CSI 4105/ Winter 2017

CSI 4105 DESIGN AND ANALYSIS OF ALGORITHMS II (3, 0, 0) - 3 cr.
Theory of NP-completeness, methods for dealing with NP-complete problems. Selected topics in such areas as combinatorial optimization, computational geometry, cryptography, parallel algorithms.

PROFESSOR: Dr. Sylvia Boyd, STE 5106
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Office Hours: Tuesdays 13:30-15:00

TIME AND PLACE: Wednesday 13:00 - 14:30 STE F0126
Friday 11:30 – 13:00 STE F0126

COURSE WEB PAGE: http://www.site.uottawa.ca/~sylvia/csi4105web/index.htm
(some course information will be posted here)

CLASS NOTES: Will be provided by email and/or on the course website.

TEXTBOOK: (Required) Kleinberg and Tardos, *Algorithm Design*, Addison Wesley.
The textbook is available at the Agora bookstore.

COURSE EVALUATION:

Assignments (there will be three)	25%
Midterm tests (there will be two)	50%
(Dates: Wed. March 1, Wednesday Apr. 5)	
Project (see Project Outline for details)	25%

COURSE OBJECTIVES

- To understand the importance of a formal treatment of "problems" and "algorithms" in the design of algorithms for solving difficult problems and in Computer Science in general.
- To learn what NP-complete problems are, to be able to recognize NP-complete problems, and to be able to formally prove that certain problems are NP-complete.
- To learn techniques to deal with NP-complete problems, such as approximation algorithms, local search, backtracking and randomized algorithms, and to be able to analyze these algorithms.
- To also learn about other formal complexity classes for problems.

BRIEF COURSE OUTLINE

1) Introduction
2) NP-complete: Definition, examples.
3) Examples of reductions for NP-complete proofs.
4) Methods for dealing with NP-complete problems: Approximation algorithms, local search, backtracking, randomized algorithms.
5) Polynomial-time algorithms for special cases of NP-complete problems.
6) Beyond NP and NP-complete—other special complexity classifications of problems.

SOME SPECIAL IMPORTANT NOTES

- Taking photographs or videos during class is **strictly prohibited**.
- All materials prepared by the course professor, including lab manuals, class handouts and test papers, are **copyright**. Copying or scanning them or posting them on a website is therefore **a violation of copyright and is illegal**.