University of Lethbridge
Department of Mathematics and Computer Science

Computer Science 4625 –Design and Analysis of Advanced Algorithms
Course Outline – Spring 2023

LECTURES: Mo Wed 10:30 am – 11:45 am **ROOM:** D632

INSTRUCTORS: Robert Benkoczi (office C556)
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TEXTS: *Algorithm Design*, by Kleinberg and Tardos, 2006, Ch. 8-10
Parallel Algorithms, by M. Ghaffari, Jan. 2019, `https://people.inf.ethz.ch/gmohsen/CHParallel18.pdf`.
The relevant chapters are available as a coursepack from the bookstore.

GRADING SCHEME:		
	Assignments (approx. 5)	25%
	Programming assignments (approx. 3)	15%
	Midterm exam	30%
	Final exam	30%

GRADE DISTRIBUTION: This information is provided as a guideline only and may be revised in this offering.

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) Time complexity, classes P, NP, and NP-complete problems (Ch 8, Kleinberg and Tardos).
2) Space complexity. PSPACE-complete problems (Ch 9, Kleinberg and Tardos).
3) Notions of parameterized complexity (Ch 10, Kleinberg and Tardos).
4) Parallel models of computation.
5) Parallel algorithms for list ranking, sorting, connected components, bipartite matching.
6) Massively parallel algorithms for sorting, connected components, maximal matching, and maximal independent set.

COMMENTS:

- Work must be submitted at the scheduled time. In case of emergencies, contact your instructor to enquire about the possibility of obtaining an extension. 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 assignmemnt or midterm, briefly explain why you believe the mark is incorrect. You can send your request by e-mail. 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 student discipline policy at `https://www.uleth.ca/policy/resources/student-discipline-policy-academic-offenses-undergraduate-students` Any code submitted for grading may be checked for plagiarism using MOSS `https://theory.stanford.edu/~aiken/moss/`.

LINKS

- Moodle: `http://moodle.uleth.ca/`
- Instructor's page including office hours: `http://www.cs.uleth.ca/~benkoczi/`