

CSCI-261 Analysis of Algorithms Syllabus Spring Semester 2023-24 (2235)

Course Description

This course provides an introduction to the design and analysis of algorithms. It covers a variety of classical algorithms and their complexity and will equip students with the intellectual tools to design, analyze, implement, and evaluate their own algorithms.

Prerequisites are MATH-190 (Discrete Mathematics for Computing) and CSCI-243 (The Mechanics of Programming) or equivalent courses.

Course Outcomes

- Students should demonstrate an understanding of basic concepts related to the design and analysis of algorithms.
Evaluation: Assessed by homework and exams.
- Students should demonstrate knowledge of classical algorithms and their complexity.
Evaluation: Assessed by homework and exams.
- Students should be able to design and analyze their own algorithms.
Evaluation: Assessed by homework exams.
- Students should implement, experiment with, compare, and report on various algorithmic solutions to the same problem.
Evaluation: Assessed by programming homework assignments.

Instructor Contact

Ting Cao

Office: GOL-3525

E-mail: tcvc@rit.edu

I am usually good at answering emails promptly. However, there is no guarantee I'll respond during the evening or on weekends. **I am unlikely to answer emails about the homework on**

the day the assignment is due. If you have questions and I am not available, I highly recommend that you stop by the tutoring center (see below).

Theory tutoring center:

In addition to the usual support services RIT and the CS department offer, the CS theory faculty are offering their own tutoring service featuring very qualified CS students. The tutoring takes place in the CS mentoring center (GOL-3660). For hours, see the [theory tutoring page](#).

Office Hours (First draft):

Tuesday: 12:10 AM - 1: 40 PM.

Wednesday: 9:00 AM - 10:30 AM.

- Emails are highly encouraged for asking questions.
- If none of these times is suitable for you, please do not hesitate to contact me via email to arrange a different time slot.

Lectures:

TuTh 9:30 AM - 10:45 AM @ GOL -3435

Course Policies

Homework Assignments

- There are six homework assignments. The assignments will be made available on MyCourses.
- All homework are due (almost-)bi-weekly on **Thursdays**, 11:59 pm.
- The homework assignments will usually be posted at least 10 days before their due date. Sometimes a part of the homework will be posted two weeks before the due date and another part a week before the due date.
- You are free to discuss the current homework with your classmates. After such discussions, you have to discard all notes, cell phone pictures, and other materials you created during these discussions before you write up the solutions on your own. During the writing phase, you are not allowed to further discuss the solutions with your classmates. Moreover, you are not allowed to show your code to your classmates.
- Discussions with anybody else, including looking up the solutions online or in the literature other than the course books, are not permitted.

- You are encouraged to discuss any class material and homework that have already been handed in with your peers, in the tutoring center, or with the instructor.
- Handing in your homework:
 - The coding part of the homework has to be submitted using the **try** system from a Linux-based CS lab machine.
 - The non-coding part must be uploaded to MyCourses as a **single pdf** file.
- The lowest homework grade will be dropped, and the remaining five will contribute evenly toward your final grade. Zeros for cheating will not be dropped. These six homework assignments contribute 49% of the final grade attributed to homework. The remaining 1% will be allocated to a small Homework 0 designed to introduce everybody to the naming and submission conventions required for the coding portions of assignments in this course.
- **There will be no make-up homework or exams. No excuse is considered. Every missed homework receives a zero grade.**
- **Late homework will be assessed as follows.**

Late. One Day	30% off
Late. Two Days	45% off
Late. Three Days	60% off
Late. Four Days	75% off
Late. Five or more Days	No credit

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Midterm Exam

- Week 8 (tentative)
 - It will be in person during regular class time.
 - Detailed information about the midterm exam will be provided in a separate email and the announcement.
 - **There will be no make-up homework or exams. No excuse is considered. Every missed exam receives a zero grade.**

Final Exam

- The final Exam schedule will be available at SIS. I will update it at a later time once I have more information.
- The final exam is a closed book and notes, but you may bring one sheet of letter-sized paper with your own hand-written notes.

- **There will be no make-up homework or exams. No excuse is considered. Every missed exam receives a zero grade.**

Textbooks

Two excellent books are listed as recommended texts. Neither is explicitly required. You will probably find that reading the Kleinberg text is more useful during the semester (the schedule indicates appropriate readings in the Kleinberg textbook). All topics we cover will be supported through in-class slides and examples. In-class slides will be posted via MyCourses. Most of the topics we will cover are included in each of the recommended textbooks, although in some cases, a topic is covered more in one than the other.

- (Recommended text) Algorithm Design, Kleinberg and Tardos, Addison Wesley, 2005.
- (Recommended text) Introduction to Algorithms, Thomas Cormen et al., 3rd edition.

Additional Resources

- Instructor notes. Slides from lectures will be posted on MyCourses.
 - Credit for course materials is given to Aaron Deever, Ivona Bezakova, and Kevin Wayne / Pearson-Addison Wesley.

Topics

- Asymptotic analysis
- Divide-and-conquer algorithms and recurrences
- Greedy algorithms
- Dynamic programming
- Graph algorithms
 - Traversals
 - Minimum spanning trees
 - Single source shortest path
 - All pairs shortest path
 - Network flow
- The P versus NP problem and NP-completeness

Grading

- Attendance and Participation 5%

- Homeworks 50%
- Midterm exam 20%
- Final exam 25%

Grading policies:

Grading scale:

- A: [91, 100]
- A-: [88, 91)
- B+: [84, 88)
- B: [80, 84)
- B-: [77, 80)
- C+: [73, 77)
- C: [69, 73)
- C-: [66, 69)
- D: [55, 66)
- F: [0, 55)

If you feel that an error is made in grading your homework or exam, you have **one week** from the moment the graded work is handed back to dispute your grade. All grading issues should be taken up with me; do not discuss grading issues with graders or tutors.

All grades will be posted on MyCourses.

Success in this course depends heavily on your personal health and well-being. Recognize that stress is an expected part of the college experience, and it often can be compounded by unexpected setbacks or life changes outside the classroom. Moreover, those with marginalized identities may be faced with additional social stressors. Your other instructors and I strongly encourage you to reframe challenges as an unavoidable pathway to success. Reflect on your role in taking care of yourself throughout the term before the demands of exams and projects reach their peak. Please feel free to reach out to me about any difficulty you may be having that may impact your performance in this course as soon as it occurs and before it becomes unmanageable. In addition to your academic advisor, I strongly encourage you to contact the many other support services on campus that stand ready to assist you.

CS Common Course Policies Include:

- Rescheduling an Exam

Exams can not be made up except for real emergencies in which case proper documentation (like a doctor's note) will be required. If at all possible, you should contact me prior to the exam. Oversleeping, cars that don't start etc. do not constitute a valid excuse.

RIT's Academic Senate revised the [Final Examination Policies](#) on March 28, 2013. Please refer to the policies for related questions.

- **Course Withdrawal**

During the add/drop period, you may drop this course and it will disappear from your transcript. After that time, you can only withdraw from the course; the course will appear on your transcript with a grade of W. See the institute's [calendar](#) regarding the add/drop period and latest withdrawal date.

- **Disability Services**

RIT is committed to providing reasonable accommodations to students with disabilities. If you would like to request accommodations such as special seating or testing modifications due to a disability, please contact the Disability Services Office. It is located in the Student Alumni Union, Room 1150; the web site is www.rit.edu/dso. After you receive accommodation approval, it is imperative that you contact me so that we can work out whatever arrangement is necessary.

- **Academic Integrity**

The [DCS Policy on Academic Honesty](#) will be enforced.

You should only submit work that is completely your own. Failure to do so counts as academic dishonesty and so does being the source of such work. Submitting work that is in large part not completely your own work is a flagrant violation of basic ethical behavior and will be punished according to department policy.

List of Topics and Sub-Modules for Syllabus