An Introduction to CS 491

“What will matter is what you learned and how you used it.” – poster outside my office

Oregon State University

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Mike Bailey

• Professor of Computer Science, Oregon State University
• Has been in computer graphics for over 30 years
• Has had over 9,000 students in his university classes
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Kelley Engineering Center at Oregon State University, home of CS

Welcome! I'm happy to be here. I hope you are too!

I Apologize in Advance for What Noise You Might Hear in the Background 😊

Concerns Taken from our Mid-summer Qualtrics Survey

You're concerned that the course is too difficult
Hard to quantify what is “too difficult”, but hundreds of previous students have succeeded in it.

You're concerned about the math level
We will use algebra, trigonometry, and (a tiny bit of) calculus

You're concerned about the 8:00 AM class time
I want you to know that I didn't choose this time! There will be class lecture recordings. It's better to come to class, but the recordings are backups just in case.
The Premise Behind our CS 491 Topics:

1. In any simulation or game, a certain number of actions must be produced.
2. Producing them by hand is hard.
3. And oftentimes they don’t look very good that way anyway.
4. Producing them using computer programming, mathematics, physics, and algorithms makes the task easier and faster to achieve.
5. Also, this allows you to adjust parameters to get them exactly the way you want.
6. And it usually ends up looking better.

Course Topics

CS 491 topics include:

1. Parametric lines
2. Vectors: dot product, cross product, uses for dot and cross products
3. Matrices: definition, multiplication, transpose, determinant, inverse
4. GLM C++ vector and matrix classes and methods
5. 3D coordinate systems, transformations
6. Forward kinematics (Hierarchical transformations)
7. Newton’s method for solving for roots of nonlinear equations
8. Inverse kinematics using Cyclic Descend
9. Rigid-body constant-acceleration kinematics, projectiles
10. Rigid-body dynamics, integrating equations of motion
11. Keyframe animation
12. Functional Animation (Collision avoidance)
13. Collisions, impulse-momentum, rebounding
14. Particle systems
15. Modeling the world as a mesh of springs (e.g., chains, strings, cloth, jelly)
16. Guest Lectures

Grading: Points and Cutoffs

- There will be 10 quizzes, 2 tests, and 7 programming projects

<table>
<thead>
<tr>
<th>Points</th>
<th>Grade</th>
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<tbody>
<tr>
<td>910</td>
<td>A</td>
</tr>
<tr>
<td>890</td>
<td>A-</td>
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<tr>
<td>870</td>
<td>B+</td>
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<tr>
<td>850</td>
<td>B</td>
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<td>830</td>
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<td>D+</td>
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<td>730</td>
<td>D</td>
</tr>
<tr>
<td>710</td>
<td>D-</td>
</tr>
</tbody>
</table>

Total Points = 940

Grade cutoffs will be no higher than:

- Notes that this is not a 90-80-70-60 scale! I use this scale because I do a soft grade on the programming projects.

Quizzes

- Quizzes will go live on Canvas every Friday at 10:00 AM Pacific Time.
- Each quiz is due at 23:59 Pacific Time Sunday evening.
- Exception: Quiz #0 is due at 4:00 PM Friday, October 1
- There is no quiz on the Friday of Thanksgiving weekend (Week #9).
- Part of what is being quizzed is the time management skill to remember to take the quizzes. Thus, if you forgot to take the quiz, there is no make-up.
- I really recommend that you take the quiz **before the end of Friday!** That way, all your weekend activities won’t distract you from getting your quiz grade.
Students With Disabilities

Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at http://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

Religious Holidays

Oregon State University strives to respect all religious practices. If you have religious holidays that are in conflict with any of the requirements of this class, please see me immediately so that we can make alternative arrangements.

Life Events

As (John Lennon? Allen Saunders?) has said: "Life is what happens to you while you're busy making other plans". I care about you as a person. When life happens to you, send me an email and come see me. I might be able to help. I might not. But I surely can listen. You are not alone.

Reach Out for Success

University students encounter setbacks from time to time. If you encounter difficulties and need assistance, it's important to reach out. Consider discussing the situation with me or an academic advisor. Learn about resources that assist with wellness and academic success at http://oregonstate.edu/ReachOut. If you are in immediate crisis, please contact the Crisis Text Line by texting OREGON to 741-741 or call the National Suicide Prevention Lifeline at 1-800-273-TALK (8255)

Basic Needs

Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live, is urged to contact the Human Services Resource Center (HSRC) for support: hsrc@oregonstate.edu, 541-737-3747. The HSRC has a food pantry, a textbook lending program, and other resources to help. Furthermore, if you are comfortable doing so, please talk with me. I will do everything I can do to help you.