



NASC 5770

Visualization Basics: Game Programming

Tuesdays 6:00-8:00 pm



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Office Hours: TBD

Course Description: In this course, we will explore how **game programming** can be used effectively in the middle school curriculum. The course is split into two eight-week parts. During the first part, participants will learn about game programming in a variety of platforms: AgentSheets and AgentCubes, Snap! (a descendant of Scratch), and Bootstrap (which uses Scheme). The common threads will be (1) the computational thinking skills that are required to build computer games, and (2) how these relate to the appropriate teaching standards. During the second part of the course, participants will incorporate what they learned in an afterschool setting for their students and report back to each other and the research team, so that all of us can benefit from their experience.

There will be only eight meetings in this course, and our plan is to conduct seven of the meetings in a “flipped classroom” arrangement. These seven meetings will consist of in-class game programming activities. This will give you hands-on experience with the ideas we are learning. The class meetings will also provide us an opportunity to discuss the materials we are learning, and to collaborate on ideas related to incorporating game programming in your setting. Our role in the meetings will be to help you succeed in the game programming activities. More traditional lecture-style meetings, where we show you how to program in these different platforms, will be provided as short YouTube videos. You are expected to view the videos *before class* so that you can apply the knowledge during class. Think of the videos as the equivalent to traditional homework assignments.

Prerequisite(s): None.

Credit Hours: 2

Text: None.

Course Objectives:

At the completion of this course, participants will be able to:

1. Understand how game programming relates to educational standards for middle school mathematics, science, and computing.
2. Describe the basic, abstract components that comprise most computer games.
3. Write short programs in the following game/programming platforms: AgentSheets, AgentCubes, Snap!, and Bootstrap.
4. Debug non-working programs in these platforms.
5. Demonstrate knowledge of computational thinking patterns and characteristics.
6. Demonstrate the ability to foster the computational thinking patterns and characteristics of their students.
7. Demonstrate the ability to foster cultural aspects of design while teaching K-12 students game programming.

Expectations:

This course is possible because of an NSF-funded research project, so please approach this course with the intent to help the research team in its obligations. We hope that you will learn a lot about teaching

computational thinking in general, and about teaching game programming in particular. Along the way, you will become experts in computational thinking and game programming. This will not be easy, but it will be rewarding. To maximize your chances of success, and to help the project team in its research goals, please abide by the following rules:

- Attendance is mandatory.
- Active participation in class meetings and discussion boards is also expected.
- You must be prepared before class. This means watching the videos related to the class *before class*. It also means self-assessing your knowledge of the content, and seeking help in the discussion board for any items that may seem obscure.

Assessments:

Your grade in this class will be based on the following components:

- **Class participation** (30%)
- **Introspective, Weekly Journal Entries** (30%)
- **In-class Programming Challenges** (40%)

| Range | Grade | Points |
|-------------|-------|--------|
| 90.00– | A | 4.00 |
| 88.50–89.99 | A- | 3.67 |
| 87.00–88.49 | B+ | 3.33 |
| 80.00–86.99 | B | 3.00 |
| 78.50–79.99 | B- | 2.67 |
| 77.00–78.49 | C+ | 2.33 |
| 70.00–76.99 | C | 2.00 |
| 68.50–69.99 | C- | 1.67 |
| 67.00–67.49 | D+ | 1.33 |
| 60.00–66.99 | D | 1.00 |
| –59.99 | F | 0.00 |

Miscellaneous Items:

- **Disability Statement:**
 - If you have a physical, learning, or psychological disability and require accommodations, please let the instructors know as soon as possible. You must register with, and provide documentation of your disability to University Disability Support Services (UDSS) in SEO, Room 330, Knight Hall.
- **Social Justice:**
 - The University of Wyoming is committed to social justice. We concur with that commitment and expect to foster a nurturing learning environment based upon open communication, mutual respect, and non-discrimination. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color, or national origin.
- **Attendance/Participation Policy:**
 - University sponsored absences are cleared through the Office of Student Life.
- **Academic Honesty Policy:**
 - Make sure all the work that you turn in to me for grading is your own and not somebody else's. You may discuss your work with others in the class, and you may collaborate to figure out how to do an assignment. But the actual work you turn in to me must be your own. I.e., learn with others if that works for you, but do your own work in the end.

I take a very dim view of academic dishonesty. If I do discover that you are engaging in an act of academic dishonesty, I will give you a zero for that assignment. I will also deduct a letter grade from your final score (so if you get a 95%, I will mark it as a B, an 85% as a C, and so on), *regardless of the severity of the infraction*. Further, I will pass the matter on to the Dean's Office, following the procedures outlined in UW Regulation 6-802. Note that according to the UW General Bulletin any form of academic dishonesty is unacceptable to our community and will not be tolerated. UW regulation 6-802 and other UW regulations can be found at <http://www.uwyo.edu/generalcounsel/new-regulatory-structure/index.html>

Tentative Course Outline:

The weekly coverage might change as it depends on the progress of the class.

| Week | Topics |
|-------------|---------------------------------------------------------------------------|
| 1 | Introduction to relevant standards in mathematics, science, and computing |
| 2 | Introduction to AgentSheets |
| 3 | Diffusion and gradient descent in AgentSheets |
| 4 | 3 Dimensions with AgentCubes |
| 5 | Sound and Turtle Graphics with Snap! |
| 6 | Functions and recursion with Snap! |
| 7 | Functional programming with Bootstrap |
| 8 | Building a game with Bootstrap |