CS 4150/5150: GAME AI
SPRING 2016 COURSE SYLLABUS

COURSE LOGISTICS
Professor: Yetunde Folajimi
Email: y.folajimi@neu.edu
Office: 571 Holmes Hall
Office Hours: Fridays, 3:00pm – 5:00pm
Lecture Time: Wednesdays and Fridays, 11:45pm – 1:25pm
Lecture Location: Kariotis Hall, Room 110
Course Website: http://www.ccs.neu.edu/course/cs5150sp16/
Piazza Forums: https://piazza.com/class#spring2016/cs41505150

COURSE DESCRIPTION
The course aims to teach applications of Artificial Intelligence (AI) techniques in digital games towards the creation of believable agents and environments with the goal of providing a fun and engaging experience to players. The course will start with an overview of fundamental problems, theories, and algorithms of AI as it applies to problem-solving. The Techniques for design, development, and evaluation of game prototypes that use AI effectively will be discussed. Overall, the course is going to be interactive and engaging with several readings, and discussions that cover various topics in Game AI. Being practical oriented, the course will feature series of individual and group assignments and presentations. At the end of the term, students will work on a final project that demonstrates specific application of AI for game development.

In this course, we will be using the Piazza Forum (https://piazza.com/class#spring2016/cs41505150) for conducting all class-related discussion this term. If you have a question about the course that other students could benefit from hearing the answer, please post to the appropriate discussion thread on Piazza rather than sending individual emails to the instructor. You also have the choice of anonymizing your communications if necessary. The quicker you begin asking questions on Piazza (rather than via emails), the quicker you'll benefit from the collective knowledge of your classmates and instructors. We encourage you to ask questions when you're struggling to understand a concept—you can even do so anonymously.

PRE-REQUISITES
Undergraduate students: CS 2800 and CS 3500,
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. The course is treated as being part technical content and part design-based. As such, rather than having formal lectures in each class, most aspect of the course will feature in-class discussion (and sometimes activity) based on the reading assigned for that day. Students are required to write a short (1-page) summary of the reading material(s) for each class and present their write-up during the in-class discussion. The summary must be submitted by noon of the day before the in-class discussion.

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 Adaptive Game AI and 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 mandatory textbook assigned for this course. Instead, we will be reading and discussing selections from a variety of relevant textbooks, academic sources and publications as well as articles from industry professionals. Downloadable links to most of these reading materials will be provided. 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. Prior to each lecture time, students are expected to read and document a written summary of the readings assigned to each class. The summary must be submitted latest by noon on the day before each class and will be discussed orally during the class.

Mandatory Textbook:
No textbook is mandatory for this course.

Recommended Textbooks
- *Artificial Intelligence for Games*, by Ian Millington, Morgan Kaufmann, ISBN: 0-12-497782-0
- *AI Game Programming Wisdom*, Thomson Learning, Inc. – a series of books on various aspects of game development
- *AI for Game Developers*, David Bourg and Glenn Seemann, O'Reilly, ISBN: 978-0596005559
- *Artificial Intelligence: A Modern Approach, 2nd Ed. By Stuart Russel and Peter Norvig*

READING RESPONSES

You are expected to have completed the reading materials prior to the time of commencement of each class. 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 summary that addresses the reading(s) that have been assigned to them for that class and present a brief discussion during the lecture time. All responses for a particular class are due by noon of the day before that that class.

PARTICIPATION POLICY

Participation in discussions and class activities is an important aspect on the class. The Piazza forum is the official discussions forum for this class. Students are strongly encouraged to participate (e.g. asking and answering questions about assignments, posting course-related ideas, 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. You have the option of anonymizing your discussions if you are not comfortable about making them public. 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, plagiarism is a very serious offence. All work that you submit or present in class must be written 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 term, 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 noon on the due date. A late penalty of -10% per day (including weekend days) is attached to each assignment. Subject to a total of 5 late days, each students can be exempted from this rule if they obtain prior permission in writing from the professor before assignment due date. Any exceptions to this policy due to unavoidable or unforeseen circumstances such as illness or family emergencies must be approved by the professor. Students who contact the professor for extension and/or make-up assignments before the due date will be given an extension of time equal to the time lost due to the unavoidable/unforeseen circumstance

ATTENDANCE

Attendance of class meetings and participation in all presentations are mandatory. If a student is unable to attend a class due to unavoidable/unforeseen situations such as sickness, please notify your instructor/professor in writing

GUEST LECTURES

Industry guest lecturers may be invited to present material relating to their expertise. Students must realize the fact that these guests have created time out of their very busy schedules to share their knowledge as it relates to the course. Students should therefore participate fully and treat the guest lectures as any other regular class meetings.

POLICY ON ELECTRONIC DEVICES

- All phone must be set to "silent" off turned off or set to "silent" during lecture time. Any student that wishes to take calls must step outside in order to do so.
- All audible notifications or sounds on phones, tablets or laptops must be turned off during class.
- Students are allowed to use their electronic devices for taking notes or looking up relevant information but the use of Facebook, YouTube, Twitter, etc. is totally disallowed during classes

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 seminar 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	10%
Reading responses	20%
Midterm Paper	15%
Assignments	15%
Final Project	40%

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.

This syllabus is subject to change from time to time throughout the course of the semester to accommodate evolving issues that pertain to the course

Note: Some content of this course syllabus are taken from Game CS4150/5150 Fall 2014 with permission from Gillian Smith