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PLACE AND TIME: Room DIA004, Mondays 11:15-13:00 (part A) and 14:15-16:00 (part B)

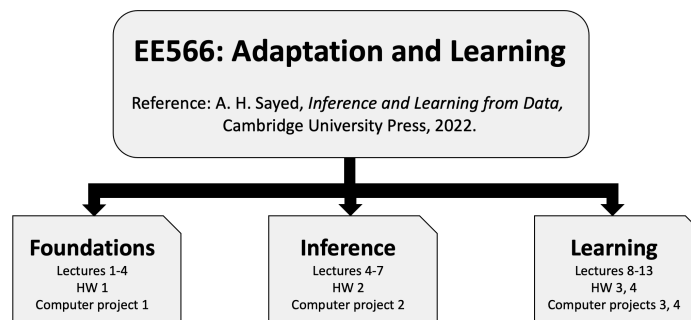**INSTRUCTOR:** Ali H. Sayed, Email: ali.sayed@epfl.ch
TEACHING ASSISTANTS: Virginia.Bordignon@epfl.ch and Mert.Kayaalp@epfl.ch

COURSE MATERIAL: Lecture notes distributed by the instructor for exclusive use by the students enrolled in this class:
A. H. Sayed, *Inference and Learning from Data*, Cambridge University Press, 2022.

PRE-REQUISITES: Some familiarity with matrix theory, linear algebra, and probability. Review handouts on these topics will be provided by the instructor.

GRADING: 4 homework assignments including computer projects (50%) and two exams worth 25% each.

TOPICS: Core concepts on inference and learning from data. Emphasis is on foundations and statistical limits of learning.

EE566: Adaptation and Learning

Reference: A. H. Sayed, *Inference and Learning from Data,*
Cambridge University Press, 2022.

Foundations	**Inference**	**Learning**
Lectures 1-4	Lectures 4-7	Lectures 8-13
HW 1	HW 2	HW 3, 4
Computer project 1	Computer project 2	Computer projects 3, 4

LECTURE	TASK	DATE	TENTATIVE TOPICS
1A		Feb. 21	Vector Differentiation.
1B			Convex Functions.
2A		Feb. 28	Proximal Operator.
2B			Gradient-Descent Algorithms.
3A	HW1 due	Mar. 7	Stochastic Optimization.
3B			Recommender Systems.
4A		Mar. 14	Adaptive Gradient Methods.
4B			Gradient Noise.
5A		Mar. 21	Convergence Analysis.
5B			Mean-Square-Error Inference.
6A	HW2 due	Mar. 28	Bayesian Inference I.
6B			Bayesian Inference II.
7A	EXAM OUT	Apr. 4	Linear Regression.
7B			Maximum Likelihood.
8A	EXAM IN	Apr. 11	Least-Squares.
8B			L2-Regularization.
	NO CLASS	Apr. 18	**EASTER HOLIDAY (NO CLASS)**.
9A		Apr. 25	L1-Regularization.
9B			Nearest-Neighbor Rule. K-means Clustering.
10A	HW3 due	May 2	Naïve Bayes.
10B			Principal Component Analysis.
11A		May 9	Logistic Regression.
11B			Perceptron. Support Vector Machines.
12A		May 16	Kernel Methods.
12B			Generalization.
13A, B		May 23	Neural Networks I.
14A, B	HW4 due	May 30	Neural Networks II.
	FINAL EXAM		EXAMINATION WEEK: JUNE 20-JULY 9, 2022