Syllabus   Spring 2025
MCS 401 – Computer Algorithms I

Instructor: Lev Reyzin, SEO 417, `lreyzin@uic.edu`

Time and location: M-W-F, 9:00-9:50am at Thomas Beckham Hall (TBH) 180G

Credit hours: 3 credits (16607, 17454), 4 credits (20665, 20666)

Prerequisites: MCS 360 or CS 251. See instructor with any concerns.

Office hours: TBD

Website: `http://homepages.math.uic.edu/~lreyzin/s25_mcs401/`

Textbook: J. Kleinberg and É. Tardos. *Algorithm Design*, 1st ed.

Topics: This course will cover the important principles behind the design and analysis of computer algorithms. We will study techniques such as divide-and-conquer, dynamic programming, and greedy methods, as well as algorithms for sorting, searching, graph computations, and pattern matching. We will also discuss the theory of NP-completeness.

Weekly schedule: Week 1: intro and Gale-Shapley, Week 2: data structures and asymptotic notation, Week 3: greedy algorithms, Week 4: greedy graph algorithms, Week 5: divide and conquer, Week 6: divide and conquer continued, Week 7: dynamic programming, Week 8: dynamic programming continued, Week 9: midterm and review, Week 10: flows and cuts, Week 11: flows and cuts continued, Week 12: reductions, Week 13: NP-completeness, Week 14: NP-completeness continued, Week 15: approximation algorithms, Week 16: final exam.

Assignment and exam dates: Problem set 1 due 1/31/25, problem set 2 due 2/17/25, problem set 3 due 3/5/25, problem set 4 due 3/21/25, problem set 5 due 4/11/25, problem set 6 due 5/2/25. Midterm exam: Wednesday, March 19th, 9:00-9:50pm. Final exam: Tuesday, May 6th, 10:30am-12:30pm

Grading: The components are weighted as follows: problem sets are 10%, the in-class midterm is 35%, and the final exam is 55%. for the exams. Students who receive an 80% or above will receive an "A," 60% or above at least a "B," 40% or above at least a "C," and 20% or above at least a "D." This scale may be made more generous, especially for undergraduates, at the instructor's discretion.

Attendance and participation: In addition to the grading policies outlined above, a student's grade might be adjusted *slightly*, e.g. a point, upward for positive contributions through class participation. Moreover, students are responsible for *all material covered in lectures*, in problem sets, and in assigned readings.

Problem set grading and collaboration policy: The goal of the problem sets is for students to *think* about the problems and attempt to answer them. Problem sets will be graded based on *demonstrated effort*. Any answer that seriously attempts to answer a problem will receive full credit, *regardless of correctness*. Collaboration with other students is encouraged. Use of outside resources is discouraged but allowed. Unless otherwise stated, all problem sets will be weighted equally. (Collaboration and outside resources are disallowed on all exams, which are to be completed by students on their own.)

Late work policy: Problem sets are to be turned in on Gradescope by 9am the day they are due. In general, late work will not be accepted. Exceptions must be asked for *in advance of the due date* and will be made rarely, on a case-by-case basis.

Course drop policy: According to the UIC administration, "Only a student can initiate the dropping of a course. The student can drop a course through Banner up through the 10th day of the semester; there is no academic penalty nor does a 'W' appear on the transcript. After the 10th day and through Friday of the 10th week, the student may drop courses by seeing a college academic advisor. These late drops are indicated by 'W' on the transcript and are limited to a total of four for the student's entire UIC career. In emergency situations, the college will entertain petitions for drops beyond the official deadlines. The student must see an academic advisor for guidance and a petition form."

Classroom environment: University classes play an important role in educating students and imparting a deep understanding of the course materials and topics. With this goal in mind, students are urged to speak their minds, explore ideas and arguments, play devil's advocate, and engage in civil but robust discussions. Students ought to do business in the proper currency of respectful intellectual discourse—a currency consisting of reasons, evidence, and arguments.

Disclamer This syllabus is intended to give the student guidance on what may be covered during the semester and will be followed as closely as possible. The instructor reserves the right to modify, supplement, and make changes as course needs arise.

Disability policy: Students with disabilities who require accommodations for access and participation in this course must be registered with the Office of Disability Services (ODS). Please contact ODS a 312/413/-2183 (voice) or 312/413-0123 (TTY).