



CS229

Syllabus and Course Schedule

Time and Location: Monday, Wednesday 4:30-5:50pm, [Bishop Auditorium](#)

Class Videos: Current quarter's class videos are available [here](#) for SCPD students and [here](#) for non-SCPD students.

Event	Date	Description	Materials and Assignments
Lecture 1	9/24	Introduction and Basic Concepts	
A0	9/24	Problem Set 0 [pdf] . Out 9/24. Due 10/3. Submission instructions.	
Lecture 2	9/26	Supervised Learning Setup. Linear Regression.	Class Notes <ul style="list-style-type: none"> Supervised Learning, Discriminative Algorithms [ps] [pdf]
Section	9/28	Discussion Section: Linear Algebra [Notes]	
Lecture 3	10/1	Weighted Least Squares. Logistic Regression. Netwon's Method	Class Notes <ul style="list-style-type: none"> Generative Algorithms [ps] [pdf]
Lecture 4	10/3	Perceptron. Exponential Family. Generalized Linear Models.	

Event	Date	Description	Materials and Assignments
A1	10/3	Problem Set 1 [zip] . Out 10/3. Due 10/17. Submission instructions.	
Section	10/5	Discussion Section: Probability [Notes] [Slides]	
Lecture 5	10/8	Gaussian Discriminant Analysis. Naive Bayes.	
Lecture 6	10/10	Laplace Smoothing. Support Vector Machines.	Class Notes <ul style="list-style-type: none"> Support Vector Machines [ps] [pdf]
Section	10/12	Discussion Section: Python [slides]	
Lecture 7	10/15	Support Vector Machines. Kernels.	
Lecture 8	10/17	Bias-Variance tradeoff. Regularization and model/feature selection.	Class Notes <ul style="list-style-type: none"> Bias/variance tradeoff and error analysis[pdf] Regularization and Model Selection [ps] [pdf] Advice on applying machine learning[pdf]
A2	10/17	Problem Set 2 [zip] . Out 10/17. Due 10/31. Submission instructions.	

Event	Date	Description	Materials and Assignments
Section	10/19	Discussion Section: Learning Theory [ps] [pdf]	
Project	10/19	Project proposal due at 11:59pm .	
Lecture 9	10/22	Tree Ensembles.	Class Notes <ul style="list-style-type: none"> Decision trees [pdf] Ensembling methods [pdf]
Lecture 10	10/24	Neural Networks: Basics	Class Notes <ul style="list-style-type: none"> Online Learning and the Perceptron Algorithm. (optional reading) [ps] [pdf] Deep learning [pdf] Backpropagation [pdf]
Lecture 11	10/29	Neural Networks: Training	
Section	10/26	Discussion Section: Evaluation Metrics [Slides]	

Event	Date	Description	Materials and Assignments
Lecture 12	10/31	Practical Advice for ML projects	Class Notes <ul style="list-style-type: none">Unsupervised Learning, k-means clustering. [ps] [pdf]Mixture of Gaussians [ps] [pdf]The EM Algorithm [ps] [pdf]Factor Analysis [ps] [pdf]Principal Components Analysis [ps] [pdf]Independent Components Analysis [ps] [pdf]
Lecture 13	11/5	K-means. Mixture of Gaussians. Expectation Maximization.	
Lecture 14	11/7	Factor Analysis.	
Lecture 15	11/12	Principal Component Analysis. Independent Component Analysis.	
Lecture 16	11/14	MDPs. Bellman Equations.	
Section	11/2	Discussion Section: Midterm Review [pdf]	
A3	10/31	Problem Set 3 [zip]. Out 10/31. Due 11/14. Submission instructions.	
Midterm	11/7	We will have a take-home midterm. All details are posted on Piazza.	
Section	11/16	Discussion Section: canceled	
Project	11/16	Project milestones due 11/16 at 11:59pm .	

Event	Date	Description	Materials and Assignments
Lecture 17	11/26	Value Iteration and Policy Iteration. LQR. LQG.	Class Notes <ul style="list-style-type: none">• Reinforcement Learning and Control [ps] [pdf]• LQR, DDP and LQG [pdf]
Lecture 18	11/28	Q-Learning. Value function approximation.	
Lecture 19	12/3	Policy Search. REINFORCE. POMDPs.	
Lecture 20	12/5	Optional topic. Wrap-up.	
A4	11/14	Problem Set 4 [zip]. Out 11/14. Due 12/5. Submission instructions .	
Section	11/30	Discussion Section: On critiques of Machine Learning [slides]	
Section	12/07	Discussion Section: Convolutional Neural Networks	
Project	12/10	Project poster PDF and project recording (some teams) due at 11:59 pm Submission instructions .	
Project	12/11	Poster presentations from 8:30-11:30am. Venue and details to be announced.	
Project	12/13	Final writeup due at 11:59pm (no late days).	

Event	Date	Description	Materials and Assignments
Supplementary Notes <ol style="list-style-type: none"> 1. Binary classification with +/-1 labels [pdf] 2. Boosting algorithms and weak learning [pdf] 3. Functional after implementing stump_booster.m in PS2. [here] 4. The representer theorem [pdf] 5. Hoeffding's inequality [pdf] 			
Section Notes <ol style="list-style-type: none"> 1. Linear Algebra Review and Reference [pdf] 2. Probability Theory Review [pdf] 3. Convex Optimization Overview, Part I [ps] [pdf] 4. Convex Optimization Overview, Part II [ps] [pdf] 5. Hidden Markov Models [ps] [pdf] 6. The Multivariate Gaussian Distribution [pdf] 7. More on Gaussian Distribution [pdf] 8. Gaussian Processes [pdf] 			
Other Resources <ol style="list-style-type: none"> 1. Advice on applying machine learning: Slides from Andrew's lecture on getting machine learning algorithms to work in practice can be found here. 2. Previous projects: A list of last year's final projects can be found here. 3. 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 NIPS(all old NIPS papers are online) and ICML. Some other related conferences include UAI, AAAI, IJCAI. 4. 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. 5. Machine learning study guides tailored to CS 229 by Afshine Amidi and Shervine Amidi. 			