



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
Week 1			
9/21	Lecture 1	<ul style="list-style-type: none">• Introduction.	Class Notes
9/21	Assignment	Problem Set 0 released.	
9/23	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)
9/23	Assignment	Problem Set 1 will be released. Due Thursday, 10/7 at 11:59pm	
Week 2			
9/28	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)
9/30	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 [pdf]

Date	Event	Description	Materials and Assignments
10/1	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]
10/1	Project	Project proposal due 10/1 at 11:59pm.	
Week 3			
10/5	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]
10/7	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]
10/7	Assignment	Problem Set 2 will be released. Due Thursday, 10/21 at 11:59pm	

Date	Event	Description	Materials and Assignments
10/8	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]
Week 4			
10/12	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]
10/14	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]
10/15	Section 3	<ul style="list-style-type: none"> Friday TA Lecture: Python/Numpy Tutorial. 	Notes <ul style="list-style-type: none"> Python Review Code Friday Section Slides [pdf]
Week 5			
10/19	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]

Date	Event	Description	Materials and Assignments
10/21	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]Lecture slides: bias and variance [pdf]Lecture slides: lasso regression [pdf]Lecture slides: ridge regression [pdf]
10/21	Assignment	Problem Set 3 will be released. Due Thursday, 11/4 at 11:59pm	
10/22	Section 4	<ul style="list-style-type: none">Friday TA Lecture: Midterm Review.	Notes <ul style="list-style-type: none">Friday Section Slides [pdf]
10/22	Project	Project milestones due 10/22 at 11:59pm.	
Week 6			
10/26	Lecture 11	<ul style="list-style-type: none">Decision Trees. Boosting	Class Notes <ul style="list-style-type: none">Decision trees slides [pdf]Overfitting decision trees slides [pdf]The EM Algorithm slides [pdf]

Date	Event	Description	Materials and Assignments
10/28	Lecture 12	<ul style="list-style-type: none"> K-Means. GMM (non EM). Expectation Maximization. Factor Analysis. 	Class Notes <ul style="list-style-type: none"> Unsupervised Learning, k-means clustering. [pdf] Mixture of Gaussians [pdf] The EM Algorithm [pdf] Factor Analysis [pdf] Kmeans slides [pdf]
10/28	Midterm	For midterm details, please see this post on Ed	
10/29	Section 5	<ul style="list-style-type: none"> Friday TA Lecture: Evaluation Metrics. 	Notes <ul style="list-style-type: none"> Friday Section Slides [pdf]
Week 7			
11/2	Lecture 13	<ul style="list-style-type: none"> EM. GMM. 	Class Notes <ul style="list-style-type: none"> The EM Algorithm [pdf] Principal Components Analysis [pdf] Independent Component Analysis [pdf] EM Slides [pdf] GMM Slides [pdf]
11/4	Lecture 14	<ul style="list-style-type: none"> PCA. Types of learning. 	Class Notes <ul style="list-style-type: none"> PCA [slides, annotated] Types of learning [slides, annotated]
11/4	Assignment	Problem Set 4 will be released. Due Saturday, 11/20 at 11:59pm	
11/5	Section 6	<ul style="list-style-type: none"> Friday TA Lecture: Deep Learning (ConvNets). 	Notes <ul style="list-style-type: none"> Deep Learning [slides]

Date	Event	Description	Materials and Assignments
Week 8			
11/9	Lecture 15	<ul style="list-style-type: none"> ML Advice 	Class Notes
11/11	Lecture 16	<ul style="list-style-type: none"> Unsupervised learning. Reinforcement learning. 	Class Notes
11/12	Section 7	<ul style="list-style-type: none"> Friday TA Lecture: Ensembling Techniques 	Notes <ul style="list-style-type: none"> Ensembling Techniques [pdf]
Week 9			
11/16	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]
11/18	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 (Spring 2021) [pdf]
11/19	Section 8	<ul style="list-style-type: none"> Friday TA Lecture: On Critiques of ML. 	Class Notes
Thanksgiving Break			
Week 10			

Date	Event	Description	Materials and Assignments
11/30	Lecture 19	<ul style="list-style-type: none"> Fairness, algorithmic bias, explainability, privacy 	
12/2	Lecture 20	<ul style="list-style-type: none"> Fairness, algorithmic bias, explainability, privacy 	
12/2	Project	Project final report + poster due 12/2 at 11:59pm.	
12/3	Section 9	<ul style="list-style-type: none"> Friday TA Lecture: Learning Theory. 	Class Notes <ul style="list-style-type: none"> Learning theory [pdf]

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.
7. [The Matrix Cookbook](#): quick reference for matrix identities, approximations, relations, etc.