

EE520 Data Driven Analysis of Complex Systems

Fall 2025

Professor Erik M. Bollt
Clarkson University
Potsdam, NY 13699
315-268-2307
ri Fax 315-268-2371
bolltem@clarkson.edu

Dates	Lectures	Group	Topic	Problems
Linear Algebra and Singular Value Decomposition				
M Aug 25		1	Meet the Data – What is a Complex System	HW 1 Assigned
W Aug 27		2	Our favorite Linear Dimension Reduction Method: SVD, PCA, POD, KL	
F,M Aug29,Sept1		2	SVD, PCA, POD, KL	
W,F Sept 4,5		2	INCL SVD Image Compression, Eigenfaces, POD-KLT (Karhunen-Loeve Transform).	
M,W,F Sept 8-12.		2	INCL SVD Image Compression, Eigenfaces, POD-KLT (Karhunen-Loeve Transform).	
M Sept 15		3	Regression, Model Selections, Inverse Problems	HW 2 Assigned
W Sept 17		3	Regression, Model Selections, Inverse Problems	HW 1 Due Sept 17
F Sept 19		3	Matrix Methods, SVD and Geometry of LS	
M Sept 22		3	Regression, Model Selections, Over-Under Fitting – Toward Tikhonov and Ridge Regression	
W,F,M,W S24-O1		3	Inverse Problems, Lasso, and Compressed Sensing	
			HW 2 due M Oct 6 - > Oct 10.	
			HW 3 Assigned on M Oct 6.	
Data-Driven Forecasting and Analyzing Spatiotemporal Processes				
W-W	Oct 8-22	4	DMD – Dynamic Mode Decomposition	
Fall Break Oct 13-14 (M-Tu)				
Class cancelled Fri Oct 17.				
Neural Networks – Deep Learning				
F, M	Oct 24-27	5	“Classic” feedforward ANN – deep learning	
W, F, M, W	Oct 29-Nov 5	5	Random ANN, Reservoir computing, Echo State. ELM – forecasting	
			HW 3 Due on F Nov 7.	
Classification and Clustering Problems				

M- Nov 6-

6

Clustering Methods – Kmeans then Spectral Clustering

HW 4 Assigned on M Nov 4 .

HW 4 Due on F Dec 2