ITP-382 “Mobile Game Programming”
Units: 4
Fall 2024
Mon&Wed 10:00-11:50 am

Location: KAP 267

Instructor: Matt Whiting

Office: RRB 221
Office Hours:
   TBD See Piazza for latest

Contact Info:
   Email: whitingm@usc.edu
   Skype: crashlotus
   Discord: Matt Whiting#2805

IT Help: Viterbi IT

Hours of Service:
Monday – Friday, 8:30 a.m. – 5:00 p.m.
Contact Info:
   DRB 205
   (213) 740-0517
   engrhelp@usc.edu
Course Description

Cell phones and tablets are everywhere today. Everyone has at least one, and they usually carry one around at all times. Everyone plays mobile games – even people who don’t consider themselves video game players.

With just a few extra skills, any programmer can learn to build and distribute unique and creative mobile games.

Catalogue Description

Application of techniques used to develop games for mobile devices. Sprites, mobile input, mobile graphics and monetization.

Learning Objectives

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

At semester’s end, students will have:

1. Developed a solid foundation in software engineering for mobile games
2. Gained an understanding of Unity & programming in C#
3. Demonstrated an understanding of the unique design requirements of supporting mobile devices
4. Deployed a game onto multiple different iOS and Android devices
5. Distributed a game via App Store Connect and Google Play
6. Applied these concepts creatively to develop their own unique game and deploy it to mobile devices

Prerequisite(s): CSCI-104 or ITP-365
Co-Requisite(s): n/a
Concurrent Enrollment: n/a
Recommended Preparation: prior experience with Unity

Course Notes

Each week is centered around a specific mobile game project. Each class session will begin with a lecture where we discuss new topics. After the lecture, the remainder of the in-class period will be devoted to building that week’s Lab Project. These projects are individual week-long mobile game programs, and the due dates are listed in the schedule below. Lab Projects are always due by 10 am before the start of the class on that day.

In this way, students get hands-on practice with the concepts while also getting an overview of several influential mobile games and the design lessons they have to teach us.

The in-class lectures are supplemented by pre-recorded videos to augment the lecture material and fill in the gaps for students with varied previous experience.

We will use a variety of online services in the classroom. Assignments and lecture notes can be found on Blackboard. The Lab Projects are in Github Classroom. Outside the class, questions and discussion can be found on Piazza.
Technological Proficiency and Hardware/Software Required

We will be programming in C#, so previous experience with either C# or C++ is required. Students with significant previous experience with C# in Unity may be allowed to waive the C++ prerequisite.

Required Readings and Supplementary Materials


*Recommended:*


Description and Assessment of Assignments, Grading Breakdown

<table>
<thead>
<tr>
<th>Assignment</th>
<th>% of grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab Projects</td>
<td>30</td>
</tr>
<tr>
<td>In-Class</td>
<td>10</td>
</tr>
<tr>
<td>Lab Report Summary</td>
<td>10</td>
</tr>
<tr>
<td>Individual Project</td>
<td>10</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>20</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

**Lab Projects**

Each week is focused on an individual mobile game project. We will use roughly half of our in-class time each day to work on these projects with the help of the instructor and TA(s).

Each Lab Project begins with base requirements that all students must fulfill. After that, the assignment is divided into three Tracks: Programming, Design, and Art. After fulfilling the base requirements, each student may choose a track and perform the tasks called for on that track.

**In-Class**

Roughly half of our lecture time is devoted to working on the Lab Projects each day. As such, it is expected that students attend the session and dedicate themselves to working on the appropriate assignments during that time.

Students will receive credit for being present and working on class-related material each day.

In-Class credits will also be accumulated for use as Late Credits (see below).

**Lab Report Summary**

Along with completing the functional game, each lab assignment concludes by filling out a short form where the students reflect on what they learned and accomplished with the project.
**Individual Project**
The series of weekly Lab Projects culminates with a unique, individually designed and created game project. The project will be formally presented to the class during the last in-class session.

The individual project will take place over several weeks, and the grade has been subdivided into milestones along the way.

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>10%</td>
</tr>
<tr>
<td>Prototype</td>
<td>20%</td>
</tr>
<tr>
<td>Presentation</td>
<td>20%</td>
</tr>
<tr>
<td>Game</td>
<td>50%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
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</tbody>
</table>

**Midterm Exam**
There will be a midterm exam in the form of a programming task that must be completed in the classroom during the specified lecture period. The midterm exam instructions will be on Blackboard, and it will be turned in via Github Classroom.

**Final Exam**
Finally, there will be an exam in the form of a programming task that must be completed in the classroom during the final exam period. The final exam instructions will be on Blackboard, and it will be turned in via Github Classroom.

**Assignment Submission Policy**
In-Class checkoffs are recorded during the class period. Lab Projects, the Individual Project, and the exams are submitted to Github Classroom. Finally, the Lab Report Summaries are Google Forms.

**Lab Project Late Credits**
Each student begins the semester with 2 Late Credits.

For every 5 In-Class credits they earn, each student will accrue 1 additional Late Credit.

Each Late Credit can be exchanged for a 24-hour, no questions asked extension on a Lab Project (including the Lab Report Summary).

There is a form ([https://forms.gle/LzaGcahrFVjkJEm8](https://forms.gle/LzaGcahrFVjkJEm8)) for requesting the extension, and it must be filled out no later than the due date for the affected Lab Project.

Late credits cannot be applied to exams nor any step of the Individual Project.

Exams will not be accepted late unless specific exceptions have been arranged in advance.
Grading Scale
Course final grades will be determined using the following scale

A    93-100
A-   90-92
B+   87-89
B    83-86
B-   80-82
C+   77-79
C    73-76
C-   70-72
D+   67-69
D    63-66
D-   60-62
F    59 and below

Half percentage points will be rounded up to the next whole percentage. For instance, 89.50% is an A-, but 89.49% is a B+. 
# Course Schedule: A Weekly Breakdown

*Subject to modification and update prior to the beginning of class August 26, 2024*

<table>
<thead>
<tr>
<th>Week 1 8/26</th>
<th>Topics</th>
<th>Assignment</th>
<th>Read it Before Class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Course Introduction, Building to Device, Mouse 0 as Touch</td>
<td><strong>In-Class 01:</strong> github</td>
<td>Gibson: Chapter 17, Appendix C</td>
</tr>
<tr>
<td></td>
<td>GameObjects, Transforms</td>
<td><strong>Begin:</strong> Blackjack</td>
<td>Gibson: Preface, Chapters 18-24</td>
</tr>
<tr>
<td>Week 2 9/2</td>
<td></td>
<td><strong>No Class</strong></td>
<td>Labor Day</td>
</tr>
<tr>
<td>Week 2 9/4</td>
<td>Sprites, Prefabs</td>
<td><strong>Continue:</strong> Blackjack</td>
<td>[Supplementary][1]</td>
</tr>
<tr>
<td>Week 2 9/9</td>
<td>Accelerometer, XML Resource Data</td>
<td><strong>Due 10am:</strong> Blackjack <strong>Begin:</strong> Heads Up!</td>
<td>Gibson: Chapters 24-26, Appendix A</td>
</tr>
<tr>
<td>Week 3 9/11</td>
<td>Coroutines</td>
<td><strong>Continue:</strong> Heads Up!</td>
<td>Gibson: Appendix B (“Math Concepts” and “Interpolation”)</td>
</tr>
<tr>
<td>Week 4 9/16</td>
<td>Sprite Animation</td>
<td><strong>Due 10am:</strong> Heads Up! <strong>Begin:</strong> Missile Command</td>
<td></td>
</tr>
<tr>
<td>Week 4 9/18</td>
<td>Collision Detection, Audio</td>
<td><strong>Continue:</strong> Missile Command</td>
<td>Gibson: Appendix B (“C# and Unity Coding Concepts”)</td>
</tr>
<tr>
<td>Week 5 9/23</td>
<td>Infinite Scrolling, Procedural Levels</td>
<td><strong>Due 10am:</strong> Missile Command <strong>Begin:</strong> Flappy Bird</td>
<td></td>
</tr>
<tr>
<td>Week 5 9/25</td>
<td>Swipe Input, UI</td>
<td><strong>Continue:</strong> Flappy Bird</td>
<td>Gibson: Chapter 1</td>
</tr>
<tr>
<td>Week 6 9/30</td>
<td>3D and 3D Animation, Screen-to-World Transform</td>
<td><strong>Due 10am:</strong> Flappy Bird <strong>Begin:</strong> Candy Crush</td>
<td></td>
</tr>
<tr>
<td>Week 6 10/2</td>
<td>Custom Shaders</td>
<td><strong>Continue:</strong> Candy Crush</td>
<td>Gibson: Chapter 2</td>
</tr>
<tr>
<td>Week 7 10/7</td>
<td>Midterm Review</td>
<td><strong>Due 10am:</strong> Candy Crush</td>
<td></td>
</tr>
<tr>
<td>Week 7 10/9</td>
<td>Midterm Exam</td>
<td></td>
<td>Gibson: Chapter 7</td>
</tr>
<tr>
<td>Week 8 10/14</td>
<td>Object Pools</td>
<td><strong>Begin:</strong> Subway Surfer</td>
<td></td>
</tr>
<tr>
<td>Week 8 10/16</td>
<td>Save/Load</td>
<td><strong>Continue:</strong> Subway Surfer</td>
<td>Gibson: Chapter 8</td>
</tr>
<tr>
<td>Week 9 10/21</td>
<td>Streaming Assets, Android Asset Packs</td>
<td><strong>Due 10am:</strong> Subway Surfer <strong>Begin:</strong> Clash of Clans 1</td>
<td></td>
</tr>
<tr>
<td>Week 9  10/23</td>
<td>Camera</td>
<td><strong>Continue</strong>: Clash of Clans 1</td>
<td>Gibson: Chapter 9</td>
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<tr>
<td>Week 10 10/28</td>
<td>Virtual Joysticks</td>
<td><strong>Due 10am</strong>: Clash of Clans 1&lt;br&gt;<strong>Begin</strong>: Fortnite</td>
<td>Supplementary [2]</td>
</tr>
<tr>
<td>Week 10 10/30</td>
<td>Animation Blend Trees</td>
<td><strong>Continue</strong>: Fortnite</td>
<td>Gibson: Chapter 10</td>
</tr>
<tr>
<td>Week 11 11/4</td>
<td>AI Navigation</td>
<td><strong>Due 10am</strong>: Fortnite&lt;br&gt;<strong>Begin</strong>: Clash of Clans 2</td>
<td>Supplementary [3]</td>
</tr>
<tr>
<td>Week 11 11/6</td>
<td>AI State Machines</td>
<td><strong>Continue</strong>: Clash of Clans 2</td>
<td>Gibson: Chapters 11 &amp; 12</td>
</tr>
<tr>
<td>Week 12 11/11</td>
<td>Project Setup</td>
<td><strong>Due 10am</strong>: Clash of Clans 2&lt;br&gt;<strong>Begin</strong>: Project</td>
<td>Supplementary [4]</td>
</tr>
<tr>
<td>Week 12 11/13</td>
<td>Sprite Atlas</td>
<td><strong>Due 10am</strong>: Project Design&lt;br&gt;<strong>Continue</strong>: Project</td>
<td>Gibson: Chapter 13</td>
</tr>
<tr>
<td>Week 13 11/18</td>
<td>In-App Purchases</td>
<td><strong>Continue</strong>: Project</td>
<td>Supplementary [5]</td>
</tr>
<tr>
<td>Week 13 11/20</td>
<td>In-Game Ads</td>
<td><strong>Due 10am</strong>: Project&lt;br&gt;Prototype&lt;br&gt;<strong>Continue</strong>: Project</td>
<td>Gibson: Chapter 14</td>
</tr>
<tr>
<td>Week 14 11/25</td>
<td>Analytics</td>
<td><strong>Continue</strong>: Project</td>
<td></td>
</tr>
<tr>
<td>Week 14 11/27</td>
<td>No Class&lt;br&gt;Thanksgiving Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week 15 12/2</td>
<td>Language Support</td>
<td><strong>Continue</strong>: Project</td>
<td></td>
</tr>
<tr>
<td>Week 15 12/4</td>
<td>Project Presentations</td>
<td><strong>Due 10am</strong>: Project</td>
<td></td>
</tr>
<tr>
<td><strong>Final Exam</strong></td>
<td></td>
<td>In the Classroom Monday Dec 16 8-10am</td>
<td></td>
</tr>
</tbody>
</table>
Supplemental Reading:

Andrea Knezovic, April 12, 2023
https://www.blog.udonis.co/mobile-marketing/mobile-games/mobile-gaming-statistics

[2] Cost Per Thousand (CPM)
Will Kenton, June 11, 2023
https://www.investopedia.com/terms/c/cpm.asp

[3] Demystifying Cost Per Install: Understanding the CPI of Your Mobile Game
Annabel Youens, 2021
https://get.theappreciationengine.com/2021/01/25/demystifying-cpi/

[4] How Much Do Games Make From Ads
Maria Martinez, Nov 30, 2022

[5] The Average Revenue for an iPhone Game
David Weedmark
https://smallbusiness.chron.com/iphone-advertising-strategy-13596.html
Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call studenthealth.usc.edu/counseling
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call suicidepreventionlifeline.org
Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press “0” after hours – 24/7 on call studenthealth.usc.edu/sexual-assault
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) - (213) 740-5086 | Title IX – (213) 821-8298 equity.usc.edu, titleix.usc.edu
Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298 usc-advocate.symplicity.com/care_report
Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity |Title IX for appropriate investigation, supportive measures, and response.

The Office of Disability Services and Programs - (213) 740-0776 dsp.usc.edu
Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.
USC Campus Support and Intervention - (213) 821-4710
campussupport.usc.edu
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101
diversity.usc.edu
Information on events, programs and training, the Provost’s Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call
dps.usc.edu, emergency.usc.edu
Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call
dps.usc.edu
Non-emergency assistance or information.

Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)
ombuds.usc.edu
A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.