CSC 4510  
Machine Learning  
Spring 2012

Instructor: Dr. Mary-Angela Papalaskari  
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Class Meetings: Tu-Th 2:30-3:45 [Mendel G88]  
Office Hours: MW 9:00-11:00 am

Course Description: This course is an introduction to the field of Machine Learning.

Course Objectives: After taking this course, you should expect to be able to:

1) Understand the basic mechanics behind how neural networks, Bayesian learning, decision tree induction, logical-concept learning, and genetic algorithms operate.  
2) Adapt the above algorithms to various kinds of application areas  
3) Discuss the practical and ethical issues behind the use of this technology.  
4) Read seminal technical papers with some dexterity.  
5) Conduct a 20-minute presentation on a Machine Learning topic.

Course Organization: I will balance the course meetings between lecture, discussion of readings, and hands-on exercises. Some readings will come from research papers, some from textbook chapters. The primary text will be Negnivitsky’s “Artificial Intelligence: A Guide to Intelligent Systems.”

Your work for the course will be in the form of hands on exercises in class, homework assignments, 4 quizzes, a midterm, final exam, and a term project/presentation during the last week of classes.

Homeworks: There will be several homework assignments, mostly involving reading, problems to solve and questions to answer, and some questions may involve programming or the use of software to explore topics in machine learning. Programming exercises will generally be extensions of hands-on exercises that we did in class, so you will have ample opportunity to ask questions. The frequency of homework assignments will be approximately one every two weeks.

Exams and quizzes: There will be four short quizzes (approximately 15 minutes), a midterm, and a final exam. Please refer to the course schedule and make note of the dates. No make-ups are allowed except in cases of documented, unavoidable absence.
Final Project Notes: The last week will be taken up by student presentations on final projects. In addition to the presentation, you will submit two “homework questions” for classmates to answer based on the presentation. Project reports will be due April 17th.

Grading:
Your overall course grade will be based on the following weighted sum:

Semester Score = 25% Final exam + 25% Tests (midterm & quizzes) + 25% Term Project + 25% Homeworks

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All assignments in this course are individual in scope. You are not allowed to share work, files, etc., You are allowed to seek help from the TA or classmates but you need to ensure that what you hand in to me is the product of your own thinking, or is properly attributed (in cases where you were unable to come up with a solution on your own). WHEN IN DOUBT, consult me for help. ANY VIOLATION OF ACADEMIC INTEGRITY WILL RESULT IN AT LEAST A GRADE OF ZERO FOR THE ASSIGNMENT. For more information, please check the Villanova web site for our University's complete Academic Integrity Policy.

Course Topic Schedule:
I expect to cover the following topics in the following order, with the amount of time shown per topic:

A) Machine Learning overview and AI orientation (2-3 classes)
B) Supervised learning and decision tree induction (3 classes)
C) Machine learning software (1-2 classes)
D) Unsupervised learning – clustering, data mining (2 classes)
E) Neural networks (4 classes)
F) Support Vector Machines (2-3 classes)
G) Genetic algorithms (2 classes)
H) Guest lectures (1-3 classes)
I) Project Presentations (2 classes – final week of class)