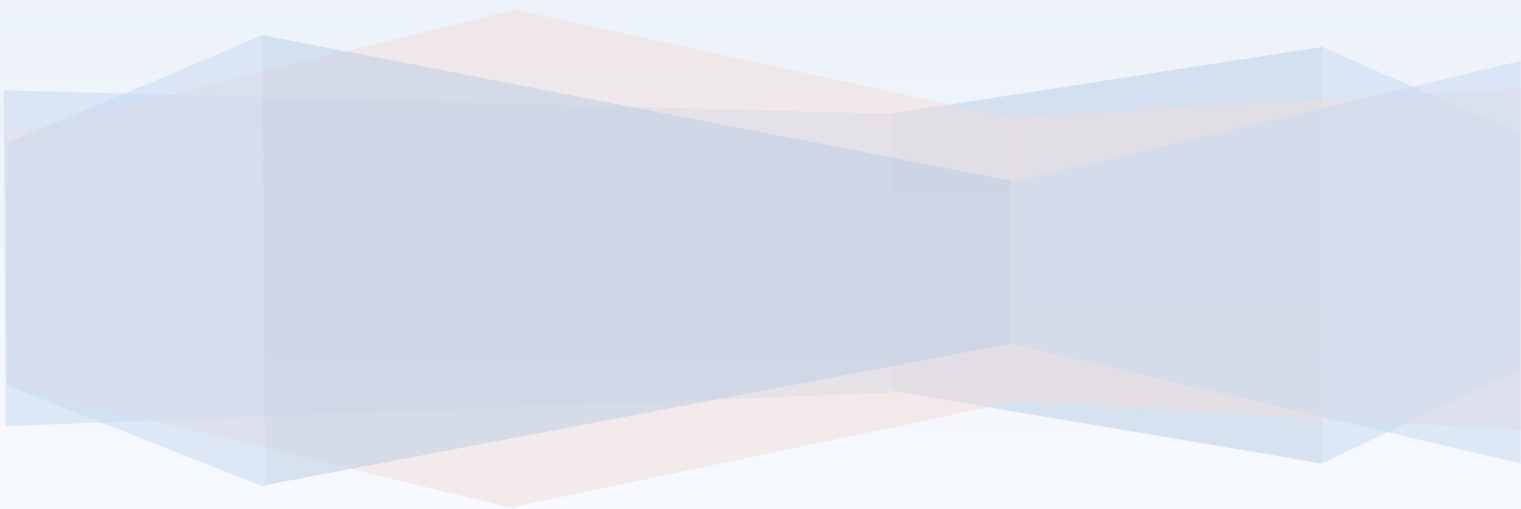# COS30002 AI for Games

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Lab Report

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Introduction

This report summarises what was covered in the Lab Tasks for COS30002, AI for Games. I have broken down which lab tasks fall under which ILOs and explained the relations between the tasks and the ILOs.

Coverage of the Intended Learning Outcomes

This section Shows which lab tasks were associated with which ILOs

ILO 1: Software Development for Game AI

"Discuss and implement software development techniques to support the creation of AI behaviour in games"

- *Each Lab is used to show one or more techniques to implement AI behaviour in games:*
- *Lab 01 is about basic Finite State Machines used to control actions taken by AI*
- *Lab 02 is about interactions between AI and the standard game loop taken*
- *Lab 04 is about bias and tactical analysis between bots and how to use this to create basic AI*
- *Lab 05 is about basic steering movement models and attaching them to an agent*
- *Lab 06 is about basic wondering behaviour and group AI*
- *Lab 10 is about path planning and graphical searching for AI*

ILO 2: Graphs and Path Planning

"Understand and utilise a variety of graph and path planning techniques."

- *The main Lab that applies to this ILO is Lab 10, "Graphs, Paths and Search".*
- *This lab shows us algorithms to search a graph. Including*
- *Dijkstra's, A*, Breadth First Search and Depth First Search*
- *Breadth First and Depth First Searches are based on exploring the branches of a graph until they hit a solution. Breadth First looks at all the nodes connected to the first node before looking at the nodes connected to each of those nodes, Depth First on the other hand explores the entire path of nodes before moving to the next node attached to the first node.*
- *Dijkstra's Algorithm is used to find the shortest distance between the origin node and any possible solutions and return that path.*
- *A* is a modification to Dijkstra's Algorithm that adds an additional heuristic to the calculation which while it won't be the absolute fastest path between nodes, it will arrive at this solution quicker than Dijkstra's.*
- *This Lab also shows us how to implement a basic graph based movement system in games.*

ILO 3: Force-based Agent Movement

"Create realistic movement for agents using steering force models."

- *Labs 05 and 06 are the primary labs on Force Based Agent Movement*
- *Lab 05 deals with building a model of the game world and agents as well as implementing very basic kinematics and dynamics upon an agent,*
- *Lab 06 expands this by simulating movement between groups of agents, showing more complex ways to implement a force model.*

ILO 4: Goals and Planning Actions

"Create agents that are capable of planning actions in order to achieve goals."

- *Labs 01, 02, and 04 are the primary labs to show action planning and goal achievement*
- *Lab 01 deals with a basic finite state machine as an introduction to creating an "Agent" that can make decisions based off variables within its environment. In this case energy, bloodlust and health*
- *Lab 02 asked us to create an agent that can play a game of tic tac toe. It has goals (win, don't die) and a list of possible actions that it can take (an ordered list of the best moves of the game)*
- *Lab 04 like Lab 02 asked us to create agents for a game, in this case Planet wars. It also asked us to combine the basic decision-making like in lab 02 with a small amount of tactical analysis to plan which actions to take.*

ILO 5: Combine AI Techniques

"Combine AI techniques to create more advanced game AI."

For the most part this ILO is the domain of the Spikes in the Unit, however a small amount of Lab 04 allows us to combine the tactical analysis with the basic decision making (enemies first, neutral first) that is showed in Lab 02

ILO 5: Combine AI Techniques