Machine Learning Course Outline

**Course Title:** Machine Learning

**Instructor Name:** Jun Albert Pardillo

**Credit Units:** 3

**Target Students:** Masters Degree CSIE Students

**Total Hours:** 54

**Class Hours per Week:** 3

**Description:** Machine Learning is a graduate-level course designed for Masters Degree CSIE students who are interested in exploring the field of artificial intelligence and its applications. This course provides an in-depth understanding of the fundamental concepts, algorithms, and techniques used in machine learning. The course begins with an introduction to the basics of machine learning, including supervised and unsupervised learning, regression, classification, clustering, and dimensionality reduction. Students will learn how to use various machine learning algorithms such as decision trees, random forests, support vector machines, and neural networks to solve real-world problems. The course also covers advanced topics such as deep learning, reinforcement learning, and natural language processing. Students will learn how to use deep learning techniques to build complex neural networks for image recognition, speech recognition, and natural language processing. Throughout the course, students will work on several hands-on projects and assignments to gain practical experience in implementing machine learning algorithms. They will also learn how to evaluate the performance of machine learning models and how to optimize them for better accuracy. By the end of this course, students will have a solid understanding of the principles and techniques of machine learning and will be able to apply them to solve real-world problems. They will also be well-prepared to pursue further research in the field of artificial intelligence.

# Course Outline

## Weeks 1-4: Introduction to Machine Learning

* Overview of Machine Learning
* Types of Machine Learning: Supervised, Unsupervised, and Reinforcement Learning
* Regression and Classification
* Clustering and Dimensionality Reduction
* Evaluation of Machine Learning Models

## Weeks 5-8: Machine Learning Algorithms

* Decision Trees and Random Forests
* Support Vector Machines
* Neural Networks Basics
* Ensemble Learning Methods
* Algorithm Selection and Optimization

## Weeks 9-12: Deep Learning

* Introduction to Deep Learning
* Deep Neural Networks
* Convolutional Neural Networks (CNNs)
* Recurrent Neural Networks (RNNs)
* Deep Learning for Image and Speech Recognition

## Weeks 13-15: Reinforcement Learning

* Basics of Reinforcement Learning
* Markov Decision Processes
* Q-Learning and Policy Learning
* Applications of Reinforcement Learning

## Weeks 16-18: Natural Language Processing (NLP) and Project Presentations

* Overview of Natural Language Processing
* Text Processing and Analysis
* NLP Algorithms and Applications
* Final Project Presentations