

# GAM 476: Artificial Intelligence in Computer Games

## Description:

Artificial Intelligence (AI) is one of the essential components of a computer game. The course introduces basic concepts of AI. Emphasis will be placed on applications of AI in various genres of computer games. In the implementation component of this course students will be exposed to the existing AI game engines (middleware), which contain implemented AI algorithms that are ready to be applied into game code. These algorithms include: decision trees, pathfinding, neural networks, and script-driven game object behaviors. PREREQUISITE(S): GAM 372 or (SE 350 and CSC 361) PREREQUISITE(S): GAM 372 or (SE 350 and 376)

<b>Quarter/Year:</b>	AQ 2018
<b>Meeting Time:</b>	MON 5:45 – 9:00pm
<b>Location:</b>	Lewis Center 1005
<b>Type:</b>	Lecture
<b>Website:</b>	D2L, Piazza
<b>Software:</b>	Perforce, <a href="#">Unity 2018</a>
<b>Instructor:</b>	William Meyers
<b>Email:</b>	<a href="mailto:wmeyers@cdm.depaul.edu">wmeyers@cdm.depaul.edu</a>
<b>Office Hours:</b>	M/T 12:30 – 5:00pm, or by email appointment
<b>Office:</b>	CDM 849

## Learning Outcomes:

- Students will gain a breadth of understanding of current techniques and disciplines used in academic and industry in Game AI.
- Students will get hands-on experience developing AI programs in existing game engines and game projects.
- Students will be capable of developing some of the most common Game AI techniques used in the industry.
- Students will get a better understanding of the relationship between Game AI and the game development process (such as Art, Design, Narrative and Player Experience)
- Students will gain a understanding between developing artificial intelligence in the computer game industry versus other areas of research doing AI.

## Week Schedule:

### Tentative Schedule:

Week 1: Sept 11	Intro, Decision Making: Decision Trees, State Machines
Week 2: Sept 18	Movement
Week 3: Sept 25	Decision Making: Behavior Trees
Week 4: Oct 2	Decision Making: Behavior Trees
Week 5: Oct 9	Lab: Work on Final Project
Week 6: Oct 16	Path Finding
Week 7: Oct 23	Tactical & Strategic AI
Week 8: Oct 30	Learning Algorithms
Week 9: Nov 6	Learning Algorithms
Week 10: Nov 13	Lab: Work on Final Project

## Grading

- Scale:
  - A (93-100), A- (90-92), B+ (87-89), B (83-86), B- (80-82), C+ (77-79), C (73-76), C-(70-72), D+ (67-69), D (63-66), D- (60-62), F (0-59)
- 60% Homework Assignments
  - 4-6 Assignments
  - Topics: State Machines, Movement, Decision Making, Strategic AI, Learning Algorithms
  - Learning Algorithm Assignment:
    - GAM-376: Decision Tree Learning
    - GAM-476: Neural Network Learning
      - Optional Replacement for GAM-376 students
- 30% Project
  - 1 Final Project.
  - Zombie Survival Game

- 10% - Participation
  - Being kind, helpful and participatory in class and on Piazza.
- No Final Exam

How projects and homework are graded according to two criteria:

1. Does it run and meet all of the requirements? This is worth 80% of the grade
2. How creative or impressive is the solution? This is worth 20% of the grade.

If a student turns in a project that runs and meets all the requirements, then she earns 80% or a B for the project. If the student has also solved the project assignment in a creative or impressive way, meaning that she did something unique and innovative in her solution, then she can earn up to another 20%.

## Grading Late Projects

Every day a student's project is late will remove 10% points from that project's grade. For example, if a student completes a project of 97% (or A level) quality, but hand it in 12 hours late, she will earn 87% or a B for that project. If she were to hand it in 36 hours late, then she would earn a 77% or a C for that project, and so on.

## ATTENDANCE AND TARDINESS

If you miss class, you're responsible for catching up on missed material by referring to Piazza and asking classmates.

## Textbooks and printed resources (Recommended) :

- Funge, John *Artificial Intelligence for Games*. CRC Press 2009
- Buckland, Matt *Programming Game AI by Example*. Wordware Publishing. 2005.

## Software:

- Unity 2018 (C#)

## Piazza Discussion forum:

- Statistics show: students who participate more and help other students do better!
  - The correlation is ridiculous!
    - Poor understanding / poor participation.
    - Great understanding / Great participation
  - As you master the material, help others learn!
    - Want to be a Master programmer so master it!

- Everyone is ***expected*** and encouraged to participate on the Piazza discussion forum. All class-related discussion here this term.
- 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. I encourage you to ask questions when you're struggling to understand a concept.
- All correspondence that is not personal in nature should be vectored through Piazza
- Sensitive material, use Piazza private note, not email.
- Keep the forum professional and positive, help each other out.
  - Karma really pays off here.
  - Help each other whenever you can.
    - There will be a section where you'll need help (trust me).

NOTE: Do ***NOT*** post until you have watched the entire lecture ***FIRST*** (in class or online)

This will prevent frustration on all sides (members asking or answering questions)

## Collaborating together on programming assignments

- You are encourage to work together
  - Use the Piazza forums heavy
  - Even share your material with others in the common directory
- Everyone is 100% responsible for the work they do.
  - If you get help with a section of code,
  - Please refactor the code
    - Comment and understand that material
    - Transform the code to ***make it yours***
  - Be able to answer ***any*** question regarding the code you commit
- If you gain significant support / help from another student
  - Fully disclose the support / help you had in a Readme.txt file submitted with your assignments.
    - Disclosing the help, is ***not permission*** for copying the code.
    - Only there to clarify and acknowledge help you were given from a fellow student.
- If you are stuck and find yourself even tempted to plagiarize
  - Ask for help !!!!
    - Use on Piazza,
    - Visit during offices hours, make an appointment
  - ***Don't ever compromise your integrity!***

## Important Dates

- Sept 11, 2018: Last Day to add classes to AQ2018 schedule
- Sept 18 2018: Last day to drop classes no penalty, Last day to select pass/fail option
- Sept 19 2018: Grades of "W" assigned for AQ2018 classes dropped on or after this day
- Sept 25 2018: Last day to select auditor status
- Oct 23 2018: Last day to withdraw from AQ2018 classes

## Course Policies

### Changes to Syllabus

This syllabus is subject to change as necessary during the quarter. If a change occurs, it will be thoroughly addressed during class, posted under Announcements in D2L and sent via email.

### Online Course Evaluations

Evaluations are a way for students to provide valuable feedback regarding their instructor and the course. Detailed feedback will enable the instructor to continuously tailor teaching methods and course content to meet the learning goals of the course and the academic needs of the students. They are a requirement of the course and are key to continue to provide you with the highest quality of teaching. The evaluations are anonymous; the instructor and administration do not track who entered what responses. A program is used to check if the student completed the evaluations, but the evaluation is completely separate from the student's identity. Since 100% participation is our goal, students are sent periodic reminders over three weeks. Students do not receive reminders once they complete the evaluation. Students complete the evaluation online in [CampusConnect](#).

### Academic Integrity and Plagiarism

This course will be subject to the university's academic integrity policy. More information can be found at <http://academicintegrity.depaul.edu/>. If you have any questions be sure to consult with your professor.

### Academic Policies

All students are required to manage their class schedules each term in accordance with the deadlines for enrolling and withdrawing as indicated in the [University Academic Calendar](#). Information on enrollment, withdrawal, grading and incompletes can be found at: [cdm.depaul.edu/enrollment](http://cdm.depaul.edu/enrollment).

### Students with Disabilities

Students who feel they may need an accommodation based on the impact of a disability should contact the instructor privately to discuss their specific needs. All discussions will remain confidential.

To ensure that you receive the most appropriate accommodation based on your needs, contact the instructor as early as possible in the quarter (preferably within the first week of class), and make sure that you have contacted the Center for Students with Disabilities (CSD) at: [csd@depaul.edu](mailto:csd@depaul.edu).

Lewis Center 1420, 25 East Jackson Blvd.

Phone number: (312)362-8002

Fax: (312)362-6544

TTY: (773)325.7296

### Retroactive withdrawal

This policy exists to assist students for whom extenuating circumstances prevented them from meeting the withdrawal deadline. During their college career students may be allowed one medical/personal administrative withdrawal and one college office administrative withdrawal, each for one or more courses in a single term. Repeated requests will not be considered. Submitting an appeal for retroactive withdrawal does not guarantee approval. Information on enrollment, withdrawal, grading and incompletes can be found at:  
<http://www.cdm.depaul.edu/Enrollment-Policies.aspx>