CS229

Syllabus and Course Schedule

This table will be updated regularly through the quarter to reflect what was covered, along with corresponding readings and notes.

Date	Event	Description	Materials and Assignments
9/14	Lecture 1	• Introduction.	
9/16	Lecture 2	• Supervised learning setup. LMS.	**Class Notes** • Supervised Learning [pdf](Sections 1-3)
9/16	Assignment	**Problem Set 0** released. Due Tuesday, 9/22 at 11:59pm	
9/19	Section 1	• **Friday TA Lecture:** Linear Algebra Review.	**Class Notes** • Review of Linear Algebra [pdf] • Linear Algebra Review and Reference [pdf] **Prerequisite Reading** • Linear Algebra, Multivariable Calculus, and Modern Applications (Stanford Math 51 course text) [pdf]
9/21	Lecture 3	• Weighted Least Squares. Logistic regression. Newton's Method.	**Class Notes** • Supervised Learning [pdf] (Sections 4, 5, and 7)

Date	Event	Description	Materials and Assignments
9/23	Lecture 4	• Perceptron. Exponential family. Generalized Linear Models.	**Class Notes** • Supervised Learning [pdf] (Sections 6, 8, and 9)
9/23	Assignment	**Problem Set 1** will be released. Due Wednesday, 10/7 at 11:59pm	
9/25	Section 2	• **Friday TA Lecture:** Probability Theory Review.	• Probability Theory Review [pdf] • The Multivariate Gaussian Distribution [pdf] • More on Gaussian Distribution [pdf] • Section slides [pdf]
9/28	Lecture 5	• Gaussian discriminant analysis.	**Class Notes** • Generative Algorithms [pdf] (Section 1)
9/30	Lecture 6	• Naive Bayes, Laplace Smoothing.	**Class Notes** • Naive Bayes and Laplace Smoothing [pdf] (Section 2)
10/2	Section 3	• **Friday TA Lecture:** Python/Numpy Tutorial.	• Slides [pdf] • Python Tutorial Notebook [link, jupyter notebook]
10/2	Project	**Project proposal** due 10/2 at 11:59pm.	
10/5	Lecture 7	• Kernels.	**Class Notes** • Kernel Methods [pdf]
10/7	Lecture 8	• Neural Networks 1.	**Class Notes** • Deep Learning [pdf]

Date	Event	Description	Materials and Assignments
10/7	Assignment	**Problem Set 2** will be released. Due Wednesday, 10/21 at 11:59pm	
10/9	Section 4	• **Friday TA Lecture:** Deep Learning.	• Slides [pdf]
10/12	Lecture 9	• Neural Networks 2. Backpropagation.	**Class Notes** • Deep Learning [pdf]
10/14	Lecture 10	• Bias - Variance. Regularization. Feature / Model selection.	**Class Notes** • Bias - Variance [pdf] • Regularization and Model Selection [pdf] • Some Calculations from Bias Variance (Addendum) [pdf] • Bias-Variance and Error Analysis (Addendum) [pdf] • Double Descent (Optional Reading) [link] • Hyperparmeter Tuning and Cross Validation [canvas video]
10/16	Section 5	• **Friday TA Lecture:** Evaluation Metrics.	• Slides [pdf]
10/19	Lecture 11	• K-Means. GMM (non EM). Expectation Maximization.	**Class Notes** • Unsupervised Learning, k-means clustering. [pdf] • Mixture of Gaussians [pdf] • The EM Algorithm [pdf] • Live lecture notes (spring quarter) [old draft]

Date	Event	Description	Materials and Assignments
10/21	Lecture 12	• GMM (EM). Factor Analysis.	**Class Notes** • Lagrange Multipliers Review [pdf] • Factor Analysis [pdf] • Live lecture notes [draft]
10/21	Assignment	**Problem Set 3** will be released. Due Wednesday, 11/4 at 11:59pm	
10/23	Section 6	• **Friday TA Lecture:** Midterm Review.	• Slides [pdf]
10/23	Project	**Project milestones** due 10/23 at 11:59pm.	
10/26	Lecture 13	• PCA, ICA.	**Class Notes** • Principal Components Analysis [pdf] • Independent Component Analysis [pdf] • Live lecture notes (spring quarter) [old draft, in lecture]
10/28	Lecture 14	• Weak supervised / unsupervised learning.	**Class Notes** • Live lecture notes [pdf] • Weak Supervision [pdf (slides)] • Weak Supervision (spring quarter) [old draft, in lecture]
10/29	Midterm	The midterm details TBD.	
11/2	Lecture 15	• ML advice.	**Class Notes** • ML advice [pdf]

Date	Event	Description	Materials and Assignments
11/4	Lecture 16	• Advice for applying machine learning.	**Class Notes** • Advice for applying machine learning. [pdf]
11/4	Assignment	**Problem Set 4** will be released. Due Wednesday, 11/18 at 11:59pm	
11/9	Lecture 17	• Basic RL concepts, value iterations, policy iteration.	**Class Notes** • Basic RL concepts, value iterations, policy iteration [pdf] (Sections 1 and 2)
11/11	Lecture 18	• Model-based RL and value function approximation.	**Class Notes** • Model-based RL and value function approximation [pdf] (Sections 3 and 4)
11/16	Lecture 19	• Policy search. REINFORCE.	**Class Notes** • REINFORCE [pdf]
11/18	Lecture 20	• Societal impact.	
11/18	Project	**Project final report** due 11/18 at 11:59pm.	

Date	Event	Description	Materials and Assignments

Other Resources

1. All lecture videos can be accessed through Canvas.
2. Advice on applying machine learning: Slides from Andrew's lecture on getting machine learning algorithms to work in practice can be found here.
3. Previous projects: A list of last year's final projects can be found here.
4. Data: Here is the UCI Machine learning repository, which contains a large collection of standard datasets for testing learning algorithms. If you want to see examples of recent work in machine learning, start by taking a look at the conferences NeurIPS (all old NeurIPS papers are online) and ICML. Some other related conferences include UAI, AAAI, IJCAI.
5. Viewing PostScript and PDF files: Depending on the computer you are using, you may be able to download a PostScript viewer or PDF viewer for it if you don't already have one.
6. Machine learning study guides tailored to CS 229 by Afshine Amidi and Shervine Amidi.