

## Course Information

**Webpage:** <https://cs-people.bu.edu/sofya/sublinear-course/>

**Prerequisites:** CS 537 (Randomness in Computing) and some background on theory of computing. You need to be comfortable with mathematical proofs. Most assignments in this course require proving some statement and some creativity in finding a proof will be necessary.

**Lectures:** TuTh 12:30pm-1:45pm. You may attend lectures in person or remotely. The zoom link is posted on Piazza. Lectures will be recorded and posted to accommodate students from different time zones.

**Syllabus:** This course covers the design and analysis of algorithms that are restricted to run in sublinear time. Such algorithms are typically randomized and produce only approximate answers. A characteristic feature of sublinear algorithms is that they do not have time to access the entire input. Therefore, input representation and the model for accessing the input play an important role. We will study different models appropriate for sublinear algorithms. The course will cover sublinear algorithms discovered in a variety of areas, including graph theory, algebra, geometry, and discrete mathematics, and introduce many techniques that are applied to analyzing sublinear algorithms.

The topics include: property testing, sublinear-time approximation algorithms, streaming, algorithm design and analysis techniques, and methods for proving lower bounds.

This course is aimed at PhD students who are interested in doing research in theoretical computer science. The highlights of the course will be a research project and a final project presentation.

**Questions and class discussion on Piazza:** We will use Piazza for class discussion and course announcements. Please post all course-related questions on Piazza, rather than emailing them to us. **Top participants will get bonus points at the end of the course.** Our class page is at: [piazza.com/bu/fall12020/cs591](https://piazza.com/bu/fall12020/cs591)

**Class participation:** If you can attend lectures, you are encouraged to actively participate and ask questions. In addition, you can participate via discussions on piazza and office hours. Reporting mistakes, typos, and imprecisions in lecture notes also counts as class participation! And so does helping us stay together as a class: for example, organizing study groups on zoom, helping us keep track of lecture notes, etc.

**Submission of assignments:** Assignments will be typically due at 10am on Thursdays. All assignments will be collected on Gradescope. Please sign up on [gradescope.com](https://www.gradescope.com) using your [@bu.edu](mailto:@bu.edu) email address. The entry code for our class is posted on piazza.

**Optional supplementary textbook:** Oded Goldreich. *Introduction to Property Testing*.

**Homework:** There will be about 4-5 homework assignments. Assignments will be posted on the course web page, usually one week in advance.

You are strongly encouraged to type your solutions in L<sup>A</sup>T<sub>E</sub>X. Sample L<sup>A</sup>T<sub>E</sub>X homework files are provided on the course web page.

You should be as clear and concise as possible in your write-up of solutions. Understandability of your answer is as desirable as correctness, because communication of technical material is an important skill. A simple, direct analysis is worth more points than a convoluted one, both because it is simpler and less prone to error and because it is easier to read and understand.

**Collaboration and Honesty Policy:** You are allowed and encouraged to collaborate on homework problems **verbally**, however, you must write your solutions independently. If you choose to collaborate on a problem, you are allowed to discuss it with at most 3 other students currently enrolled in the class. Before working with others on a problem, you should think about it yourself for at least 30 minutes. On **each** problem you submit, you must include the names of the students with whom you have had discussions concerning your solution in the header. **Indicate whether you gave help, received help, or worked together. If you worked alone, write “Collaborators: none”.**

You are not allowed to get homework help from people outside of this class or search for homework solutions on the web. You are also not allowed to share written (or typed) work related to homework problems with other students. You must acknowledge all your sources on homework solutions. It is a good habit to get into for your research.

Please familiarize yourself with the university academic conduct policies:

<https://www.bu.edu/academics/cas/policies/academic-conduct/>

<https://www.bu.edu/academics/grs/policies/academic-conduct/>

If it is your first semester at a US university, pay special attention to the university policy on plagiarism.

**Course Project:** A course project is an integral part of this course. You should expect to submit a project proposal, a progress report, and a final report and, in addition, to give a presentation on your project. The instructor will guide you on all aspects of your project, starting from choosing a topic. Detailed guidelines will be provided a few weeks into the course.

**Grading:** The grade will be calculated as follows:

Homework	30%
Scribing lecture notes	15%
Course project and presentation	45% (only 35% for PhD students)
Peer grading (PhD student only)	10%
Class participation	10%

PhD students will be asked to help with grading. This extra work will account for 10% of their grade.