CS-GY 6923 INET
Spring 2024 Schedule

Finish by	Activities
Jan 22	**Topic 1: Introduction to the course and to machine learning** • Objective: Be able to describe, at a very high level, what machine learning is and why it is becoming increasingly prevalent. • Readings: Alpaydin, Chapters 1 and 2. Read for the big picture. Don't get stuck on the details. • Discussion Forum: Introductory post about yourself. • Webinar Session • Programming Assignment: Set up your Jupyter notebook environment.
Jan 29	**Topic 2: The Perceptron and Adaline machine learning models** • Objectives: Be able to describe and implement the Perceptron and Adaline machine learning models. Be able to compare the assumptions of these two models and discuss their strengths and weaknesses. • Reading: Alpaydin, Ch. 11.1 - Ch. 11.4 • Reading: Raschka, Ch 2., pp 1-50; Ch 3., pp 51-58. • Discussion Forum • Webinar Session • Programming Assignment 2.
Feb 05	**Topic 3: Logistic regression model, regularization. Multiclass classification** • Objectives: Be able to describe and implement the logistic regression machine learning model. Be able to describe regularization, determine to which machine learning situations it is applicable, and apply it. Be able to apply binary classification models to multiclass problems. • Reading: Alpaydin, Ch. 10 • Reading: Raschka, Ch 3. pp 51-58. • Discussion Forum • Webinar Session • Programming Assignment 3

Feb 12	**Topic 4: Support Vector Machines and Kernel Machines**
	• Objectives: be able to
	  • Describe the support vector machines and kernel machines.
	  • Implement SVM and kernel machine learning models.
	• Reading: Alpaydin, Ch. 10
	• Reading: Raschka, Ch 3, pp. 76-87.
	• Discussion Forum
	• Webinar Session
	• Programming Assignment 4

Feb 26	**Topic 5: Decision Trees and Decision Tree Pruning** • Objectives: Be able to describe and implement the decision tree machine learning model and to determine when pruning is appropriate and, when it is appropriate, implement it. • Reading: Aplaydin Ch. 6 and Ch. 9. • Reading: Raschka, Ch 3, pp. 88-97. • Discussion Forum • Webinar Session • Programming Assignment 5
Mar 04	**Topic 6: Bayesian Learning** • Objective: Be able to describe and implement Bayesian machine learning models. • Reading: Alpaydin, Ch. 3. • Discussion Forum • Webinar Session • Project description
Mar 11	**Topic 7: Ensemble Methods** • Objectives: Be able to describe the difference between strong and weak learnings. Be able to describe the techniques of bootstrapping, gradient boosting, and Adaboosting. Be able to describe and implement the random forest machine learning model. • Reading: Alpaydin, Ch 17. • Reading: Raschka, Ch. 7. • Discussion Forum • Webinar Session • Programming Assignment 7
Mar 25	**Topic 8: Regression** Objectives: Be able to describe how to use multiple machine learning models to solve regression problems and to implement these techniques. • Reading: Alpaydin, Chs. 7, 8. • Reading: Raschka, Ch. 10, Ch. 11. • Discussion Forum • Webinar Session • Programming Assignment 8.
Apr 01	**Topic 9: Clustering and Nonparametric Models including PCA. Dimensionality Reduction** Objectives: Be able to describe and implement clustering and nonparametric models. • Reading: Alpaydin, Chs. 7, 8. • Reading: Raschka, Ch. 10, Ch. 11. • Discussion Forum

	• Webinar Session
Apr 08	**Topic 10: Neural Networks and Backpropagation** • Objective: Be able to describe the technique of backpropagation. Be able to describe and implement machine learning models based on neural networks • Reading: Alpaydin, Ch 11.5 - Ch. 11.13. • Reading: Raschka, Ch. 12. • Discussion Forum • Webinar Session
Apr 15	**Topic 11: Other topics in Neural Networks** • Objective: Be able to describe and implement techniques utilizing convolutional neural networks, recurrent neural networks, transformers, GANs. • Reading: Alpaydin Ch 15 • Discussion Forum • Webinar Session
Apr 22	**Topic 12: Reinforcement Learning** • Objective: Be able to describe and implement reinforcement learning machine learning techniques. • Reading: Alpaydin, Ch 18. • Discussion Forum • Webinar Session • Submit Project Report Draft
Apr 29 – May 06	**Topic 14: Presentation of Final Projects**