





Course Syllabus

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#	Topic	Content	Recap
1	Data-driven Analysis <i>week 1</i>	Components of a learning algorithm	
		Categorizing learning problems: <i>Supervised, Unsupervised, Reinforcement Learning</i>	
2	Unsupervised Learning <i>weeks 1-2</i>	Clustering: <i>k-means clustering</i>	
		Dimensionality reduction: <i>Principle Component Analysis</i>	Linear Algebra
		Learning data distribution: <i>Gaussian Mixture Model</i>	Probability Theory
3	Supervised Learning <i>weeks 3-9</i>	Basic regression approach: <i>linear regression</i>	
		Binary classification: <i>logistic regression and Perceptron</i>	
		Training via gradient descent: <i>function optimization and the steepest descent (ascent) algorithm</i>	Functional Analysis
		Support vector machines	
		Overfitting and underfitting: <i>Lagrange multipliers and regularization</i>	Optimization
		Multiclass classification	
		Non-linearity and representation learning: <i>kernels and neural networks</i>	
4	Deep Models <i>weeks 10-12</i>	Expressive power of neural networks: <i>Universal approximation theorem</i>	
		Multilayer perceptrons: <i>feedforward neural networks</i>	
		Training neural networks: <i>backpropagation algorithm, stochastic gradient descent</i>	Chain Rule for Derivatives
		More advanced deep models: <i>convolutional neural networks, beyond FNNs</i>	

Course Summary:

Date	Details	Due
Tue Jan 28, 2025	 <u>Assignment 1</u> https://q.utoronto.ca/courses/381364/assignments/1464987	due by 11:59pm
Thu Feb 13, 2025	 <u>Assignment 2</u> https://q.utoronto.ca/courses/381364/assignments/1473418	due by 11:59pm
Tue Feb 25, 2025	 <u>Midterm Exam</u> https://q.utoronto.ca/courses/381364/assignments/1484705	due by 11:59pm
Fri Mar 7, 2025	 <u>Group Forming</u> https://q.utoronto.ca/courses/381364/assignments/1483929	due by 11:59pm
Sun Mar 9, 2025	 <u>Assignment 3</u> https://q.utoronto.ca/courses/381364/assignments/1480665	due by 11:59pm
Tue Mar 25, 2025	 <u>Assignment 4</u> https://q.utoronto.ca/courses/381364/assignments/1489446	due by 11:59pm
	 <u>Midterm Practice</u> https://q.utoronto.ca/courses/381364/assignments/1480429	