

CSCI 5611: Animation & Planning in Games (3 credits)  
4:00 – 5:15 Monday, Wednesday Mechanical Engineering 212  
Spring, 2019

<https://canvas.umn.edu/courses/98199>

<https://piazza.com/configure-classes/spring2019/csci5611>

Welcome to CSCI 5611 Animation & Planning in Games. This course is designed to introduce you to the state-of-the art in computer animation, AI, motion planning and other technologies that are used to bring digital worlds to life. There are many exciting topics in the field, I am happy to adjust what is covered based on the interests of those in the class. Please let me know if there is something in particular which interests you or you'd like us to cover.

## **Basic Information**

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*Instructor:* Stephen J. Guy

*E-mail:* [sjguy@umn.edu](mailto:sjguy@umn.edu)

*Office:* KH 5-225F

*Office Hours:* TBA

I'm generally available if you have questions about the course, or just want to chat about new ideas. If I'm not in my office, you can often find me in the lab, KH 5-216.

*TA:* Liam Tyler

*E-mail:* [tyler147@umn.edu](mailto:tyler147@umn.edu)

*Location:* TBA

*Office Hours:* TBA

*TA:* Matthew Overby

*E-mail:* [over0219@umn.edu](mailto:over0219@umn.edu)

*Location:* TBA

*Office Hours:* TBA

## **Course Overview**

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### **Course Objective**

The main goal of this course is to expose students to current motion planning and animation techniques and to provide them experience with implementing these techniques in the context of games, simulations and virtual environments. A secondary goal for this course is that students develop and exercise the skills needed to be an independent researcher working on the cutting edge of a discipline.

### **Course Materials**

As the intention of this course is to cover state-of-the-art approaches, no textbook covers the course material. However, students should become familiar with Google Scholar and the resources provided by the library for accessing recent scientific papers.

## **Prerequisites**

I expect students to have been exposed to at least some of the following at the undergraduate level: calculus, computer graphics, 2D/3D digital art, artificial intelligence, and statistics. If some of these areas are new to you that's great, if all are new to you come see me after class.

## **Expectation of Student**

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### **Class Participation**

Please ask questions. We will be covering very recent work, and not all questions will have clear answers, but asking questions is likely to spur good class discussions.

### **Classroom Behavior**

Please minimize use of laptops, tablets, smart phones and other electronics. Try to avoid eating in class; I'm fine with beverages.

### **Programming Experience**

Use any language or tool that produces fast simulations. Cite *any code* you got from elsewhere. Please avoid slower, interpreted languages such as Python.

### **Plagiarism & Academic Dishonesty**

Note *prominently* any sources you got code from, any libraries you used and any people you worked with. Never falsify data, analysis or research procedures.

## **Assignments and Grading**

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### **Course Work**

This class will have about 4 programming assignments, two quizzes, a (group) student presentation, and a final programming project. The final project can be completed in pairs. Students are expected to post a short write-up of each assignment to a webpage, and send a link to the instructor. There will be no final exam, but students will be asked to give a presentation of their final project during exam time and turn in a brief write-up.

### **Late Policy**

Assignments are due on the date posted. If you cannot turn something in by the deadline due to some extreme or unusual circumstance, you must contact me before the deadline passes.

### **Homework Check-In**

For assignments with deadline longer than 2 weeks, there will be a mandatory check-in part-way through. Here, you must turn in a required minimum subset of the overall project.

### **Grading Breakdown (approximate)**

40% HWs, 30% Final Project, 10% Quizzes, 10% Presentation, 10% Participation

## **Extra Credit**

Each assignment will provide ideas for extra credit. The goal of this is to encourage students to explore creative extensions of the assignment. Expanding on an assignment is a great way to get involved in research in this area, attract attention from the graphics and robotics groups, improve your cv/demo reel, or jump-start personal projects. Most importantly, please remember to document your work so we can give you credit for it!

## **Assignments**

Programming assignments will be given bi-weekly during the first portion of the course; the last several weeks will be reserved for you to work on the Final Project. The details of each assignment are subject to change, but the following should give an expectation of the type of projects that will be assigned:

- Particle System*: Create a particle system that resembles an animated fountain, fire or some other natural phenomena.
- Physical Simulation*: Simulate a physical system such as cloth or water.
- Motion Planning*: Plan the path a character can take through a virtual environment with obstacles.
- Flocking and Crowds*: Animate agents to follow paths in the style of flocks, herds and schools. Plan intelligent paths for multiple agents who must navigate around each other.
- Character Animation*: Display an articulated character walking in an environment.
- Student-led Presentations*: Students will work in small groups to prepare a short poster and/or presentation that presents a recent paper from the field. I will provide a list of suggested recent papers on the course webpage.

## **Approximate Schedule\***

- Week 1 – Introduction to Graphics and Animation
- Week 2 – Particle Systems & Collision Detection
- Week 3 – Mass-Spring Systems & Cloth Simulation
- Week 4 – Water Simulation
- Week 5 – Integration Techniques
- Week 6 – Search and Navigation
- Week 7 – Character Animation & IK
- Week 8 – Crowd Simulation
- Week 9 – Student presentations
- Week 10 – Student presentations
- Week 11 – Student presentations
- Week 12 – Sound Simulation
- Week 13 – Special Topics
- Week 14 – Special Topics
- Week 15 – Review & Special Topics
- Finals – Project Presentations

\*This schedule *will change*, as we get ahead or behind in material and discover new topics of interest. Conference travel may overlap with a couple of classes resulting in cancelations, or guest lectures. Check the course webpage for updates.

### **Graduate Students**

Note that if you are taking this class for graduate credit, several of the assignments will have increased requirements.

### **Additional Information**

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Statements on disabilities, mental health, non-discrimination, and sexual harassment can be found on the course webpage.

Please do not hesitate to contact me if any needs or considerations arise during the course.