

# CSS 452 A Wi 22: Game Engine Development

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Tuesday 11am-1pm: Virtual Via Zoom

Friday 11am-1pm: UW1-220 (**Subject to University Policy**)

## COVID-19 Related Resources

Course Zoom URL: <https://washington.zoom.us/j/92683768727>

<https://washington.zoom.us/j/92683768727?pwd=VnJjQk1iSnNhaXEzdIZ4Nm90cXJyd09> (code: 452)

[Class shared drive](https://drive.google.com/drive/folders/1AbYMgyPFOk0BM7jraPf05XT9fSDfCCYM) [\\_https://drive.google.com/drive/folders/1AbYMgyPFOk0BM7jraPf05XT9fSDfCCYM](https://drive.google.com/drive/folders/1AbYMgyPFOk0BM7jraPf05XT9fSDfCCYM): access to recorded lecture, final project shared docs

CSS452 Course Discord: <https://discord.gg/aYUBSFTAA8> [\\_https://discord.gg/aYUBSFTAA8](https://discord.gg/aYUBSFTAA8)

Remote Learning: [notes on learning via Zoom](#)

<https://docs.google.com/document/d/1Wutj7AOKPEvDakgK5lk2M23BCemtYQ5gIKLghl0df5M/edit?usp=sharing>

Student Help for Learning Online <https://www.uwb.edu/it/student-continuity>

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**Name:** Kelvin Sung

**Office:** UW1-260-O

**Email:** ksung@uw.edu

**Office Hours:** Mon 12-2pm (or email for appointment) Zoom:

<https://washington.zoom.us/j/97352723875>  
[https://washington.zoom.us/j/97352723875?](https://washington.zoom.us/j/97352723875?pwd=cFBsdK92M0JLSXZjSk54V2dHdFhQQT09)  
[pwd=cFBsdK92M0JLSXZjSk54V2dHdFhQQT09](https://washington.zoom.us/j/97352723875?pwd=cFBsdK92M0JLSXZjSk54V2dHdFhQQT09)  
(code 1234)



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This class studies the technical fundamentals and the implementation of a 2D game engine from two important aspects: programmability and maintainability. Relevant concepts from software engineering, computer graphics, mathematics, physics, user interface, and game development will be presented in the context of game engine architecture, world coordinate system specification, object behaviors and interactions, camera manipulations, illumination, and game physics. The coverage of each topic will be coupled with the analysis of sample implementation source code and students will be challenged to extend the provided functionality. Beginning from scratch, the implementation of the concepts continuously build upon preceding results based on a software architecture that facilitates programmability by game developers supports maintainability which enables code reuse, ongoing system upkeep, improvement, and expansion.

**Prerequisites:** CSS343 with a grade of C or better; may not be repeated.

## Grading (approximate)

Programming Assignments (5)	60%
Weekly Assignments	15%
Classroom Participation	5%
Final Project	20%

## Required Textbooks

- **Engine:** Build your own 2D Game Engine and Create Great Web Games, Sung, Pavleas, Munson, Pace. Apress, Dec 2021.
- **Reference books:**
  - Interactive Computer Graphics: A Top Down Approach with WebGL. Angle and Shreiner. Pearson Education, 2014.
  - Elementary Linear Algebra: Applications Version, 11th edition. Anton and Rorres. Wiley, 2013.

## Approximated Schedule

Depending on class progress and what the class wants to learn, the following schedule is subjected to change, especially the latter part of the class.

Week	Topics	Reading	Date	Notes
1	Intro + Working with API	Chap:1-3	Jan 4, 7	<b>Assign:</b> MP1
2	Game Engine Components	Chap: 4	Jan 11, 14	<b>Assign:</b> MP2 <b>Due:</b> MP1



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4	Behaviors + Collisions	Chap 6	Jan 25, 28	<b>Assign:</b> MP4 <b>Due:</b> MP 3
5	Camera Manipulations	Chap 7	Feb 1, 4	
6	Lights + Illuminations	Chap 8	Feb 8, 11	<b>Assign:</b> MP5 + Final Project <b>Due:</b> MP4
7	Final Project: Game Survey Presentation Lights + Illumination continue	Chap 8	Feb 15, 18	<b>Due:</b> Game Survey
8	Final Project: API Proposal Rigid Bodies + Motion Simulation	Chap 9	Feb 22, 25	<b>Due:</b> API Proposal <b>Due:</b> MP5
9	Relaxation Loop + Impulse Response	Chap 9	Mar 1, 4	
10	Final Project: Progress Demo Final catch up		Mar 8, 11	<b>Due:</b> Progress Demo
11	Final's Week: Final Project Demo		Mar 15	<b>Due:</b> Final Demo

## Submitting Programming Assignments (MPs)

**Submitting Source Code:** You will submit your source code of each programming assignment (or machine problem, or mp) and the grader will run/test your submissions. We will be using the canvas facility (refer to the course web-site for the canvas submission link). There is a folder with the corresponding mp number on the submission site (e.g. mp1, mp2, etc.). Before the due time of the assignment, you should:

- Create a folder containing all the relevant source files of your mp and a folder containing the index.html,

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- Use your first and last name and mp# as the name of your folder. Please **do not include blank space** as part of the name for this folder (i.e. **do** use “KelvinSungMp1” as folder name, and **do not** use “Kelvin Sung MP1” with blank spaces.)
- Please zip up our folder into one zip file. Go to our course submission area and “turn in” you .zip file.
- Submit as many times as you wish, the grader will only look at the last one received before the deadline. Please **do not** submit hard copies of your program. Let’s save some trees, we will look at your source code electronically.

In addition, and **very importantly**, you should always download your submission, un-zip/load-into-NetBeans/run to ensure your submission is correct. Remember, the grader will download your submission, unzip, load into NetBeans, and run. You will lose credits if anything in your submission should prevent us from automating this process. You have been warned.

You are responsible to ensure that the files you submitted are correct. On the due date of the mp, the corresponding directory will be **close** at precisely the due time. After which, you **will not be able to submit your work!** We **will not** accept submissions via emails. You are responsible to ensure that the files you submitted are correct. Minor submission mistakes (e.g. missed a small file) will result in significant deduction from the assignment. Major submission mistakes (e.g. forgot to include a major source code file) will be treated as incomplete assignment and you will get **0%** for the assignment. On a case-by-case basis, I will decide if a submission mistake is minor or major. There will be no exceptions!

If there is an emergency and/or personal difficulty, please talk to me in person. Remember to document your code, and practice the good programming skills.

## General Policies

**Assignment Deadlines:** There will be no late assignments accepted. Let me put this in another way, there will be no late assignments accepted. These apply to both homework assignments and machine problems. Pay attention to the deadline on the assignments (including the time), there will be no late assignments accepted. Let me explain this again, there will be no late assignments accepted. I am actually a reasonable person, come talk to me about exceptional circumstances. You know the deadlines now please plan ahead.

**Lateness to classes:** It does not bother me, just don’t disturb anyone. If you want to leave early, it would be very nice if you could give me advance warning. If that’s too much trouble, or if you forgot, don’t worry, just don’t disturb anyone and leave quietly.

**Commitments and such:** I am usually very easy going. I like relaxed classrooms for learning and will try my best to create such an environment. Please do not confuse relax environment with relax requirements. I work hard, and expect students to work as hard. On average, each percentage of your assignments should represent one-two hours of outside-of-class time. For example, if an MP worth 8%, then on average, you will probably need about 10-15 hours to finish this assignment. Please use this as a reference and let me know if you are spending too much time on the assignments. If most of you are experiencing the same problem, then we will have to adjust the amount of work. Please consider if you have the time this quarter for this class. If you



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**Group Assignments:** The final project is a group assignment. You **must** form groups of two or three (with extra) to work on the final project. No groups can be less than two members.

## Problems

If you have any problem with this course, please talk to me as soon as possible. I would like to help in any way I could, but I have to know there is a problem. If you fall behind in this class, it will be difficult to catch up.

## Special Needs

If you believe that you have a disability and would like academic accommodations, please contact [Disability Resources for Students](http://www.uwb.edu/student-services/drs) (<http://www.uwb.edu/student-services/drs>) (UW1-175) at 425.352.5307 or at [drs@uwb.edu](mailto:drs@uwb.edu) (<mailto:drs@uwb.edu>). In most cases, you will need to provide documentation of your disability as part of the review process. I will coordinate with the University to ensure that the appropriate accommodations are made in this class.

**Access and Accommodations:** Your experience in this class is important to me. If you have already established accommodations with Disability Resources for Students (DRS), please communicate your approved accommodations to me at your earliest convenience so we can discuss your needs in this course. If you have not yet established services through DRS, but have a temporary health condition or permanent disability that requires accommodations (conditions include but not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), you are welcome to contact [Disability Resources for Students](http://www.uwb.edu/student-services/drs) (<http://www.uwb.edu/student-services/drs>) (UW1-175) at 425.352.5307 or at [drs@uwb.edu](mailto:drs@uwb.edu) (<mailto:drs@uwb.edu>). DRS offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions. Reasonable accommodations are established through an interactive process between you, your instructor(s), and DRS. It is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law.

**For Our Veterans:** If you are a student who has served in our nation's military forces, welcome home, and thank you for your service. I hope that you feel comfortable enough to confidentially self-identify yourself to me so I can help you make a successful transition from the military to higher education.

**Religious Accommodation Policy:** Washington state law requires that UW develop a policy for accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The UW's policy, including more information about how to request an accommodation is available at [Religious Accommodations Policy](#)

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## Academic Conduct

Student Code of Conduct: <http://apps.leg.wa.gov/WAC/default.aspx?cite=478-120>

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*“The university is a public institution having special responsibility for providing instruction in higher education, for advancing knowledge through scholarship and research, and for providing related services to the community. As a center of learning, the university also has the obligation to maintain conditions conducive to freedom of inquiry and expression to the maximum degree compatible with the orderly conduct of its functions. For these purposes, the university is governed by the rules, regulations, procedures, policies, and standards of conduct that safeguard its functions and protect the rights and freedoms of all members of the academic community.”*

...

*“An instructor has the **authority to exclude a student from any class session** in which the student is disorderly or disruptive. If the student persists in the disorderly or disruptive conduct, the instructor should report the matter to the dean of the school or college, or, at the University of Washington Bothell and Tacoma campuses, to the dean or director of the program in which the student is enrolled.”*

**Academic Integrity and Plagiarism:** See <http://www.uwb.edu/student-services/academicconduct>

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for crucial information regarding academic integrity. The library also has an extremely useful website with resources at <http://libguides.uwb.edu/ai> (<http://libguides.uwb.edu/ai>). You are responsible for knowing what constitutes a violation of the University of Washington Student Code, and you will be held responsible for any such violations whether they were intentional or not. Plagiarism is one of the most common violations of academic integrity, so please pay attention to both the web information and when your instructor explains all of this in class. In short, do your own work, and clearly cite all your sources. If you are unsure, ask for help!

**Privacy:** The opinion you expressed (in class discussion, in written assignments, on our course discussion board), are yours. None of this information will be shared with anyone, not even your parents.

## Other potentially useful/important information

**Inclement Weather:** Please check if the campus may be closed due to weather. Information about suspension of operations will be made public and available through the media. Students can learn of campus operations status from the website or by calling the Campus Information Hotline 425-353-3333. You may also sign up with

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Student Support Services:

IT Helpdesk: [IT@uwb.edu \(mailto:IT@uwb.edu\)](mailto:IT@uwb.edu) , 425-352-3456

Library: <http://library.uwb.edu/> [\(http://library.uwb.edu/\)](http://library.uwb.edu/) 425-352-5340

Writing Center: [www.uwb.edu/WritingCenter/](http://www.uwb.edu/WritingCenter/) [\(http://www.uwb.edu/WritingCenter/\)](http://www.uwb.edu/WritingCenter/) 425-352-5253

Quantitative Skills Center: <http://www.uwb.edu/qsc> [\(http://www.uwb.edu/qsc\)](http://www.uwb.edu/qsc) 425-352-3170

Student Success Services: <http://www.uwb.edu/cusp/studentsuccess>  
[\(http://www.uwb.edu/cusp/studentsuccess\)](http://www.uwb.edu/cusp/studentsuccess) 425-352-3776

Career Services: <http://www.uwb.edu/careers> [\(http://www.uwb.edu/careers\)](http://www.uwb.edu/careers) 425-352-3706

Student Counseling Services: <http://www.uwb.edu/studentervices/counseling>  
[\(http://www.uwb.edu/studentervices/counseling\)](http://www.uwb.edu/studentervices/counseling) 425-352-3183

Course Summary:

Date	Details	Due
Thu Jan 6, 2022	 <a href="#">Quiz 0: On Syllabus</a> <a href="https://canvas.uw.edu/courses/1541359/assignments/6929285">(https://canvas.uw.edu/courses/1541359/assignments/6929285)</a>	due by 11:59pm
Sun Jan 9, 2022	 <a href="#">Quiz 1: Basics of Shaders</a> <a href="https://canvas.uw.edu/courses/1541359/assignments/6921903">(https://canvas.uw.edu/courses/1541359/assignments/6921903)</a>	due by 11:59pm
Tue Jan 11, 2022	 <a href="#">Week 2 Lecture 1: In-Class Exercise on Drawing</a> <a href="https://canvas.uw.edu/courses/1541359/assignments/6958691">(https://canvas.uw.edu/courses/1541359/assignments/6958691)</a>	due by 11:59pm
Sat Jan 15, 2022	 <a href="#">MP1: Warm Up + API</a> <a href="https://canvas.uw.edu/courses/1541359/assignments/6921907">(https://canvas.uw.edu/courses/1541359/assignments/6921907)</a>	due by 11:59pm
Sat Jan 22, 2022	 <a href="#">MP2: One Slice Through The Engine</a> <a href="https://canvas.uw.edu/courses/1541359/assignments/6921908">(https://canvas.uw.edu/courses/1541359/assignments/6921908)</a>	due by 11:59pm
Sat Jan 29, 2022	 <a href="#">MP3: Resource Management + Fun with Camera</a> <a href="https://canvas.uw.edu/courses/1541359/assignments/6921909">(https://canvas.uw.edu/courses/1541359/assignments/6921909)</a>	due by 11:59pm
Sun Feb 6, 2022	 <a href="#">Final Project Team Formation</a> <a href="https://canvas.uw.edu/courses/1541359/assignments/6921906">(https://canvas.uw.edu/courses/1541359/assignments/6921906)</a>	due by 11:59pm
Sat Feb 12, 2022	 <a href="#">MP4: Textures and Sprites</a> <a href="https://canvas.uw.edu/courses/1541359/assignments/6921910">(https://canvas.uw.edu/courses/1541359/assignments/6921910)</a>	due by 11:59pm

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