

**Math 7740: Statistical Learning Theory: Classification, Pattern Recognition, Machine Learning (Fall 2009)**

**Lecturer: Michael Nussbaum, <mn66>, Malott 441**

The course aims to present the developing interface between machine learning theory and statistics. Topics include an introduction to classification and pattern recognition; the connection to nonparametric regression is emphasized throughout. Some classical statistical methodology is reviewed, like discriminant analysis and logistic regression, as well as the notion of perceptron which played a key role in the development of machine learning theory. The empirical risk minimization principle is introduced, as well as its justification by Vapnik-Chervonenkis bounds. Basic principles of constructing classifiers are treated in detail, such as support vector machines, kernelization, neural networks and tree methods. The course will conclude with an outline of boosting and aggregation as the most active research areas in learning theory today.

4 credits. Prerequisites: Basic mathematical statistics (MATH 6740 or equivalent) and measure theoretic probability (MATH 671 or equivalent) or permission of instructor.

Office hours: MF 2:30–3:30

Lecture: TR 2:55-4:10, Malott 230

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Course Website <http://mysite.verizon.net/vzey4zz5/math7740/>

*Required textbook: Course packet: Nussbaum, M., Topics in Statistical Learning Theory, Cornell University, 2009.*

Optional textbook: The Elements of Statistical Learning (Data Mining, Inference and Prediction) by T. Hastie, R. Tibshirani, J. H. Friedman, *Second Edition*, Springer, 2009.