CS 536 : Machine Learning

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Time:	Friday, 10:20am - 1:20pm
Place:	PH 115
Instructor:	Wes Cowan
Office:	Hill Center, Office 268
E-Mail:	cwcowan at scarletmail.rutgers.edu (Instructor)
Office Hours:	Tuesdays 4-6, and by appointment.

Outline of the Course: The general problem this course addresses is this: how to algorithmically generate models and hypotheses for usefully describing data. This will draw on various topics from mathematics and probability, to statistics, to algorithms and data science. This will generally be a fairly math intensive course, and familiarity with probability is a must. A rough outline of topics for the class is as follows:

- Probability Theory and Estimation
- Decision Lists and Trees
- Classification
- Support Vector Machines
- Regression: Ridge and Lasso
- Statistical Learning Theory
- Boosting and Ensemble Methods
- Graphical Models
- Optimization
- Semi-Supervised Learning
- Reinforcement Learning
- Deep Learning

Text:

There is no required text for this course. I will post some notes regularly on Sakai as I am able. There are some resources that may be useful to have available though, in particular:

- Machine Learning and Pattern Recognition by Chris Bishop
  `https://www.amazon.com/Pattern-Recognition-Learning-Information-Statistics/dp/0387310738`
- Machine Learning: a Probabilistic Perspective by Kevin Murphy
  `https://www.cs.ubc.ca/~murphyk/MLbook/`
- The Elements of Statistical Learning by Trevor Hastie, Robert Tibshirani and Jerome Friedman
  `https://web.stanford.edu/~hastie/ElemStatLearn//`

Prerequisites:

The most important thing that you need to do well in this class is comfort and skill using and interpreting probabilities. If you do not have this, you will likely struggle to do well in this course.

Grading:

Grades will primarily have two components: 50% as homework assignments (a mix of problems and programming), and 50% a final project. This split reflects the importance of both the analysis and the implementation of the ideas we discuss in this class.