

University of Lethbridge
Department of Mathematics and Computer Science

Computer Science 4110/5110/7110 – Introduction to Algorithms in Facility Location
Course Outline – Spring 2019

LECTURES: Tu Thr 9:25 – 10:40 **ROOM:** L1050

INSTRUCTOR: Robert Benkoczi (office C556)
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TEXTS: Reading will be assigned from academic papers and a selection of chapters from “Algorithm Design” by Kleinberg and Tardos, “Introduction to the Theory of Computation” by Sipser, and “Linear Programming: Foundations and Extensions” by Vanderbei. It is important to take good notes during the lectures.

GRADING SCHEME:	Final exam	40%
	Midterm	20%
	Assignments (approx 5)	25%
	Project	15%

GRADE DISTRIBUTION: This information is provided as a guideline only and may be revised in this offering. Minimum percentages for each letter grade are:

A+	95	B+	77	C+	67	D+	55
A	85	B	73	C	63	D	50
A-	80	B-	70	C-	60	F	< 50

SCHEDULE:

(as time permits):

- 1) Introduction to complexity theory. Classes P and NP. Reductions. Complexity of some basic graph problems. Complexity of facility location problems. Space complexity, classes L and NL.
- 2) A framework for solving difficult optimization problems – Linear and Integer Programming. Duality. The simplex method.
- 3) Advanced algorithms for exact solutions of facility location problems in restricted networks: dynamic programming, prune and search, sorted matrices, parametric optimization. Data structures used in efficient algorithms: centroid decomposition of tree graphs.
- 4) As time permits, we will explore other types of facility location problems such as locating facilities in the plane, locating obnoxious facilities, facility location with uncertain information.

COMMENTS:

- Lectures are common for graduate and undergraduate students; expectations for students at the undergraduate level will be scaled at the appropriate level.

- Work must be submitted at the scheduled time; no provision is made for make-up midterm or late assignments, except for medical reasons or emergencies. Missed tests and assignments receive 0 points.
- Requests for remarking tests and assignments are accepted only in writing *no later than one week from the date your graded work was returned*. On the request: identify the assignment or midterm, briefly explain why you believe the mark is incorrect, date and sign. Note that if your work is remarked, your grade may go up, down, or remain unchanged.
- Copying is strictly prohibited. Plagiarism can lead to severe penalties – please consult the calendar.