University of Jordan
Computer Engineering Department
Course Outline
Pattern Recognition (0907542)

I. Course Description

Basic concepts in pattern recognition. Classifiers, data mining, and knowledge discovery. Basic concepts of decision functions. Linear decision functions, generalized decision functions, and orthogonal functions. Classification by distance functions and clustering. Minimum distance classification. Single prototypes, multi-prototypes, and nearest-neighbor classification. Clustering and clusters: threshold order-dependent clustering algorithm, Max-Min distance method, c-means iterative algorithm (CMI). The ISODATA algorithm. Classification using statistical approaches. A general Bayes classifier. Normally distributed patterns: univariate, multivariate, multiclass multivariate. Estimation of probability density functions. Feature selection: introduction, distance measures, and clustering transformations. Feature selection methods: entropy minimization, and functional approximation. Fuzzy concepts: fuzzy set theory, the extension principle, and fuzzy relations. Fuzzy and crisp classification. Fuzzy clustering: fuzzy c-means iterative algorithm (FCMI), and fuzzy partitioning. Fuzzy pattern recognition. Syntactic pattern recognition: grammar types, selecting primitives, syntax analysis for recognition, and stochastic languages. Introduction to NNs, the McCulloch-Pitts (MP) neuron, Hebb NN, the Perceptron, the ADALINE, and Backpropagation NN and its applications: Pattern classification using Neural Networks (NNs).

Prerequisite: Operating Systems (1901473)

II. Textbooks and References

1. Theodoridis S, Koutroumbas K (2006) Pattern recognition, 3rd ed. Academic Press. *Main Textbook*.
2. Pattern Classification (2nd ed.) by Richard O. Duda, Peter E. Hart and David G. Stork, Wiley Interscience, 2001.

III. Student Materials

Textbook, Class Handouts, Web Page, PC, and the Internet.

IV. College Facilities

A classroom with whiteboard and projection facilities, library, and computer laboratory.

V. Instructional Methods

1. Lectures
2. Office discussions
3. Projects and presentations by the students
4. Course homepage at http://www.abandah.com/gheith/?page_id=726
5. Facebook page posts and discussions on http://www.facebook.com/pages/Cpe542-Pattern-Recognition/114343765412692

VI. Evaluation of Outcomes

1. Mid-Term Exam — 30%
2. Term Project's Report and Presentation — 20%
3. Final Exam — 50%

VII. Class Policies
- Attendance is required
- All submitted work must be yours
- Cheating will not be tolerated
- Open-book exams
- Follow the facebook page (Like it)
- Check department announcements at: http://www.facebook.com/pages/Computer-Engineering-Department/369639656466107

VIII. Course Outline
- Introduction
- Bayes Classifiers
- Linear Classifiers
- Non Linear Classifiers

Midterm Exam

- Feature Selection
- Feature Generation
- Template Matching
- Context Dependent Classification
- System Evaluation
- Clustering Algorithms

Final Exam

IX. Schedule
The following table contains the important dates of this course.

Date	Event
Mon 4 Feb 2013	Classes Begin
Mar 17 – Apr 4, 2013	Midterm Exam Period
Mon 18 Mar 2013	Term project proposal is due
Mon 6 May 2013	Term project report is due and start of simulation project demonstrations
Mon 13 May 2013	Last Lecture
May 18 – May 26, 2013	Final Exam Period

X. Sections and Instructors

Sec	Meeting Time	Room	Instructor	Office Hours	e-mail, Homepage
1	Mon & Wed 8:00-9:30	CPE 001	Dr. Gheith Abandah	Sun 12-1 Mon 11-12 Thu 9-10	abandah@ju.edu.jo, http://www.abandah.com/gheith