instance, 89.5% is an A-, but 89.4% is a B+.

There is no curving. Students will receive the grade they earn. Several opportunities for extra credit will be offered starting Week 4.

Projects

There are two group projects in this class. For each of these projects, you will be in a group of 3-4 students and work on a complete game concept. You are not required to work with the same group of students for both projects, but you certainly can choose to do so. For both game projects, individual contributions are also evaluated in the grading breakdown.

Group Project #1:
The first group project is intended to familiarize students with the concepts covered during the first half of the semester. Students are encouraged to be creative with their game design ideas, but the overall game concept and proposal must be approved by the instructor. Students should also follow the mobile design principles that are outlined in class when creating this concept. The proposal is required to outline specifically which items will be completed for the playable prototype, and which items are intended to be stretch and/or polish goals.

Group Project #1 is required to utilize most of the following features: texture atlases, mobile-specific input, animated sprites, and multiple scenes and layers. Furthermore, students must create a full game experience, that is, it is required to have instructions for new players, and there needs to be a clear start and end of the project.

The schedule for the first project is as follows:
Week 4 – Form groups, come up with game concept, and get approval.
Week 5-6 – Work on playable prototype milestone for the game.
Week 7 – Demonstrate playable prototype in class (graded).
Week 8 – Perform final polish/bug fixing and implement stretch goals if time allows.
Week 9 – Final Presentation for Group Project #1
The grading breakdown is as follows (as percent of overall course grade):
10% – Playable prototype (includes verification that intended features were implemented in a satisfactory manner)
10% – Final project grade (quality/polish of final resulting game, including lack of bugs, complete game experience, and fun factor)

Group Project #2:
The second group project is required to be a more advanced game than the first project. The game can either be a large expansion of group project #1, or it can be a new game entirely. This will really depend on what your first game project encompassed. The proposal criteria is the same as the first group project, but the game must now also utilize most of the following features: scrolling, tile maps, physics, 3D graphics, and multiplayer/push notifications. Playtesting and iterating based on feedback is a requirement.

The schedule for the second project is as follows:
Week 9 – Form groups, come up with game concept, and get approval.
Week 10-12 – Work on playable prototype milestone for the game.
Week 13 – Demonstrate playable prototype in class (graded).
Week 14 – Perform final polish/bug fixing and implement stretch goals if time allows.
Week 15 – Final Presentation for Group Project #2

The grading breakdown is as follows (as percent of overall course grade):
10% – Playable prototype (includes verification that intended features were implemented in a satisfactory manner)
15% – Final project grade (quality/polish of final resulting game, including lack of bugs, complete game experience, and fun factor)

Policies
Make-up policy for exams: To make up for a missed exam, the student must provide a satisfactory reason (as determined by the instructor) along with proper documentation. Make-ups are only allowed under extraordinary circumstances.

Projects: Projects must be committed and in the student’s repository by the due date. Late projects will not be accepted without penalty unless the student(s) meet the same criteria for making up exams. Assignments turned in one day late will have 20% of the total points deducted from the graded score. Assignments turned in two days late will have 50% of the total points deducted from the graded score. After two days, submissions will not be accepted thus receiving a 0.

Before logging off a computer, students must ensure that they saved projects created during the class or lab session. Any work saved to the computer will be erased after restarting the computer. ITP is not responsible for any work lost.

ITP offers Open Lab use for all students enrolled in ITP classes. These open labs are held beginning the second week of classes through the last week of classes. Specific times and days for the current semester are posted at http://itp.usc.edu/labs/
**Hardware**

Programming assignments are for iOS devices (iPad, iPhone, iPod Touch). Students are not required to have their own personal devices, as devices will be available during class as well as on a limited checkout basis from the ITP office.

**Academic Integrity**

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one’s own academic work from misuse by others as well as to avoid using another’s work as one’s own. All students are expected to understand and abide by these principles. **SCampus**, the Student Guidebook, ([www.usc.edu/scampus](http://www.usc.edu/scampus) or [http://scampus.usc.edu](http://scampus.usc.edu)) contains the University Student Conduct Code (see University Governance, Section 11.00), while the recommended sanctions are located in Appendix A.

Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: [http://www.usc.edu/student-affairs/SJACS/](http://www.usc.edu/student-affairs/SJACS/). Information on intellectual property at USC is available at: [http://usc.edu/academe/acsen/issues/ipr/index.html](http://usc.edu/academe/acsen/issues/ipr/index.html).

In this class, all code submissions will be ran against current, previous, and future students using MOSS, which is a code plagiarism identification tool. If your code significantly matches another student’s submission, you will be reported to SJACS.

Generally, the rule of thumb is that it is acceptable to discuss solutions to problems with other students, but once you are looking at someone else’s code, it crosses over into the realm of cheating. It does not matter if this code is online or from a student you know, it is cheating in all situations. Do not share your code with anyone else in this or a future section of the course, as allowing someone else to copy off your code carries the same penalty as you copying the code yourself.

**Students with Disabilities**

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. Website and contact information for DSP: [http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html](http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html), (213) 740-0776 (Phone), (213) 740-6948 (TDD only), (213) 740-8216 (FAX) [ability@usc.edu](mailto:ability@usc.edu).

**Emergency Preparedness**

In case of a declared emergency if travel to campus is not feasible, USC executive leadership will announce an electronic way for instructors to teach students in their residence halls or homes using a combination of Blackboard, teleconferencing, and other technologies.

Please activate your course in Blackboard with access to the course syllabus. Whether or not you use Blackboard regularly, these preparations will be crucial in an emergency. USC’s Blackboard learning management system and support information is available at [blackboard.usc.edu](http://blackboard.usc.edu).
## Course Outline

**Week 1 (1/13) – Course Intro and Objective-C and Cocos2d Basics**
- Course Introduction
- Why Mobile?
- Objective-C
- Cocos2d overview: Game flow, Nodes, Scenes, Layers, Sprites

**Reading:** Itterheim: Chapter 1 and 2

**Lab:** Begin Duck Hunting Lab.

**Week 2 (1/20) – No class 1/20 due to Martin Luther King’s Birthday.**

**Reading:** Itterheim: Chapter 3 and 5

**Lab:** Continue Duck Hunting Lab.

**Week 3 (1/27) – Mobile Game Input**
- Basic Touch and Multi-Touch Gestures
- Accelerometer
- Virtual joypads

**Reading:** Burba: Chapter 2

**Lab:** Duck Hunting DUE Sunday, 2/2 @ 11:59PM

**Week 4 (2/3) – Advanced 2D Graphics and Designing for Mobile**
- Texture Atlases
- Animation
- Scrolling
- Usability
- Game case studies
- Designing for the impatient gamer

**Reading:** Itterheim: Chapter 4 and 6

**Lab:** Begin work on Group Project #1

**Week 5 (2/10) – Math and Physics**
- Quick overview of vector math
- Physics principles
- Box2d physics system

**Reading:** Itterheim: Chapter 7 and 12

**Lab:** Continue work on Group Project #1

**Week 6 (2/17) – No class 2/17 due to Presidents’ Day.**

**Lab:** Continue work on Group Project #1

**Week 7 (2/24) – Artificial Intelligence**
- AI behavior
- Pathfinding

**Reading:** Burba: Chapter 7

**Lab:** Present playable prototype of Group Project #1

**Week 8 (3/3) – Midterm Exam during lecture hours on 3/3**

**Lab:** Continue work on Group Project #1
<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>(3/10)</td>
<td>Tilemaps - Basic tilemaps - Isometric tilemaps&lt;br&gt;<strong>Reading:</strong> <em>Itterheim</em>: Chapter 10 and 11&lt;br&gt;<strong>Lab:</strong> Present final version of Group Project #1&lt;br&gt;<strong>Lab:</strong> Begin work on Group Project #2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spring Recess&lt;br&gt;<strong>GDC</strong>&lt;br&gt;<strong>Lab:</strong> Continue work on Group Project #2</td>
</tr>
<tr>
<td>10</td>
<td>(3/24)</td>
<td>Advanced Graphical and Audio Effects - Particle systems - Audio effects&lt;br&gt;<strong>Reading:</strong> <em>Itterheim</em>: Chapter 9; <em>Burba</em>: Chapter 6&lt;br&gt;<strong>Lab:</strong> Continue work on Group Project #2</td>
</tr>
<tr>
<td>11</td>
<td>(3/31)</td>
<td>Connecting to the World - Multiplayer principles - Game Center and competitors - Push Notifications&lt;br&gt;<strong>Reading:</strong> <em>Itterheim</em>: Chapter 14&lt;br&gt;<strong>Lab:</strong> Continue work on Group Project #2</td>
</tr>
<tr>
<td>12</td>
<td>(4/7)</td>
<td>Augmented Reality Games - “Social” mobile gaming - ARG case studies - Design principles&lt;br&gt;<strong>Lab:</strong> Continue work on Group Project #2</td>
</tr>
<tr>
<td>13</td>
<td>(4/14)</td>
<td>3D Introduction - 3D math primer - Basics of the 3D world - 3D rendering essentials - Using UDK for 3D development&lt;br&gt;<strong>Reading:</strong> <em>Burba</em>: Chapter 8&lt;br&gt;<strong>Lab:</strong> Present playable prototype of Group Project #2</td>
</tr>
<tr>
<td>14</td>
<td>(4/21)</td>
<td>Advanced 3D on Mobile - Shaders on mobile - Advanced 3D effects&lt;br&gt;<strong>Lab:</strong> Continue work on Group Project #2</td>
</tr>
<tr>
<td>15</td>
<td>(4/28)</td>
<td>Publishing and Conclusion - Deploying on the App Store - Thin line between success and failure - Future of mobile games&lt;br&gt;<strong>Reading:</strong> <em>Itterheim</em>: Chapter 17&lt;br&gt;<strong>Lab:</strong> Present final version of Group Project #2</td>
</tr>
</tbody>
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**Final Exam 5/12 @ 7PM**