FALL 2017

ECE 7650: APPLIED COMPUTATIONAL INTELLIGENCE

COURSE DESCRIPTION:

This course applies computationally intelligent algorithms to solve difficult computer engineering and computer science problems. This course consists of the following components: standard lecture delivery, hands-on, and project based. The theory of several computationally intelligent algorithms will be presented in class. Along with receiving the theory in class, students are required to demonstrate their understanding by implementing the algorithms in software to solve given difficult engineering problems, which have shown to be intractable with the application of conventional algorithms.

COURSE OBJECTIVE:

1. To understand the state-of-the-art computationally intelligent algorithms.
2. To apply the given computationally intelligent algorithms to intractable computer engineering and computer science problems.
3. To gain experience in writing software

PRE-REQUISITES:

Software languages in C, Java, and Matlab

CONTACT HOURS:

An equivalent of 3 lectures /week (3 credit hours)

COURSE CONTENT:

1. Introduction to machine learning.
2. Linear and logistic regression.
3. Support Vector Machine (SVM).
4. Simulated Annealing (SA).
5. Artificial Neural Network (ANN).
6. Genetic algorithm (GA).
7. Particle Swarm Optimization (PSO)
8. Ant Colony Optimization (ACO).
9. Data Sets

Additional advanced research topics as determined by the instructor.

PAPER REVIEWS AND SEMINARS:

A student is required to review and give a presentation for one graduate-level research paper. Students will be assigned papers to present approximately one week in advance of the presentation date. The format of the presentation will be given in the course notes.

PROJECTS:

Students are required to do four projects in this course. Each project will apply a chosen computationally intelligent algorithm to solve a given difficult computer engineering and computer science problem. The results of each algorithm will be compared and contrasted to determine its relative effectiveness to solve the given problem

TEXTBOOK:

This course provides online lecture notes and list of papers

EVALUATION:

Your final course grade is determined by your performance in seminar, course project, test, and a final exam. The weighting of each of these components is as follows:

COMPONENT	NO	VALUE %	TOTAL VALUE	DETAILS / ADDITIONAL INFO
Term Test	1	20%	20	
Project	1	20%	20	
Seminar	n	10%	10	
Final Exam	1	50%	50	
TOTAL			100	

INSTRUCTOR INFO:

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Office Hours: ..... By appointment

VOLUNTARY WITHDRAW:

Friday, 17 November 2017

REQUIREMENTS/REGULATIONS

Student Responsibilities: It is the responsibility of each student to contact the instructor if he/she is uncertain about his/her standing in the course and his/her potential for receiving a failing grade. Students should also familiarize themselves with Sections 4 and 6 of the Regulations dealing with, among others, incomplete term work, deferred examinations, attendance and withdrawal, etc..

Lectures: Attendance at lectures is essential for successful completion of this course. Students must satisfy each evaluation component in the course.

ACADEMIC INTEGRITY

Students are expected to conduct themselves in accordance with the highest ethical standards of the Profession of Engineering and evince academic integrity in all their pursuits and activities at the university. As such, in accordance with the General Academic Regulations and Requirements of the University of Manitoba, Section 7.1, students are reminded that plagiarism* or any other form of cheating is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university) regardless of media

- examinations
- assignments
- laboratory reports
- term exams

A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty

Please refer any questions regarding Academic Integrity to your course instructor.

***Plagiarism:** to steal and pass off (the ideas or words of another) as one's own; use (another's production) without crediting the source