ECE 7868: Pattern Recognition and Machine Learning

Course Description

Fundamentals of pattern recognition techniques and their application to computer and electrical engineering problems, medicine, cognitive science, and bioinformatics.

Prior Course Number: 874
Transcript Abbreviation: Pattern Recog
Grading Plan: Letter Grade
Course Deliveries: Classroom
Course Levels: Graduate
Student Ranks: Masters, Doctoral
Course Offerings: Spring
Flex Scheduled Course: Never
Course Frequency: Even Years
Course Length: 14 Week
Credits: 3.0
Repeatable: No
Time Distribution: 3.0 hr Lec
Expected out-of-class hours per week: 6.0
Graded Component: Lecture
Credit by Examination: No
Admission Condition: No
Off Campus: Never
Campus Locations: Columbus
Prerequisites and Co-requisites: Prereq: 6001 (804).
Exclusions: Not open to students with credit for both 779 and 874.
Cross-Listings:

Course Rationale: Existing course.

The course is required for this unit's degrees, majors, and/or minors: No
The course is a GEC: No
The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.1001
Subsidy Level: Doctoral Course

General Information

Students should have a good background on probability and linear algebra.

Course Goals

Learn the fundamentals of pattern recognition and its relevance to classical and modern problems
Learn to identify where, when and how pattern recognition can be applied
Learn the sufficient background necessary to read more advance texts as well as journal articles on the field
Learn how to use pattern recognition in real settings. Student are introduced to recent applications of pattern recognition, such as medicine, cognitive science and bioinformatics
Work on a selected project

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Introduction to pattern recognition and its applications	3.0							
Bayesian decision theory	3.0							
Bayesian estimation: Gaussian distribution, ML estimation, EM algorithm	3.0							
Feature selection and extraction	5.0							
Linear discriminant functions	4.0							
Nonparametric pattern recognition	3.0							
Algorithm-independent learning	3.0							
Comparing classifiers	3.0							
Learning with multiple algorithms	3.5							
Syntactic pattern recognition	6.0							

Grades

Aspect	Percent
Homework and/or midterm exams	50%
Final project and/or final exam	50%

Representative Textbooks and Other Course Materials

Title	Author
Pattern Classification (optional)	Duda, Hart and Stork
Introduction to Statistical Pattern Recognition (optional)	Fukunaga

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
***	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
***	c	An ability to design a system, component, or process to meet desired needs.
*	d	An ability to function on multi-disciplinary teams.
***	e	An ability to identify, formulate, and solve engineering problems.
	f	An understanding of professional and ethical responsibility.
*	g	An ability to communicate effectively.
	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
	i	A recognition of the need for, and an ability to engage in life-long learning.
*	j	A knowledge of contemporary issues.
*	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Additional Notes or Comments

Updated prereqs, goals and topics to match university format. Exclusions were correct as originally written (779 AND 874). Aleix says people who have taken just one might still ant to take this course or audit it. 3/20/12

Added the word "both" to exclusion to clarify meaning. 5/14/12
Updated texts to be "optional". 4/8/13 - CED

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