CARLETON UNIVERSITY
SCHOOL OF COMPUTER SCIENCE
WINTER 2021

COMP 5005   **LEARNING SYSTEMS FOR RANDOM ENVIRONMENTS**

Instructor: John Oommen
School Address: 5372 HP (oommen@scs.carleton.ca)
Method of Delivery: Virtual (ZOOM), Synchronous
Lecture Hours: Monday/Wednesday   14:35 to 15:55 Hours
Office Hours: As there is no formal "Office", there are no "Office Hours". But I will
                        work with an "Open Door" and ZOOM-meet with students as needed.

Marking Scheme: Assignments (Four)   40
                        Projects (One)   20
                        Final Exam   40

Assignments:
1. The Assignments, Project and Exam must be e-mailed **on time**.
2. Please send me the .pdf, preferably prepared by LaTex.
3. NO LATE assignments will be accepted.
4. Retain all your assignments for a proof of your mark, just in case your mark is erroneously entered or lost.

Text Book

K. S. Narendra and M. A. L. Thathachar *Learning Automata,* Prentice-Hall, 1989 (or later). You do not need to purchase it. My notes are sufficient. But it is an excellent reference.

Course Contents

Goal: This course will introduce the students to computerized adaptive learning for random environments.

Background: First of all, we will review some mathematical tools such as Markov chains and difference equations.

Material: The heart of the course will involve deterministic and stochastic learning automata with fixed and variable structures. We will study their operation in random environments and the various norms of learning. The learning algorithms studied will be the linear and nonlinear learning schemes of the continuous and discretized families with ergodic and non-ergodic properties.

State of the Art: Recent (up to within the last few months) estimator algorithms will also be examined. We will also discuss machines which can *rank* actions.

Applications: Applications of learning automata in file allocation, game playing, path finding, optimization, solving knapsack problems and in decision making will be discussed.

Important Notes:
Mails:
1. This is an on-line class. So, please minimize e-mails. But we can ZOOM-meet as needed.
2. Please let us have the discussions on-line so that all the students can hear the responses.
3. That being said, I promise that I will reply to emergency mails as promptly as possible!

Copying:
1. Students are allowed to collaborate on assignments, but only at the level of discussion.
2. When writing down the solutions, they must do so in their own words.
3. Copying of assignments is not tolerated. Such cases will be referred to the Office of the Dean of Science for proper action. This policy will be strictly enforced.
4. Students should not discuss *anything* with *anyone except me* for the Final Exam.

Accommodation of students with special needs:
1. Students with disabilities requiring academic accommodations in this course are encouraged to contact a coordinator at the Paul Menton Centre for Students with Disabilities (PMC). They must complete the necessary letters of accommodation.
2. After registering with the PMC, make an e-appointment with me to discuss your needs.
3. Please check with the PMC for the deadlines for submitting the completed forms.