Syllabus

Week One – Classification

- Introduction
  - Parametric vs non-parametric methods [2.1]
  - Supervised vs unsupervised learning [2.1]
  - Regression vs classification [2.1]
  - Bias-variance tradeoff [2.2] (polynomial approximation)
- Logistic regression [4.3]
- Bayes Classifier + Linear discriminant analysis [4.4]

Week Two – Resampling methods

- Cross validation [5.1]
- Bootstrap [5.2]

Week Three -- Linear model selection and regularization

- Subset selection [6.1]
- Shrinkage methods [6.2]

Week Four – Beyond linearity

- Polynomial regression [7.1]
- Splines [7.4, 7.5]
- Generalized Additive Models [7.7]

Week Five – Tree based methods

- Regression trees [8.1]
- Classification trees [8.1]
- Boosting, random forests and bagging [8.2]

Week Six – Support Vector Machines

- Hyperplanes [9.1]
- Maximal margin classifiers
- Classification with Support Vector Machines [9.2, 9.3]

Week Seven – Unsupervised learning

- The Singular Value Decomposition
- Dimension Reduction methods [6.3]
- PCA [10.2]

Week Eight – Unsupervised learning

- Clustering methods (K-means, Hierarchial clustering) [10.3]