CMPSC 441/GAME 450
Artificial Intelligence and Advanced Game Programming
Spring 2025

What you might like about the course.
- Having a working knowledge of implementing latest AI methods.
- Creating your own intelligent agents.
- Understanding how AI can infuse immersion and enhance excitement in games.

Communication Plan
- Please ask whatever you don't understand in class. Let's learn.
- I like to interact during my class or labs. Please feel free to discuss anything relevant to the course content during this time.
- I will need an email about any class absence for any reason 'on the day' of the class.
- Please use your Penn State email account for any email communications.

Course Description
This course has three goals: (1) to provide the students with an introduction to Artificial Intelligence concentrating on some fundamental areas of AI, including problem solving, search techniques, adversarial techniques, and reinforcement learning (2) to equip the students with a working knowledge of these AI techniques either in the context of video games or other applications. (3) to prepare students for the demands of the industry in this rapidly developing field.

A possible list of topics that you can expect to learn and apply to real world problems (some topics may need to be excluded in the interest of time or others may be added if deemed important for learning):

- Intelligent agents
- Machine learning basics
- Agentic AI
- Reinforcement Learning
- Latest in Natural Language Processing and Computer Vision
- Cognitive Agents

In addition, you will also learn some important software engineering skills in this field like Python, Git, and other libraries and packages that enable many AI technologies.

Course Objectives:
By the end of this course, you will be able to:
1. Produce aspects of a system based on the concepts related to Artificial Intelligence (AI) that you learn in class.
2. Identify various libraries and packages that are available in the Python ecosystem for AI.
3. Compose a system with modularity and successfully integrate modules into a functioning system.

Grading

I do not assign grades to students: students earn grades. Your performance both in-class and on assignments allows you to earn a certain grade in this class. This course is designed in such a way that your attendance, attention, participation, and **curiosity** will earn you a favorable grade. A project demonstration will be conducted according to the final exam schedule. The project is aimed to demonstrate the accomplishment of learning objectives of this course.

Class Participation & Quizzes	20%
Lab Assignments	50%
Project	30%
Total	100%

Class Participation:

Regular class attendance is one of the most important ways that students learn and understand course material. This course relies heavily on day-to-day class participation, instead of exams, for assessing student engagement with the material. I take this aspect of the grade very seriously, in the absence of mid-term or final exams. This includes participation in lectures and labs. This will be assessed based on the curiosity that a student brings into the classroom based on the questions a student asks and answers during the class. You can demonstrate your intellectual engagement in several ways including speaking up in class and bringing interesting and relevant material into the class with appropriate analysis and critique. Performance in pop-up knowledge check quizzes will also contribute to this component of the grade.

Lab Assignments:

The purpose of lab assignments is to reinforce your understanding of the material taught in class and encourage you to do research and to prepare you for the project. Lab assignments are supposed to be finished on your own unless otherwise stated. There may be extra credit tasks within lab assignments. You are required to submit the solution to Canvas at the end of the time of the lab period.

Late Policy:

Lab assignments that are turned in late (less than 24 hours past the deadline) will be assessed with a penalty of 50%. You will receive the full penalty (0 points) if any work is turned in 24 hours past the deadline.

Project:

A final project for this course is supposed demonstrate your engagement with the material and ability to incorporate the various topics covered in the class in a larger system (Synthesis). It will also assess your ability to complete an idea or plan in an inventive or imaginative way that involved divergent thinking and risk taking (Creativity). The project submission should demonstrate the ability to describe various components as problems and their solutions. The problems should be categorized as a synthesis problem or a creativity problem. The project related submissions will be made on Canvas.

Attendance Policy

Punctual attendance is expected for all class periods. You never know when I ask pop-up quizzes. All excused absences must be supported by written documentation, such as a athletics travel notice. Excusing attendance is at the discretion of the instructor.

Grade Assignments

A	>=94
A-	90 - 93.9
B+	87 - 89.9
B	84 - 86.9
B-	80 - 83.9
C+	77 - 79.9
C	70 - 76.9
D	60 – 69.9
F	< 60

Class Rules

To ensure the integrity of the learning process, the university considers any of the following behavior disruptive to the class. If you do any of the following, I may ask you to leave the class:

1. The use of cellphone
2. Direct challenge to instructor's authority
3. Eating or drinking
4. Vulgar or offensive behavior
5. Excessive chattering
6. Reading newspapers or other overt inattentiveness
7. Talking out of turn and/or dominating discussion
8. The use of laptops or Tablets without permission.

General Polices

Academic Integrity Policy: To view the academic integrity policy please visit https://sites.psu.edu/soesyllabus/

Special Needs Accommodation: To view information on Special Needs Accommodation services please visit https://sites.psu.edu/soesyllabus/

Educational Equity / Report Bias: To view information on reporting harassment and discrimination please visit https://sites.psu.edu/soesyllabus/

Emergency procedures: To view information on emergency procedures please visit https://sites.psu.edu/soesyllabus/

Web cam information: To view web cam information please visit https://sites.psu.edu/soesyllabus/

Mask policy: To view mask policy please visit https://sites.psu.edu/soesyllabus/

Counseling and Psychological Services: Many students at Penn State face personal challenges or have psychological needs that may interfere with their academic progress, social development, or emotional wellbeing. The university offers a variety of confidential services to help you through difficult times, including individual and group counseling, crisis intervention, consultations, online chats, and mental health screenings. These services are provided by staff who welcome all students and embrace a philosophy respectful of clients' cultural and religious backgrounds, and sensitive to differences in race, ability, gender identity and sexual orientation.

- Counseling and Psychological Services at University Park (CAPS)
  - http://studentaffairs.psu.edu/counseling/
  - 814-863-0395

- Counseling and Psychological Services at Commonwealth Campuses
  - https://senate.psu.edu/faculty/counseling-services-at-commonwealth-campuses/
  - LionHELP at Behrend: https://behrend.psu.edu/student-life/student-services/personal-counseling/resources/lionhelp-mobile-app

- Penn State Crisis Line (24 hours/7 days/week)
  - 877-229-6400

- Crisis Text Line (24 hours/7 days/week)
  - Text LIONS to 741741

This syllabus is subject to change during the semester based on the needs of the class and any high impact changes will be communicated via email to all students.

General Information

Instructor: Prof. Pulin Agrawal
Office: Burke 174
Email: pagrawal@psu.edu
Phone: x6687
Office Hours: Tuesday 8 AM - 10 AM, Monday and Wednesday 9 AM - 10 AM
or by appointment (**click here to schedule**).

Prerequisite: GAME 450: GAME 250, CMPSC122, and MATH 220
CMPSC 441: CMPSC 462/CMPSC 465
   Policy: If there is a valid reason to waive a prerequisite, an approval form stating the reason for waiving the pre/co requisite must be filled out, approved/signed by the instructor and department chair and turned into SOE office prior to the end of the first week of classes.

Website: All materials will be posted on Penn State Canvas.

Section	Times	Meeting Days	Classroom
Lecture	8:00AM - 8:50AM	Mo We	Burke 002
Lab 001	8:00AM - 9:50AM	Tr	Burke 147
Lab 002	10:05AM - 11:55AM	Tu	Burke 015

Text-book:

https://vladris.com/llm-book/index.html