

## CAP 6610 Applied Machine Learning

**Credits:** 3 credits

- **Textbook, title, author, and year:** Hal Daume III, "A Course in Machine Learning" (FREE) <http://ciml.info>
- Andreas C. Müller and Sarah Guido, "Introduction to Machine Learning with Python: A Guide for Data Scientists", O'Reilly 2016 - ISBN-13: 978-1449369415

**Both books are freely available online**

**Reference materials:** Additional reading materials will be provided during the course

### Specific course information

**Catalog description:** This course covers conceptual foundations and tools for machine learning and data analytics. The class introduces major machine learning topics, such as supervised learning, unsupervised learning and numeric predictive models. Case studies, homework assignments, and final project include application of machine learning to different domains

**Prerequisites:** STA 2023

**Specific goals for the course:** the goal of this class is for students to learn theoretical foundations and experiences on machine learning algorithms, data analytics projects, and applications of machine learning in solving domain problems. At the end of the class, students should be able to understand the whole process of machine learning project design, including key factors of machine learning projects, the life cycle of the data analytics, and the reporting and validations of machine learning projects.

### Brief list of topics to be covered:

- Introduction to the course contents and tools
- Exploratory Data Analysis (EDA) and Data Visualization
- Fundamentals of Machine Learning and Model Thinking
- Supervised Learning, Model Complexity and Model Validation
- Data Preprocessing
- Linear Models for Regression and Classification
- Trees, Forests and Ensembles
- Model Evaluation, Calibration, Imbalanced Data
- Model Interpretation
- Feature Selection and Feature Engineering
- Parameter Tuning and Automatic Machine Learning
- Neural Networks and Deep Learning
- Working with Text Data
- Working with Images and Time Series
- Communicating Results and Deploying Machine Learning Solutions