

Game AI Syllabus

Details:

Course Numbers: LCC 4731 / 6215BM; CS 4731 / 8803 GAI

Instructor: Dr. Brian Magerko (magerkoNOSPAM at gatech dot edu)

Time & Location: T&Th, 9:35-10:55am / Skiles 171

Office hours: Th. 1-2pm or by appointment, TSRB 319

Overview:

The purpose of this course is for undergraduates in Computational Media and Computing / Digital Media graduate students to gain a breadth of understanding in the toolbox of AI approaches employed in digital games. This involves learning some basic topics covered in other AI courses, but with a focus on applied knowledge within the context of digital games.

Game AI is distinct from academic AI in that the end behavior is the target. Game AI programmers are less concerned with the underlying algorithms and more so with the end result. For example, if having an AI 'cheat' provides a more entertaining experience, then cheating will likely be a main component of the design. There are also characteristics of many games that focus Game AI on specific problems, like navigation through a virtual world, tactics, and believable behavior. Academic AI researchers are more concerned with rational behavior, knowledge representations, robust multi-agent communication, etc. However, there are overlaps between the two domains, where the desired behavior requires less cheating and more realistic decision-making. This course will survey topics related to this overlap, with a focus on applying what we review in depth through implementations in digital games.

This course also observes the difference between AI as a technical challenge for opposing forces AI in games and the integration of AI as a key aesthetic component of the gaming experience. Lectures and projects will explore both of these views of Game AI.

This syllabus should be considered a living document subject to change throughout the course of the semester. There are multiple places in the class schedule to accommodate student interests in particular subjects.

Programming Skillz:

Students are required to have solid programming skills. Experience with Java or the ability to pick it up as part of the course is required. Development using SVN or other version control methods is highly encouraged, but not required or supported by the class. Students are expected to pick up pre-existing code bases and develop their AI code within that code base as part of the class.

Required Books:

Millington's *Artificial Intelligence for Games* and Buckland's *Programming Game AI by Example*. Books have been ordered at campus Barnes & Nobles Bookstore.

Assignment Policy:

Projects are due at 12:05am via T-Square on the Saturday of the week they are due. For example, if a Project is due on Week 4 then it must be turned in no later than 12:05AM on the Saturday of Week 4. Late work will not be accepted under any circumstances.

Grading Policy:

The assignments will be weighted as follows: Assignment 1 (30%), Assignment 2 (30%), Assignment 3 (40%). Up to 10% of your grade may be deducted for failure to participate in class, being absent from required presentations and poor teamwork on team projects.

Graduate Students:

As this is a grad / undergrad course, graduate students will have additional expectations put on them to differentiate the course offerings, which are listed on the individual assignments.

Course Communication:

We will use a Google group as our main method of electronic communications and announcements. All students should add the group <http://groups.google.com/group/gatech-gameai> immediately and will be responsible for any announcements made there. The use of the group is a resource for technical and design issues students have from year to year, rather than acting as a standalone discussion on T-square.

All emails to Dr. Magerko regarding the course should contain GTGameAI in the subject. Failure to include this in the subject may result in misfiling of the email and a lack of response.

Regrade Request Policy:

If you feel like the grade for a given project was not fair, please submit within 1 week via email (with GTGameAI in the subject) of receipt of your grade a word document or PDF containing the following:

- no more than 1 page of information
- a comparison between what you submitted and the grading criteria given for the assignment and the feedback given for your assignment
- what you feel your grade SHOULD be given this comparison

Please keep in mind that a requested regrade will prompt me to revisit your project in much greater detail. Your grade may change for the better or worse depending on what I see, but will be responsive to any reasonable and well-founded requests. Requests submitted a week after your grades have been returned to you will not be accepted.

Honor Code:

Students are expected to follow the GT honor code as described here. Some points to keep in mind:

Plagiarizing is defined by Webster's as to steal and pass off (the ideas or words of another) as one's own: use (another's production) without crediting the source. If caught plagiarizing, you will be dealt with according to the GT Academic

Honor Code (<http://www.honor.gatech.edu/plugins/content/index.php?id=9>). Submitting any unattributed work other than your own is a violation of the Academic Honor Code.

I encourage you to discuss the assignments, ask questions about how to program, etc. with the instructor, TA (if available), and other students, but the code you submit must be your own. Unauthorized copying of anyone else's code is a violation of the Academic Honor Code. Unauthorized reuse of code from online is a violation of the Academic Honor Code. You're taking this class to learn how to think about and create Game AI code on your own.

Learning about algorithms from text or online sources is permissible. Copying code verbatim from online or another student is not permissible.

I heavily encourage students to use assets that encourage fair use (e.g. Creative Commons licensed audio, textures, images, etc.) or to produce their own. Unattributed use of other instancial assets, such as graphics, text, or audio, or use of such assets without reappropriating them in a meaningful way to make a clear unique contribution on the student's part is a violation of the Honor Code. Reuse of outside instancial assets is permissible, in other words, but must be done in a manner that makes it clear that you have made a major and significant contribution to the project in question.

Failure to do so will result in a failing grade

Failure to cite your sources is an Honor Code violation. Unauthorized use of any previous semester course materials, such as tests, quizzes, homework, projects, and any other coursework, is prohibited in this course. Using these materials will be considered a direct violation of academic policy and will be dealt with according to the GT Academic Honor Code.

For any questions involving these or any other Academic Honor Code issues, please consult me or visit <http://www.honor.gatech.edu>.

Course Schedule:

Students are expected to read the material assigned. If you don't intend to do the reading, don't take the class. The course schedule can be found in the Resources section in the class T-Square site.

Topic	Week	Tues	Reading	Thurs	Reading	Project
Movement	1	Introduction	Buckland, Ch. 1; Millington, Ch. 2	Search	Buckland, Ch. 5	Pacman
	2	Pathplanning	Buckland, Ch. 8	Movement	Millington, Ch. 3	
	3	FSMs	Buckland, Ch. 2	Scripting	Buckland Ch. 6; Millington 5.9	
Agents	4	Scripting	Buckland Ch. 6; Millington 5.9	PacMan presentations		due
	5	Rule-based agents	Millington, 5.6-5.7	Decision trees	Millington, 5.2; 7.4; 7.5	Super Mario Bros.
ML	6	Genetic algs.	http://www.ai-junkie.com/ga/intro/gat1.html	Neural nets	Millington, Ch. 7.7	
	7	RL	Millington, 7.6	Lab day		
	8	Fuzzy Logic	Buckland, Ch. 10	Neuroevolution	http://nn.cs.utexas.edu/?stanley:cig05 , http://nn.cs.utexas.edu/?stanley:aaai06	
	9	Project presentations (3/9)		No Class		due
Design	10	Game Design & AI, Project signups (3/16)	Millington, Ch. 12 & 13	Halo Case Study	Halo GDC talk	Your Game
	11	<i>Spring break</i>		<i>Spring break</i>		
Adv. Topics	12	Project Updates		Adaptive Games		

	13	Planning		Project updates		
	14	Believable Agents		Project updates		
	15	Interactive Narrative		Project updates		
	16	Project presentations		Project presentations		due

