



Deep Generative Models (<https://deepgenerativemodels.github.io/>)

CS236 - Fall 2023

Detailed Syllabus

Current quarter's videos are available through Panopto (<https://stanford-pilot.hosted.panopto.com/Panopto/Pages/Sessions/List.aspx?folderID=e3a9ef4c-4783-498f-b0ec-b0750189ab83>).

Course notes are published here (<https://deepgenerativemodels.github.io/notes/index.html>).

Week	Date	Lecture Topics	Coursework	Sections
1	Sep 27	Introduction (Slides (assets/slides/cs236_lecture1_2023.pptx))		Probability (https://cs229.stanford.edu/section/cs229-prob.pdf) and Linear Algebra (https://cs229.stanford.edu/section/cs229-linalg.pdf)
2	Oct 02 & Oct 04	Background (Slides (assets/slides/cs236_lecture2.pdf)) + Autoregressive Models (Slides (assets/slides/cs236_lecture3.pdf))	HW 1 Released (Oct 02)	PyTorch (https://docs.google.com/presentation/d/1fyPRy-tFxdvswz2p4HyH6TGkOQCvXAPS8gxzaTJH55s/edit#slide=id.p)
3	Oct 09 & Oct 11	Maximum Likelihood Learning (Slides (assets/slides/cs236_lecture4.pdf)) + VAEs (Slides (assets/slides/cs236_lecture5.pdf))		CNNs, RNNs, Transformers (https://docs.google.com/presentation/d/1Z6jq9WNCBFy9cqhkWtNbQ-WhcYU_9g5s4-4qMKsoDNY/edit?usp=sharing)
4	Oct 16 & Oct 18	VAEs (Slides (assets/slides/cs236_lecture6.pdf)) + Normalizing Flows (Slides (assets/slides/cs236_lecture7.pdf))	HW 1 due, HW 2 released (Oct 16)	
5	Oct 23 & Oct 25	Normalizing Flows (Slides (assets/slides/cs236_lecture8.pdf)) + GANs (Slides (assets/slides/cs236_lecture9.pdf))		
Project Proposal: Due Wednesday, October 25, 2023				
6	Oct 30 & Nov 01	GANs (Slides (assets/slides/cs236_lecture10.pdf)) + Energy Based Models (Slides (assets/slides/cs236_lecture11.pdf))	HW 2 due (Oct 30)	
7	Nov 06 & Nov 08	Energy Based Models (Slides (assets/slides/cs236_lecture12.pdf)) + Score Based Models (Slides (assets/slides/lecture_13.pptx))	HW 3 released (Nov 06)	
Midterm: Day: Nov 10 - Time: 6-9pm - Location: CEMEX (Last names A-L), HEWLETT200 (Last names M-Z)				
8	Nov 13 & Nov 15	Energy Based Models (Slides (assets/slides/lecture_14_comp.pptx)) + Evaluation of Generative Models (Slides (assets/slides/lecture15.pdf))		
Project Progress Report: Due Wednesday, November 15, 2023				

Week	Date	Lecture Topics	Coursework	Sections
9	Nov 20 & Nov 22	Thanksgiving Break		
10	Nov 27 & Nov 29	Score Based Diffusion Models (Slides (assets/slides/lecture16-2023-comp.pptx)) + Discrete Latent Variable Models (Slides (assets/slides/cs236_lecture17.pdf))	HW 3 due (Nov 27)	
11	Dec 04 & Dec 06	Diffusion Models for Discrete Data (Slides (assets/slides/cs236_lecture18.pdf))		
		Poster Presentation: Wednesday, December 6, 2023 from 3:00 pm - 6:00 pm		
12	Dec 11 & Dec 13	Finals Week		
		Final Project Report: Due Monday, December 11, 2023		

Additional Reading: Surveys and Tutorials

1. Generative Modeling by Estimating Gradients of the Data Distribution (<http://yang-song.github.io/blog/2021/score/>) Yang Song. Blog post on score-based generative models, May 2021.
2. How to Train Your Energy-Based Models. (<https://arxiv.org/abs/2101.03288>) Yang Song and Diederik P. Kingma. February 2021.
3. Tutorial on Deep Generative Models. (<https://ermongroup.github.io/generative-models/>) Aditya Grover and Stefano Ermon. International Joint Conference on Artificial Intelligence, July 2018.
4. Tutorial on Generative Adversarial Networks. (<https://sites.google.com/view/cvpr2018tutorialongans/>) Computer Vision and Pattern Recognition, June 2018.
5. Tutorial on Deep Generative Models. (<https://www.youtube.com/watch?v=JrO5fSskISY>) Shakir Mohamed and Danilo Rezende. Uncertainty in Artificial Intelligence, July 2017.
6. Tutorial on Generative Adversarial Networks. (<https://www.youtube.com/watch?v=AJVyzd0rqdc>) Ian Goodfellow. Neural Information Processing Systems, December 2016.
7. Learning deep generative models. (<https://www.cs.cmu.edu/~rsalakhu/papers/annrev.pdf>) Ruslan Salakhutdinov. Annual Review of Statistics and Its Application, April 2015.