

Course Syllabus and Policies

Welcome to 15-751*, TCS Toolkit, Spring 2020 edition. This is a 12-unit star graduate course on basic mathematical topics in theoretical computer science. In this document you will find the course logistics, policies, and syllabus. If any information is unclear, or you can't find something you're looking for, please do not hesitate to ask for clarification on Diderot.

Basic information

The lectures will be held 3:00–4:20, Tuesdays and Thursdays, in POS A35 (Posner Hall).

- Instructor: Ryan O'Donnell.
- TAs: Ainesh Bakshi, Pedro Paredes, Kevin Pratt.

Office hour information can be found on the course staff page.

Diderot

Except for homework submission via Gradescope, all online course activity will be done through **Diderot**. Every student is required to sign up for the course's Diderot page. All the course content will be published on Diderot, and announcements related to the course will be made on Diderot, so it is important that you check Diderot and/or your email in a timely manner to receive these announcements. Course-related questions can also be submitted on Diderot, and you can use "Feedback" posts to give us your thoughts about the course (which we value very much). There is also a course calendar on Diderot with important date on it; please check it out.

Prerequisites and syllabus

Students should have a solid undergraduate background in math (e.g., elementary combinatorics, graph theory, discrete probability, basic algebra/calculus) and theoretical computer science (running time analysis, big-O/Omega/Theta, P and NP, basic fundamental algorithms). Mathematical maturity is important. The course will have 7 units of about 4 lectures each: Asymptotics and Probability; Fourier Transforms; Algebra and Applications; Spectral Graph Theory; CSPs and Hierarchies; Information and Learning; Hardness.

Evaluation

The course grades will be determined as follows:

- 68%: Homework
- 12%: Written project
- 8%: Project peer review
- 6%: Seminar attendance
- 3%: Class participation

Homework. There will be 6 homeworks, each worth 12%, except that the first homework will be somewhat shorter and only worth 8%. Homeworks will generally (but not always) come out on Sundays and be due on Friday evenings (12 days later). Due to TA time constraints, it is not guaranteed that all problems will be graded, but we will strive to do so. Questions about the homework should be asked on Diderot. Homework must be turned in on [Gradescope](#). *Please use a separate page for each problem* (`\newpage`).

Homework policies. `LATEX` typesetting complied with `pdflatex` is mandatory. Poor `LATEX` form on any solution may lead to a loss of points. Please try to do the homework by yourself. If you get stuck, working in a group of two is okay; maybe three, max. You may not discuss the homework with anyone outside of the class. You may use computational mathematics programs to assist you. You may not search the Internet for answers to the specific questions in the homework. On the other hand, you are welcome to search the Internet for general math concepts, and you are very strongly encouraged to search the Internet for any and all issues concerning `LATEX`. *Your homework PDF must begin with an “Acknowledgment” section (as in a research paper) in which you acknowledge any assistance you received.*

Homework late days. You have **five (5)** “late days” for use on homework throughout the semester. No more than 2 late days can be used on any one assignment. Any amount of time between 1 minute and 24 hours counts as one late day. The timing is determined by Gradescope. **You** are responsible for knowing how many late days you have left. Except through the use of late days described above, no late homework will be accepted. If you are out of late days and your homework is late, you will get 0 points. (Please note that Gradescope does not know about late days, so if you accidentally go over, Gradescope will still accept your homework. But the TAs will give it 0 points.)

Written project. You will write an (approximately 8-page) document constituting lecture notes for a hypothetical new topic in the course. More details on the project will be forthcoming later in the semester. **Friday, April 3** is the due date, and **this is an absolutely hard deadline; no late days can be used, no late projects accepted.**

Project peer review. You will read two other students’ written projects and write a short review. Your reviews will be graded. Your project’s peer-reviews will *not* determine your project’s grade, but the graders *will* take these reviews into account. More details will be forthcoming later in the semester. **Friday, April 24** is the due date. Up to 2 homework late days **may** be used up for this.

Seminar attendance. Over the course of the semester, you are required to attend **three (3)** one-hour TCS seminars. You can choose any talks from any of the following three seminar series:

- Theory Lunch Seminar (every Wednesday, noon–1pm, typically NSH 3305). Schedule: <https://www.cs.cmu.edu/~./theorylunch/>
- Theory Seminar (irregular Fridays, typically 3:30–4:30). Schedule: <http://theory.cs.cmu.edu/seminars/>
- ACO Seminar (every Thursday, 3:30–4:30, Wean 8220; unfortunately, this does overlap with class time). Schedule: <http://aco.math.cmu.edu/seminar.html>)

To get announcements about talks, *please add yourself to the appropriate mailing lists*: [theory-announce](#), and [aco-seminar](#). When you attend, you should have taken complete notes (handwritten or quickly-typed) on the seminar, as though it were a class lecture you’d have to study from later. You should then submit these notes in PDF format to Gradescope, within an hour of the end of the seminar. We can recommend the free “CamScanner” app for taking cell phone photos of handwritten pages and converting them to one PDF file. Each of the 3 submissions is worth 2% of your final grade. You will receive 2% if your submission is good, 1% if your submission is bad, and 0% if your submission is terrible-to-nonexistent.

Class participation. When participating in class, if you think I might not know your name, do not hesitate to mention it! (Either in class, or afterward by private Diderot post.)

Accommodations

If you have a disability and you have an accommodations letter from the Disability Resources office, please schedule a meeting with an instructor to discuss your accommodations and needs as early in the semester as possible. We will be happy to work with you to ensure that accommodations are provided as appropriate. If you suspect that you may have a disability and would benefit from accommodations, but are not yet registered with the Office of Disability Resources, we encourage you to contact them at access@andrew.cmu.edu.

Student wellness

Your well-being and happiness is very important to us! All of us benefit from support during times of struggle, and there are [many resources](#) on campus to help you. Please feel free to contact the instructor or a TA at any time if you need assistance accessing such resources, or run into any problems. Asking for support sooner rather than later is almost always helpful.

If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, we strongly encourage you to seek support. [Counseling and Psychological Services \(CaPS\)](#) is there to help; you can reach them online, in person, or at 412-268-2922.