# Semester Design and Implementation Project
# Due: 7 December 2022

You as a member of a team will create a project this semester to research and implement a facet of Artificial Intelligence. Your team will research a topic and submit a proposal for this topic. Upon approval you will begin to work on the project.

The project must involve the writing of code. This is a laboratory course, not a research course. You will need to write code to demonstrate your research and application of the subject material. The proposal will need to describe how you will use the code you write to explain your findings. The team will need to present a 20-minute presentation on the material you have worked on.

The project should be broken down into the following steps:

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| 1) | Project Proposal | ( 5 %) |
| 2) | Project research, and design documentation | (15 %) |
| 3) | Project Implementation | (40 %) |
| 4) | Project Test and verification | (10 %) |
| 5) | Status and Maintenance of Documentation | (10 %) |
| 6) | Project presentation | (20 %) |

It is critical that the design documentation be submitted in the state that it is at step 2, as well as step 6. You will be graded on each of the steps above, with the percentage of the grade shown.

Weekly you will be requested to fill out a status report on your project. This will help determine if the team/individual is/are proceeding in the correct direction in a timely manner. Although this is a semester long project, you should set realistic goals for the completion of this work. The status reports will help me help you stay on track.

## Project topics:

When thinking about topics be sure that the implementation of what you need to build your AI does not exceed the work on the AI itself. For example, building all the graphics to support a chess game when a simple text interface would work.

## Choose a Topic from the list below:

- Write an artificially intelligent game
- Map Coloring
- Maze follower
- Natural Language processor
- First Order Logic implementation
- Bayesian net implementation
- Learning System
- Neural Network Application project (Be careful with this one, it could be too easy)
- Build your own neural network
- Machine Learning
- Vision Processing
- Genetic Algorithms
- Decision Tree implementation
- Logistical analysis and implementation (i.e. travel planning)
- Constraint Satisfaction Solver
- Small robotics project

## Details

You will receive a project proposal form tonight. Fill it out and list the members of your team. Appoint one person as the team communications focal point. Have that person submit the proposal for the team. Although the group will work together, Some things will be graded on an individual basis. Each week everybody will need to fill out the status report. This status counts towards the individual's grade. Once a project is approved the team can begin immediately. The project presentation and due date for this project is December 7th 2022.

It is important to choose a project that everybody can get behind. If you want to write a game, be sure it is a game that has some complexity to it. If you want to utilize a technique or methodology, have a goal in mind. I will help make sure that you get a project idea that will be semester sized.

## Things to think about

- It is absolutely critical that all members of the team have input into and some control over the AI aspects of the project.
- Team size will be 3 or 4 people unless there are additional people available at the end of the team formation process. 3 is the absolute minimum size.
- Your team needs a name. Please come up with one and submit it on the proposal.
- Please choose a project that will challenge and be a sufficient workload for all of the team members.
- Avoid Stochastic projects unless you are attempting to remove randomness.
- It may help to think of this project as solving a problem as opposed to investigating a topic. Having an end goal is a good thing.
- Be wary of neural network implementation projects. They require vast amounts of data for training. If you are going to choose a neural network implementation project, please have the datasets selected before submitting the proposal.
- If I was going to do this with a team, I would pick "Build your own Neural Network"
- You are not graded on how flashy your user interface is, but you could lose points if the UI causes you to come up short in your AI solution.
- I would be amenable to a team designing a game that divides the team into to 2-person sub-teams to work on two different strategies that could compete against each other on the chosen game.
- Brute force methodologies should only be employed to show how much better your artificially intelligent solution is.
- Zero-sum games are ideal, but other games can be implemented.
- Even though it goes without saying, everybody should work equally on the project.
- Robot projects should use a kit robot for the project. Building a robot is not an AI project, using one is.
- Have libraries in mind for things like Vision for a vision based project or Speech to text for NLP processing
- The team should choose tools or libraries together.
- This project must demonstrate Artificial Intelligence techniques, technologies and/or methodologies.

The goals of this project should be:

- Learn something new
- Have Fun!