

**Machine Learning** (Computer Science 4830/5830, 3 credit hours M/W/F 2:00-2:55 pm)  
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**Course Description:** This course will give an overview of the main concepts, techniques, and underlying theory and practice of machine learning. The course will cover the fundamental topics of classification, regression and clustering, and a number of corresponding learning models such as perceptrons, logistic regression, linear regression, nearest neighbors, and Support Vector Machines. The description of the formal properties of the algorithms will be supplemented with motivating applications in a wide range of areas including natural language processing, computer vision, bioinformatics, and music analysis. The topics covered in this course will also prepare students for taking more advanced courses in data mining and deep learning.

**Learning Objectives:**

- Students will be able to be given a problem and identify the appropriate type of machine learning algorithms and methods to use to solve the problem.
- Students will be able to design and build a pipeline that utilizes python machine learning packages.
- Students will be able to apply the developed pipeline to answer research questions.
- Students will be able to present and defend the answers to research questions.

<b>Weeks</b>	<b>Topics</b>
<b>1</b>	Introduction to Machine Learning and Python
<b>2-6</b> <b>Supervised Learning</b>	Data Preprocessing, Classifier Evaluation, Linear Regression, Nearest-Neighbors Perceptrons, Support Vector Machines
<b>7-8</b>	Student Demo Presentation
<b>9-12</b> <b>Unsupervised Learning</b>	Clustering Evaluation, Dimensionality Reduction Principle Component Analysis, Correlation, Hierarchical Clustering, Elbow Method
<b>13-14</b>	Student Demo Presentation