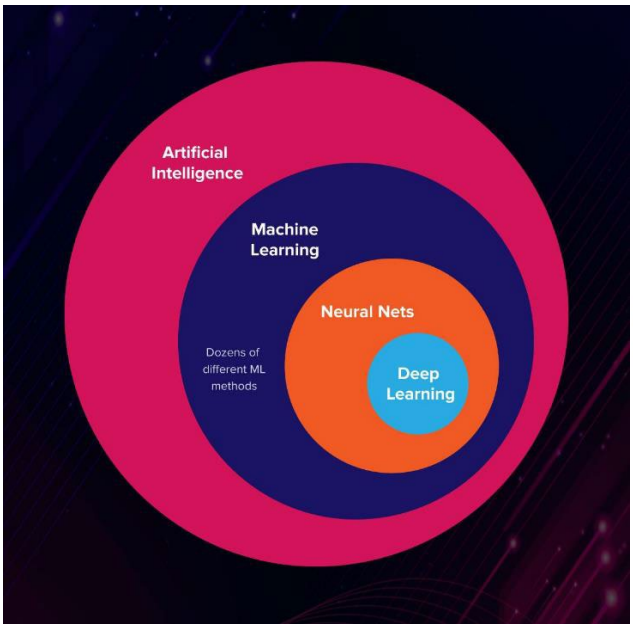


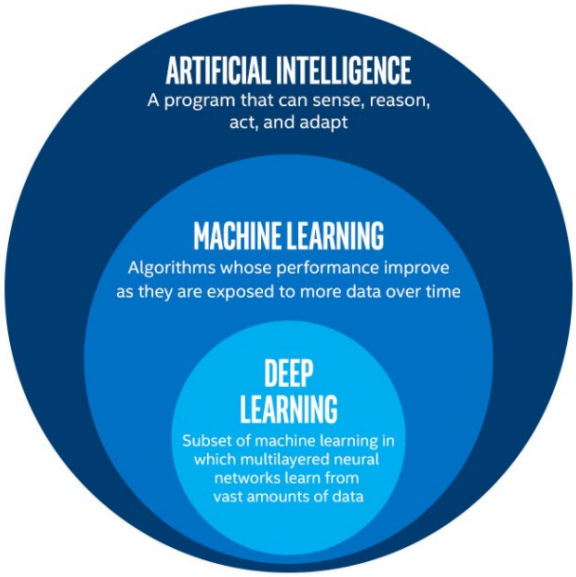


***NEW COURSE***

## EECS 498: Machine Learning Basics for Engineering Applications

**Prof. Mohammed N. Islam (mni@umich.edu)**

**3 credits**

Machine Learning Basics is designed as an "enrichment" course to give students an exposure to the basic concepts used in machine learning, neural networks and deep learning. This course is intended for students who have not taken any course on artificial intelligence AI or machine learning ML (no background is assumed, and no programming experience is assumed).

Machine learning is a branch of AI that may be described as when algorithms automatically learn from data without being explicitly programmed. For example, in ML the algorithms are trained to identify patterns in data and make decisions with minimal human intervention.

Deep Learning is a subset of machine learning where artificial neural networks, algorithms that are modeled after the structure and functioning of the human brain, learn from large amounts of data to create patterns for decision making. Neural networks with many or deep layers enable learning through performing tasks repeatedly and tweaking them to improve the performance. With the increase in computing power and vast amounts of digital data, deep learning has enabled very powerful tools in many fields and affects almost every aspect of our lives.

AI is transforming many industries and has caused an explosion of applications. Areas that have been affected by ML and deep learning include self-driving cars, speech and image recognition, effective web searching, fraud detection, human genome analysis, and many other advances. Knowledge of AI, ML and Deep Learning is becoming a must for any engineer or scientist. This course is intended to give you exposure to the underlying theory and language. This is an introduction for non-experts, and it will enable you to go onto other AI, ML and deep learning courses offered in various departments.

# LECTURES ON MACHINE LEARNING (rough guideline):

Lecture 1 Machine Learning Fundamentals

Lecture 2 Linear Regression & Model

Lecture 3 Linear Regression with Multiple Variables

Lecture 4 Logistic Regression Classification

Lecture 5 Overfitting & Regularization

Lecture 6 Non-linear Hypothesis & Neural Networks

Lecture 7 Neural Networks: Lost Function, Forward & Backward Propagation

Lecture 8 Applying Machine Learning

Lecture 9: Prioritizing Next Things

Lecture 10: Support Vector Machines

Lecture 11: Clustering in Unsupervised Learning

Lecture 12: Dimensionality Reduction & Principal Component Analysis

Lecture 13: Anomaly Detection

Lecture 14: Recommender Systems

Lecture 15: Neural Networks

Lecture 16: Neural Networks & Deep Learning

Lecture 17: Shallow Neural Networks

Lecture 18: Deep Neural Networks

Lecture 19: Improving Deep Learning: Hyper-parameter Tuning & Regularization

Lecture 20: Machine Learning Strategy & Error Analysis

Lecture 21: Convolutional Neural Networks

Lecture 22: Object Detection & Facial Recognition

Lecture 23: Recurrent Neural Networks

Lecture 24: Natural Language Processing