

## EEL 6814 NEURAL NETWORKS AND DEEP LEARNING (3)

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Department of Electrical and Computer Engineering, University of Florida

Pre-requisites: EEL 5840 Foundations of Machine Learning.

**Graduate:** Nonlinear modeling in neural networks and kernel spaces. Gradient descent learning in the additive neural model. Statistical Learning Concepts. Information theoretic cost functions. Convolution neural networks. Recurrent neural networks. Foundations of Deep Learning. Importance of Deep learning for representation. Current models for image and speech recognition. Challenges of Deep Learning.

**Website** Canvas

**Text Book:** “Machine Learning: A Constraint-Based Approach” by Marco Gori, Elsevier 2018 ISBN-13: 978-0081006597 + notes of the instructor.

**References:** Neural and Adaptive Systems: Fundamentals Through Simulation, Principe, Euliano and Lefebvre, Wiley, 2000.  
Information Theoretic Learning, Principe, Springer, 2010.  
Neural Networks for Pattern Recognition, Bishop, Oxford, 1998.  
Deep Learning by Goodfellow, Bengio & Courville, MIT Press 2016

**Professor:** J.C. Principe, Distinguished Professor of Electrical Engineering.  
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**Goals:** Understand and utilize neural network concepts in pattern recognition and deep learning. Neural networks models will be explained from the point of view of nonlinear adaptive models. Emphasis on time varying models and deep learning. Figures of merit for neural network design will also be covered.

**Projects:** Several homeworks, and class projects involving neural solutions to real world problems.

Homework	40%
Project I	30%
Project II	30%

Computer: Homework and projects require access to a fast computer and MATLAB  
or Python.