



School of Engineering  
*Information  
Technology Program*

## **ITP 380 – Video Game Programming**

**Units: 4**

### **Spring 2022 Sections:**

31908

T/Th 5-6:50PM in KAP 160

Professor: Sanjay Madhav ([madhav@usc.edu](mailto:madhav@usc.edu))

31902

T/Th 7-8:50PM in GFS 116

Clark Kromenaker ([kromenak@usc.edu](mailto:kromenak@usc.edu))

### **Remote Attendance:**

The general expectation of the University is that students will attend in-person unless they have an approved accommodation, are stuck overseas, or are currently experiencing symptoms and should isolate. This course will accommodate remote students via Zoom and Discord, though we encourage students to attend in person if at all possible.

**Office:** See Piazza

**Office Hours:** See Piazza

**Contact Info:** Ask all general course/assignments questions on Piazza (every student will receive an invitation at the start of the semester).

Personal questions and questions from prospective students should be directed via email to the instructor(s).

**Teaching Assistants:** TBA

**Office:** See Piazza

**Office Hours:** See Piazza

**Contact Info:** Via Piazza

## Course Description

This course provides students with an in-depth introduction to technologies and techniques used in the game industry today. Students will learn to program and create several different games in C++, starting with 2D games and moving on to 3D. This course focuses on practical, hands-on information that's critical to learning how to be a successful video game programmer.

## Learning Objectives

At semester's end, students will have:

1. Gained an understanding of core game systems (incl. rendering, input, sound, and collision/physics)
2. Developed a strong understanding of essential mathematics for games
3. Written several functional games in C++ individually
4. Learned critical thinking skills required to continue further study in the field

**Prerequisite(s):** CSCI 104L or ITP 365

## Course Structure

Most weeks, we have a lecture on Tuesday and a lab assignment assigned in class on Thursday. Students are required to submit part of each assignment by the end of day on Thursday, and the final submission is due the following Wednesday at the end of day.

## Exams

There is a midterm and a cumulative final exam.

## Textbook

Madhav, Sanjay. *Game Programming in C++*. Pearson. 2018. ISBN-10: 0134597206.

Students can read this book for free through the USC library website ([here](#)).

Alternatively, students can purchase a copy of the book from Amazon or the USC bookstore.

## Course Notes

Lecture slides and links to assignments will all be posted on Blackboard. Lectures will automatically be recorded and links will be posted on Blackboard. Course discussions will occur on Piazza. Assignments will be submitted on GitHub.

## Hardware Requirements

Students should have access to a computer running either Windows or MacOS. Students who do not have a computer may check one out on a weekly basis from the ITP office in OHE 412. Linux may work, but is technically unsupported.

## Grading

In-class labs are graded Credit (CR)/No Credit (NC).

Exams are graded on a points scale from 0 to 100.

Lab assignments are graded using a specification-based grading system. You can receive one of four grades: A, B, C, or F. We will discuss what each of these grades constitutes in the first class meeting.

Your lab assignments will be graded by Course TAs. With the exception of the final assignment, all assignments will be due at the end of day on a Wednesday, and you will receive your initial grade on Saturday (three days after the due date). When you receive your initial lab assignment grade, you will also

receive feedback on recommended changes. You may resubmit your lab for a regrade by the end of Tuesday (three days after receiving your grade). Upon regrade, you can increase your grade by at most one letter on the scale. Eg., an initial grade of F can potentially regrade it to a C, an initial grade of C can potentially regrade to a B, and an initial grade of B can potentially regrade to an A.

Final letter grades are assigned using a combined criteria. Possible grades are A, A-, B+, B, B-, C+, C, C-, D, and F.

As an example, here is the criteria to receive an A in the course:

- Get Credit (CR) on at least 9/12 in-class labs
- Get a B or higher on all 12 lab assignments
- Get an A on at least 8/12 lab assignments
- Have an average exam grade of at least 85%

The full table is listed on the next page.

### **Assignment Submission Policy**

All assignments must be submitted on GitHub in order to be graded. Instructions will be provided in class.

### **Late Policy**

We may make exceptions on the “at most one letter on a regrade” rule on a case by case basis, if you provide a documented and sufficient reason to the instructor. Beyond this, the regrade policy allows you to resubmit each lab within the regrade window to try to improve your lab grade by one letter grade.

### **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 documentation. Make-up exams are only allowed under extraordinary circumstances.

### **Plagiarism and Individual Work Policy**

In this class, programming assignments are expected to represent the individual effort of each student. All programming assignment submissions will be compared with current, previous, and future students' submissions using MOSS, which is a code plagiarism identification program. If your code significantly matches another student's submission, you will be referred to SJACS with a recommended penalty of an F in the course.

It is okay to discuss solutions to specific problems with other students, but it is not okay to look through another student's code. It does not matter if this code is online or from a student you know, it is cheating. Do not share your code with anyone else in this or a future section of the course, as allowing someone else to copy your code carries the same penalty as copying the code yourself.

### **Course Material Policy**

Do not reproduce, distribute, or post any lecture material, assignments, assignment solutions, or exams publicly without written consent of the instructor. You may take notes and make copies of course materials for your own use. You may not post course materials on sites like CourseHero. Doing so is a copyright violation and in some cases may also be an academic integrity violation that will be dealt with accordingly.

## Final Grade Criteria

Students must satisfy all criterion under a grade in order to receive that grade.

| Grade | Criteria   |
|-------|--|
| A     | <ul style="list-style-type: none"> <li>● Credit (CR) on at least 9/12 in-class labs</li> <li>● Get a B or higher on all 12 lab assignments</li> <li>● Get an A on at least 8/12 lab assignments</li> <li>● No Fs on any lab assignments</li> <li>● Average exam grade of at least 85%</li> </ul>         |
| A-    | <ul style="list-style-type: none"> <li>● Credit (CR) on at least 8/12 in-class labs</li> <li>● Get a B or higher on at least 11/12 lab assignments</li> <li>● Get an A on at least 6/12 lab assignments</li> <li>● No Fs on any lab assignments</li> <li>● Average exam grade of at least 80%</li> </ul> |
| B+    | <ul style="list-style-type: none"> <li>● Credit (CR) on at least 7/12 in-class labs</li> <li>● Get a B or higher on at least 11/12 lab assignments</li> <li>● Get an A on at least 4/12 lab assignments</li> <li>● No Fs on any lab assignments</li> <li>● Average exam grade of at least 75%</li> </ul> |
| B     | <ul style="list-style-type: none"> <li>● Credit (CR) on at least 7/12 in-class labs</li> <li>● Get a B or higher on at least 10/12 lab assignments</li> <li>● Get an A on at least 3/12 lab assignments</li> <li>● No Fs on any lab assignments</li> <li>● Average exam grade of at least 75%</li> </ul> |
| B-    | <ul style="list-style-type: none"> <li>● Credit (CR) on at least 6/12 in-class labs</li> <li>● Get a B or higher on at least 9/12 lab assignments</li> <li>● No more than 1 grade of F on any lab assignments</li> <li>● Average exam grade of at least 70%</li> </ul>                                   |
| C+    | <ul style="list-style-type: none"> <li>● Credit (CR) on at least 6/12 in-class labs</li> <li>● Get a B or higher on at least 8/12 lab assignments</li> <li>● No more than 2 grades of F on any lab assignments</li> <li>● Average exam grade of at least 70%</li> </ul>                                  |
| C     | <ul style="list-style-type: none"> <li>● Credit (CR) on at least 5/12 in-class labs</li> <li>● Get a B or higher on at least 7/12 lab assignments</li> <li>● No more than 2 grades of F on any lab assignments</li> <li>● Average exam grade of at least 65%</li> </ul>                                  |
| C-    | <ul style="list-style-type: none"> <li>● Credit (CR) on at least 4/12 in-class labs</li> <li>● Get a B or higher on at least 6/12 lab assignments</li> <li>● No more than 3 grades of F on any lab assignments</li> <li>● Average exam grade of at least 60%</li> </ul>                                  |
| D     | <ul style="list-style-type: none"> <li>● Credit (CR) on at least 3/12 in-class labs</li> <li>● Get a B or higher on at least 5/12 lab assignments</li> <li>● No more than 4 grades of F on any lab assignments</li> <li>● Average exam grade of at least 55%</li> </ul>                                  |
| F     | <ul style="list-style-type: none"> <li>● Fail to meet criteria for a D</li> </ul>  |

*Note:* D+ or D- grades are not assigned in this course.

## Course Schedule

| Date         | Lecture Topics                                   | Readings   | Due Dates                     |
|--------------|--|--|-------------------------------|
| 1/11         | Course Intro; Game Programming Basics            | Ch. 1 (pp. 1-14; 23-31)  |                               |
| 1/13         | Lab 1: Pong                                      |  |                               |
| 1/18         | Game Object Models; Vector Basics                | Ch. 2 (pp. 33-42); Ch. 3 (skip dot/cross product)                          | <b>Lab 1: 1/19 @ 11:59PM</b>  |
| 1/20         | Lab 2: Asteroids                                 |  |                               |
| 1/25         | AABBs; Levels; Dot Product                       | Ch. 3 (pp. 68-70); Ch. 8 (pp. 248-251); Ch. 10 (302-306; 311-312; 331-333) | <b>Lab 2: 1/26 @ 11:59PM</b>  |
| 1/27         | Lab 3: Frogger                                   |  |                               |
| 2/1          | Platforming & Basic Sounds                       | Ch. 2 (pp. 44-53); Ch. 3 (pp. 79-81)                                       | <b>Lab 3: 2/2 @ 11:59PM</b>   |
| 2/3          | Lab 4: Mario                                     |  |                               |
| 2/8          | Graphics Basics & 2D Techniques                  | Ch. 2 (excluding pp. 33-42)  | <b>Lab 4: 2/9 @ 11:59PM</b>   |
| 2/10         | Lab 5: Pac-Man                                   |  |                               |
| 2/15         | Artificial Intelligence                          | Ch. 4 (pp. 91-116)   | <b>Lab 5: 2/16 @ 11:59PM</b>  |
| 2/17         | Lab 6: Zelda                                     |  |                               |
| 2/22         | Midterm Practice/Review                          |  |                               |
| 2/24         | <b>Midterm Exam</b>                              |  |                               |
| 3/1          | 3D Graphics and Transforms                       | Ch. 5 (pp. 148-161)  | <b>Lab 6: 3/2 @ 11:59PM</b>   |
| 3/3          | Lab 7: Star Fox                                  |  |                               |
| 3/8          | More 3D Graphics; Cameras                        | Ch. 9 (pp. 275-283)  | <b>Lab 7: 3/9 @ 11:59PM</b>   |
| 3/10         | Lab 8: Mario Kart                                |  |                               |
|              | <b>Spring Break</b>                              |  |                               |
| 3/22         | Topics for Lab 9; FPS Cameras                    | Ch. 9 (read sections corresponding to slides)                              | <b>Lab 8: 3/23 @ 11:59PM</b>  |
| 3/24         | Lab 9 – Parkour’s Edge, Part 1                   |  |                               |
| 3/29         | Topics for Lab 10; Collisions                    | Ch. 10 (read sections corresponding to slides)                             | <b>Lab 9: 3/30 @ 11:59PM</b>  |
| 3/31         | Lab 10 – Parkour’s Edge, Part 2                  |  |                               |
| 4/5          | Miscellaneous Topics                             | Ch. 11   | <b>Lab 10: 4/6 @ 11:59PM</b>  |
| 4/7          | Lab 11 – Parkour’s Edge, Part 3                  |  |                               |
| 4/12         | More Graphics Topics                             | Ch. 6 (read sections corresponding to slides)                              | <b>Lab 11: 4/13 @ 11:59PM</b> |
| 4/14         | Lab 12 – Parkour’s Edge, Part 4                  |  |                               |
| 4/19         | TBD  |  | <b>Lab 12: 4/20 @ 11:59PM</b> |
| 4/21         | TBD  |  |                               |
| 4/26         | Getting Hired in the Game Industry               |  |                               |
| 4/28         | Final Exam Practice/Review                       |  |                               |
| <b>FINAL</b> | <b>Final Exam as per the final exam schedule</b> |  |                               |

## 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](http://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](http://policy.usc.edu/scientific-misconduct).

### Support Systems:

*Counseling and Mental Health - (213) 740-9355 – 24/7 on call*  
[studenthealth.usc.edu/counseling](http://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](http://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](http://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](http://equity.usc.edu), [titleix.usc.edu](http://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.symlicity.com/care\\_report](http://usc-advocate.symlicity.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](http://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](http://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](http://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](http://dps.usc.edu), [emergency.usc.edu](http://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](http://dps.usc.edu)

Non-emergency assistance or information.