

CS 688 - Fall 2017

[Pattern Recognition – 75482 – CS 688 - 001](#)

Prerequisites: CS 580

Instructor: Prof. Harry Wechsler wechsler@gmu.edu

Course Description – Explores statistical pattern recognition and neural networks. Pattern recognition topics include Bayesian classification and decision theory, density (parametric and nonparametric) estimation, linear and nonlinear discriminant analysis, dimensionality reduction, feature extraction and selection, mixture models and EM, and vector quantization and clustering. Neural networks topics include feed-forward networks and back-propagation, self-organization feature maps, and radial basis functions. **Advanced topics** include statistical learning theory and **support vector machines, convolutional neural networks and deep learning**, and text analysis using **word2vec**. [Course] emphasizes experimental design, applications, and performance evaluation.

Time, Day, and Venue: T – Tuesday, 7:20 – 10:00 pm,
Innovation Hall 134

Office Hours: T – Tuesday, 6:15 – 7:00 pm, ENGR 4448

<http://registrar.gmu.edu/calendars/fall-2017/>

First day of classes: Tuesday, August 29

Columbus Day Recess: no class on Tuesday, October 10

Last day of classes: Tuesday, December 5

<http://registrar.gmu.edu/calendars/fall-2017/final-exams/>

Final Exam: Tuesday, December 19, 7:30 – 10:15 pm

Textbook: (required) Theodoridis, *Machine Learning*, Elsevier / Academic Press, 2015.

Supplementary Material: [1] Theodoridis and Koutroumbas, *Pattern Recognition* (4th ed.), Elsevier / Academic Press, 2008 and Theodoridis, Pikrakis, Koutroumbas, and Cavouras, *Introduction to Pattern Recognition – A MATLAB Approach* --- Elsevier / Academic Press, 2010; and [2] http://psi.cse.tamu.edu/teaching/lecture_notes/

Course Outline

1. Bayesian Classification / Decision Theory
2. Parameter Estimation
3. Feature Selection and Dimensionality Reduction

REVIEW for MIDTERM, October 17

4. Mixture Models and Ensemble Methods
5. Clustering and Competitive Learning
6. Linear Discriminant Functions
7. Connectionism and Neural Networks
8. Deep Learning
9. Support Vector Machines
10. Text Analysis Using word2vec

REVIEW for FINAL, December 5

Grading Composition (100 points)

- Homework – 25%
- Mid Term – Tuesday, October 24 – 20 %
- Term Project – November 28 – 25 %
- Final – Tuesday, December 19 - 30 %

Grading Scale

<http://www.fcps.edu/southcountyhs/sservices/gradescale.html>

Honor Code

You are expected to abide by the GMU honor code. Homework assignments and exams are individual efforts. Information on the university honor code can be found at

<http://oai.gmu.edu/the-mason-honor-code/>

Additional departmental CS information:

<http://cs.gmu.edu/wiki/pmwiki.php/HonorCode/CSHonorCodePolicies>

Learning Disability Accommodation

If you have a documented learning disability or other condition which may affect academic performance, make sure this documentation is on file with the Office of Disability Services (ODS) and then discuss it with the professor in his office regarding accommodations.