



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
3/29	Lecture 1	<ul style="list-style-type: none"> Introduction. 	Class Notes <ul style="list-style-type: none"> Slides [pdf]
3/31	Lecture 2	<ul style="list-style-type: none"> Supervised learning setup. LMS. 	Class Notes <ul style="list-style-type: none"> Supervised Learning [pdf] (Sections 1-3) Live Lecture Notes (draft) [pdf]
3/31	Assignment	Problem Set 0 released.	
4/2	Section 1	<ul style="list-style-type: none"> Friday TA Lecture: Linear Algebra Review. 	Notes <ul style="list-style-type: none"> Linear Algebra Review and Reference [pdf] Linear Algebra, Multivariable Calculus, and Modern Applications (Stanford Math 51 course text) [pdf] Friday Section Slides [pdf]
4/5	Lecture 3	<ul style="list-style-type: none"> Weighted Least Squares. Logistic regression. Newton's Method. 	Class Notes <ul style="list-style-type: none"> Supervised Learning [pdf] (Sections 4, 5, and 7) Live Lecture Notes (draft) [pdf]

Date	Event	Description	Materials and Assignments
4/7	Lecture 4	<ul style="list-style-type: none"> Dataset split; Exponential family. Generalized Linear Models. 	Class Notes <ul style="list-style-type: none"> Supervised Learning [pdf] (Sections 6, 8, and 9) Live Lecture Notes (draft) [pdf]
4/7	Assignment	Problem Set 1 will be released. Due Wednesday, 4/21 at 11:59pm	
4/9	Section 2	<ul style="list-style-type: none"> Friday TA Lecture: Probability Theory Review. 	Notes <ul style="list-style-type: none"> Probability Theory Review [pdf] The Multivariate Gaussian Distribution [pdf] More on Gaussian Distributions [pdf] Friday Section Slides [pdf]
4/12	Lecture 5	<ul style="list-style-type: none"> Gaussian discriminant analysis. Naive Bayes. 	Class Notes <ul style="list-style-type: none"> Generative Algorithms [pdf] (Section 1) Live Lecture Notes [pdf]
4/14	Lecture 6	<ul style="list-style-type: none"> Naive Bayes, Laplace Smoothing. 	Class Notes <ul style="list-style-type: none"> Naive Bayes and Laplace Smoothing [pdf] (Section 2) Live Lecture Notes [pdf]
4/16	Project	Project proposal due 4/16 at 11:59pm.	

Date	Event	Description	Materials and Assignments
4/16	Section 3	<ul style="list-style-type: none"> Friday TA Lecture: Python/Numpy Tutorial. 	Notes <ul style="list-style-type: none"> Python Review Code [pdf, source] Friday Section Slides [pdf]
4/19	Lecture 7	<ul style="list-style-type: none"> Kernels. SVM. 	Class Notes <ul style="list-style-type: none"> Kernel Methods [pdf] Live Lecture Notes [pdf]
4/21	Lecture 8	<ul style="list-style-type: none"> Neural Networks 1. 	Class Notes <ul style="list-style-type: none"> Deep Learning [pdf] Live Lecture Notes [pdf]
4/21	Assignment	Problem Set 2 will be released. Due Wednesday, 5/5 at 11:59pm	
4/23	Section 4	<ul style="list-style-type: none"> Friday TA Lecture: Evaluation Metrics. 	Notes <ul style="list-style-type: none"> Friday Section Slides [pdf]
4/26	Lecture 9	<ul style="list-style-type: none"> Neural Networks 2. Backpropagation. 	Class Notes <ul style="list-style-type: none"> Deep Learning [pdf] Live Lecture Notes [pdf]
4/28	Lecture 10	<ul style="list-style-type: none"> Bias - Variance. Regularization. Feature / Model selection. 	Class Notes <ul style="list-style-type: none"> Regularization and Model Selection [pdf] Some Calculations from Bias Variance (Addendum) [pdf] Bias-Variance and Error Analysis (Addendum) [pdf] Live Lecture Notes [pdf]

Date	Event	Description	Materials and Assignments
4/30	Section 5	<ul style="list-style-type: none"> Friday TA Lecture: Deep Learning (ConvNets). 	Notes <ul style="list-style-type: none"> Friday Section Slides [pdf, ppt]
5/3	Lecture 11	<ul style="list-style-type: none"> K-Means. GMM (non EM). Expectation Maximization. 	Class Notes <ul style="list-style-type: none"> Unsupervised Learning, k-means clustering. [pdf] Mixture of Gaussians [pdf] The EM Algorithm [pdf] Live Lecture Notes (draft) [pdf]
5/5	Lecture 12	<ul style="list-style-type: none"> GMM (EM). Factor Analysis. 	Class Notes <ul style="list-style-type: none"> Lagrange Multipliers Review [pdf] Factor Analysis [pdf] Live Lecture Notes (draft) [pdf] Addendum Notes [pdf]
5/5	Assignment	Problem Set 3 will be released. Due Wednesday, 5/19 at 11:59pm	
5/7	Project	Project milestones due 5/7 at 11:59pm.	
5/7	Section 6	<ul style="list-style-type: none"> Friday TA Lecture: Midterm Review. 	
5/10	Lecture 13	<ul style="list-style-type: none"> Factor Analysis and PCA. 	Class Notes <ul style="list-style-type: none"> Principal Components Analysis [pdf] Independent Component Analysis [pdf] Live Lecture Notes (draft) [pdf]

Date	Event	Description	Materials and Assignments
5/12	Lecture 14	<ul style="list-style-type: none"> Weak supervised / unsupervised learning. 	Class Notes <ul style="list-style-type: none"> Introduction to weak supervision [slides] ICA and weak supervision [draft]
5/13	Midterm	The midterm details TBD.	
5/14	Section 7	<ul style="list-style-type: none"> Friday TA Lecture: Decision Trees + Boosting. 	Notes <ul style="list-style-type: none"> Decision trees [slides] Boosting [pdf]
5/17	Lecture 15	<ul style="list-style-type: none"> Self-supervised learning (Language Models & Image Models). 	Class Notes <ul style="list-style-type: none"> Self-Supervised Learning [slides]
5/19	Lecture 16	<ul style="list-style-type: none"> ML Advice. 	Class Notes <ul style="list-style-type: none"> ML advice [slides]
5/19	Assignment	Problem Set 4 will be released. Due Friday, 5/28 at 11:59pm	
5/21	Section 8	<ul style="list-style-type: none"> Friday TA Lecture: On Critiques of ML. 	Notes <ul style="list-style-type: none"> Technical and Societal Critiques of ML [pdf]
5/24	Lecture 17	<ul style="list-style-type: none"> Basic concepts in RL, value iteration, policy iteration. 	Class Notes <ul style="list-style-type: none"> Basic RL concepts, value iterations, policy iteration [pdf] (Sections 1 and 2) Live Lecture Notes [pdf]

Date	Event	Description	Materials and Assignments
5/26	Lecture 18	<ul style="list-style-type: none"> Model-based RL, value function approximator. 	Class Notes <ul style="list-style-type: none"> Model-based RL and value function approximation [pdf] (Sections 3 and 4) Live Lecture Notes [pdf]
5/28	Section 9	<ul style="list-style-type: none"> Friday TA Lecture: Learning Theory (cancelled). 	Class Notes <ul style="list-style-type: none"> Learning theory [pdf]
6/2	Lecture 19	<ul style="list-style-type: none"> Societal impact. 	
6/2	Project	Project final report + poster (optional) due 6/2 at 11:59pm.	

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.