

CS 4150/5150: GAME AI

FALL 2014 COURSE SYLLABUS

COURSE LOGISTICS

Professor: Gillian Smith

Email: gillian@ccs.neu.edu

Office: 146 Meserve Hall

Office Hours: Mondays, 12:00pm – 2:00pm, or **by appointment**

TA: Vishwanath Pai

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Office Hours: Thursdays, 3:00pm – 5:00pm

Lecture Time: Mondays and Wednesdays, 2:50pm – 4:30pm

Lecture Location: Kariotis Hall, Room 011

Course Website: <http://www.ccs.neu.edu/course/cs5150f14/>

Piazza Forums: <http://www.piazza.com/northeastern/fall2014/cs41505150/home>

COURSE DESCRIPTION

Offers an overview of classical and modern approaches to artificial intelligence in digital games. Focuses on the creation of believable agents and environments with the goal of providing a fun and engaging experience to a player. Covers player modeling, procedural content generation, behavior trees, interactive narrative, decision-making systems, cognitive modeling, and path planning. Explores different approaches for behavior generation, including learning and rule-based systems. Requires students to complete several individual assignments in these areas to apply the concepts covered in class. Students choose a group final project to explore one aspect of artificial intelligence for games in further depth. Offers students an opportunity to learn team management and communication.

PRE-REQUISITES

Undergraduate students: CS 2800 and CS 3500, or instructor permission

Graduate students: Knowledge of algorithms and experience with object-oriented design or functional programming.

LEARNING OBJECTIVES

Game AI is a very large field—far more complex than can be fully studied in a single semester. This course aims to provide a broad overview of game AI, combining study of industry standard techniques with new approaches from research. This course is also considered **writing intensive** and a **capstone** course in the undergraduate major; there will be frequent writing assignments, both in-class and as homework, and large programming projects. By the end of this course, students should be able to:

CONCEPTUAL KNOWLEDGE

- Describe different approaches to NPC AI in terms of their tradeoffs for efficiency and control
- Identify the relationships between AI authoring and game design, and understanding the roles that each play in the game design and development process
- Describe the basics of game design theory, to the extent necessary to assist in communicating with and creating tools for non-technical designers

PRACTICAL EXPERIENCE

- Implement common game AI algorithms for controlling NPCs
- Implement AI techniques common in recent game AI research, including procedural content generation
- Perform both game design and analysis as they intersect with artificial intelligence

WRITING AND COMMUNICATION SKILLS

- Iterate upon and incorporate feedback into written work
- Use writing as a form of reflection through authoring short pieces as part of the learning process
- Gain experience in how to read and write research papers

COURSE MATERIALS

There is no textbook assigned for this course. Instead, we will be reading and discussing selections from a variety of relevant textbooks, academic sources, and articles from industry professionals. Assignments will also come with online reference materials, where appropriate, that can assist with implementation. For the final project, students will be expected to seek out their own reference material, in addition to that which has been assigned in class. **All course materials will be available in PDF format from the course website.**

READING RESPONSES

You are expected to have completed reading by the time class begins on the day that it is assigned in the syllabus. Graduate students are required to read both the main assigned reading and any reading that is designated “graduate only” on the syllabus. **Students are required to author a short response that addresses every reading that has been assigned to them for that week.** All responses for a particular week are due by 11:59pm on the Friday at the end of that week.

PARTICIPATION POLICY

Participation in discussions and class activities is an important aspect on the class. There are also avenues for participation on the Piazza discussion forums (e.g. asking and answering questions about assignments, discussing readings, midterm review). It is important that both students and instructional staff help foster an environment in which students feel safe asking questions, posing their opinions, and sharing their work for critique. If at any time you feel this environment is being threatened—by other students, the TA, or the professor—speak up and make your concerns heard. If you feel uncomfortable broaching this topic with the professor, you should feel free to voice your concerns to the Dean’s office.

COLLABORATION POLICY

We learn best through collaboration with others. Students are strongly encouraged to collaborate through discussing strategies for completing assignments and talking about the readings before class. However, **all work that you turn in to me with your name on it must be in your own words and produced entirely by you.** Directly copied code or text from any other source is **not** allowed. If you have collaborated on ideas leading up to what you turn in, give each other credit, clearly labeling who contributed what ideas. Individuals should be able to explain the function of every aspect of group-produced work.

Not understanding what plagiarism or cheating is **does not** constitute an excuse for committing it. You should re-familiarize yourself with the University's policies on academic dishonesty at the beginning of the semester, especially if you came to Northeastern University from a different institution that may have different rules. If you have any doubts whatsoever about whether you are breaking the rules – ask **before** acting!

To reiterate: **plagiarism and cheating are strictly forbidden**. No excuses, no exceptions. **All** incidents of plagiarism and cheating **will** be sent to OSCCR for disciplinary review.

LATE POLICY

Assignments are due **by 11:59pm** on the due date marked on the schedule. Late assignments will receive a 10% deduction per day that they are late, including weekend days. It is your responsibility to determine whether or not it is worth spending the extra time on an assignment vs. turning in incomplete work for partial credit without penalty.

Each student has a total of 5 “late days” that can be used as desired to avoid the late penalty for assignments. When turning in an assignment late, make sure you clearly state how many late days you are electing to use. Late days can be used for any reason you want, you don't need to explain yourself or ask permission ahead of time. Note that the late days exist for helping you with your own time management—use them wisely.

Any exceptions to this policy (e.g. long-term illness or family emergencies) must be approved by the professor.

COURSE GRADE POLICY

Students are evaluated based on their participation in class (both online and during lecture), written responses to readings, performance on assignments and the midterm paper, and both the execution and presentation of a final project (which takes the place of a final exam). If a particular grade is required in this class to satisfy any external criteria—including, but not limited to, employment opportunities, visa maintenance, scholarships, and financial aid—it is the student's responsibility to earn that grade by working consistently throughout the semester. Grades will not be changed based on student need, nor will extra credit opportunities be guaranteed. **The default grade on an assignment is zero; you must earn your way up to a higher grade through concerted effort and demonstrated ability.**

The following weights will be applied to each category of work in the course when determining the final grade. However, **a zero average in any one of these categories will result in earning a failing grade for the entire course**. It is **impossible** to pass this class without participating in discussions, doing the readings and responses, taking the midterm exam, turning in the assignments, and completing a final project.

Course participation	20%
Reading responses	20%
Midterm Paper	20%
Assignment Average	20%
Final Project	20%

The course grading scale is one where 90-100 is in the A-/A range, 80-89 is the B-/B/B+ range, 70-79 is in the C-/C/C+ range, etc. **You should not expect a curve to be applied.**

SPECIAL ACCOMMODATIONS

Students who have documented disabilities of any kind should contact the instructor privately to discuss any specific needs and to agree upon reasonable accommodations. Please see the campus Disability Resource Center for information on the kinds of accommodations available through the University.

SCHEDULE

Please refer to the schedule on the course website; it is subject to change over the course of the semester. Any major updates to the schedule will be announced in class.