ECE 9601 - Soft-Computing and Intelligent Systems 2014-2015

[For M.E.Sc or Ph.D. candidates only]

OBJECTIVES:
Soft-computing encompasses techniques such as fuzzy logic, artificial neural networks genetic algorithms (GA) and their combinations such as neuro-fuzzy systems and fuzzy-GA. This course provides the tools necessary for applying such soft-computing methods to solve problems in pattern recognition, machine learning and knowledge discovery.

PREREQUISITES:
AM2415 or equivalent, Graduate standing in MESc or PhD program (M.Eng. Students must register for ECE 9061), Java programming knowledge,

TOPICS:
Theory and applications of artificial neural networks and fuzzy logic: multi-layer perceptron, self-organization map, radial basis network, Hopfield network, recurrent network, fuzzy set theory, fuzzy logic control, adaptive fuzzy neural network, genetic algorithm, and evolution computing. Applications to control, pattern recognition, nonlinear system modeling, speech and image processing.

SPECIFIC LEARNING OBJECTIVES:
At the completion of this course, the student is expected to achieve following objectives.
1. Understand the theory of neural networks and fuzzy logic systems.
2. Able to identify a possible neuro-fuzzy technique to solve a given task.
3. Able to evaluate the use of these techniques in a research publication.
4. Capable of implementing a simplified algorithm from a selected topic.

COURSE OUTLINE:
1. Overview of fuzzy logic systems and their applications
2. Overview of neural networks and their applications
3. Supervised classifiers
4. Unsupervised classifiers
5. Associative memories
6. Adaptive Fuzzy Neural Network
7. Genetic Algorithm and Evolution Computing
8. Applications of soft computing in various domains

CONTACT HOURS:
3 lecture hours/week. Wednesday 1:30-3:30pm and Friday 1:30-2:30 in WL 259.
TEXTBOOK:

EVALUATION:
- 6% Class Participation
- 24% Presentations (2)
- 30% Programming Assignments (2)
- 40% Final Project

All reports must be PDF files. Files must be submitted separately and not as a zip or in any other archive form. Submissions must always be on Owl. Email submissions will be discarded. Failure to follow these instructions as well as the quality of writing may result in penalties of up to 10% of each assignment.

Class participation consists of attendance as well as participation in class discussions and contributing your view points. Presentations involve a critical analysis of a research publication.

ATTENDANCE
Any student who, in the opinion of the instructor is absent too frequently from class or laboratory periods in any course, will be reported to the Dean (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Dean, the student will be debarred from taking the regular examination in the course.

CHEATING:
University policy states that cheating is a scholastic offence. The commission of a scholastic offence is attended by academic penalties, which may include expulsion from the program. If you are caught cheating, there will be no second warning.

Plagiarism is a major academic offence (see Scholastic Offence Policy in the Western Academic Calendar). Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage of text from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations.

The University of Western Ontario uses software for plagiarism checking. Students may be required to submit their written work in electronic form for plagiarism checking

COURSE INSTRUCTOR:
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CONSULTATION HOURS:
By arrangement