**ECE 595 Introduction to Machine Learning Spring 2019**

**Instructor**: K. Gopalan Office: POTT 225 Phone: (219) 989 3106 (ECE Secretary)

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**Description**: Introduction to machine learning – data modeling, learning from data and making predictions; applications. Linear regression and prediction. Logistic regression and classification. Bias-variance dilemma. Regularization. Neural network modeling and architectures. Supervised learning and neural networks – the perceptron and backpropagation algorithms. Multiclass classification. Evaluation metrics. Support vector machine and kernel-based learning. Unsupervised learning – clustering and K-means algorithm. Dimensionality reduction and principal component analysis. Convolutional Neural Networks. Anomaly detection. Recommender systems.

MATLAB/Octave implementation of common learning algorithms for engineering applications.

Class: 3, Lab: 0, Credit: 3.

Prerequisite: ECE 301, ECE 302 or equivalent, Linear algebra, Multivariate calculus; MATLAB programming.

**Suggested Books**: Sergios Theodoridis, *Machine Learning*, Academic Press, 2015.

Martin T. Hagan, Howard B. Demuth, Mark H. Beale and Orlando De Jesus, *Neural Network Design* (eBook),

Raul Rojas, *Neural Networks – A Systematic Introduction*, Springer-Verlag, 1996 (available for download from

<http://www.inf.fu-berlin.de/inst/ag-ki/rojas_home/documents/1996/NeuralNetworks/neuron.pdf>

**Grading**: Grades are assigned based on one’s performance relative to others in the class with the following weights.

Midterm Exam 35 % -- **Wednesday, February 27**

Comprehensive Final Exam 35 % -- **Monday, April 29**

Homework & Projects 30 %

**Other course information**: Make-up exams are not given except under extraordinary circumstances with proof of illness, emergency, etc. An Incomplete grade is given only if a student has a passing status up until the final exam but could not take the final exam because of a justifiable emergency. If you are absent for a significant number of classes – as determined by the instructor – ***you may be withdrawn from the course***.

**Important Dates**

Late registration ends: Friday, January 11, 4:30 PM

Spring break: Monday - Friday, March 11 - 15

Spring classes end: Saturday, April 27

**Have a challenging, enjoyable and beneficial semester!**