

Syllabus

Spring 2024

CS 501 / MCS 501 – Computer Algorithms II

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

Time and location: M-W-F, 9:00-9:50pm at Addams Hall (AH) 307

Credit hours: 4 credits (33788, 38244)

Prerequisites: CS 401 / MCS 401. See instructor with any concerns.

Office hours: M: 10:00-10:50 am, W 11:00-11:50 am in-office

Website: http://homepages.math.uic.edu/~lreyzin/s24_mcs501/

Textbook: D. P. Williamson and D. B. Shmoys. *The Design of Approximation Algorithms*.

Topics: This course will introduce students to the fundamental ideas underlying modern algorithmic techniques. Students will be taught how to design and analyze approximation algorithms, randomized algorithms, and streaming algorithms, as well as other advanced topics.

Weekly schedule (tentative): Week 1: intro to randomized algorithms, Week 2: intro to approximation algorithms, Week 3: linear programming relaxations, Week 4: randomized rounding schemes, Week 5: fully polynomial time approximation schemes, Week 6: ellipsoid method, Week 7: derandomization, Week 8: randomized rounding schemes, Week 9: semidefinite relaxations, Week 10: duality, complementary slackness, Week 11: primal-dual algorithms, Week 12: approximation-preserving reductions, Week 13: unique games.

Assignment and exam dates (tentative): Problem set 1 due: 1/26/24, problem set 2 due: 2/16/24, problem set 3 due: 3/8/24, problem set 4 due: 4/5/24, problem set 5 due: 4/26/24, Midterm exam: 3/15/24 9:00am-9:50am in AH 307, Final exam: 4/30/24 10:30am-12:30pm in AH 307.

Grading: Course grades will be determined according to the following breakdown: 40% take-home problem sets, 25% midterm, 35% final exam.

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: Unless otherwise specified on an assignment, students may discuss problem sets with one another, but they *must write the solutions 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: Please see the following website for the latest policies: <https://registrar.uic.edu/registration/drop-policy-grad/>.

Classroom environment: University classes play an important role 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.

Disclaimer 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. However 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).