EC330 – Applied Algorithms and Data Structures for Engineers

Spring 2023

Lecture: Mon/Wed 12:20 pm – 2:05 pm ET, PHO 210
Discussion: Attend one of the following two sections
MUG 205, Fri 11:15 am – 12:05 pm ET
CDS 264, Fri 12:20 pm – 1:10 pm ET

Staff Information:

Instructor:
Wenchao Li, wenchao@bu.edu (Write 'EC330-Spring2023:' in the subject line)
Graduate Teaching Assistant:
Saad Ullah, saadu@bu.edu
Undergraduate Teaching Assistants:
Tom Panenko, tompan@bu.edu
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Kaede Kawata, kkawata@bu.edu
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Details about office hours will be posted on Blackboard/Piazza.

Course Description:
A good understanding of algorithms is essential to most engineering tasks today. Correct implementations of algorithms have allowed the Internet to grow unbounded, computer games to function in real time, and databases to be accessed quickly (and incorrect implementations have done the opposite!). We will begin the course with a serious introduction to algorithmic analysis, followed by a treatment of simple data structures and sorting algorithms. We will continue with more sophisticated data structures and graph algorithms, and end with advanced data structures as time permits. Throughout the course we will discuss the many applications of the data structures and algorithms considered, and homework will focus on theory as well as C++ implementations. EC327 and MA193 (recommended) are the formal prerequisites for this class.

Topics:

- Discrete Math Review
- Asymptotic Notations
- Recurrence
- Basic Data Structures
- Sorting
- Hashing
- Search Trees
- String Matching
- Graphs and Graph Traversal
- Dynamic Programming

Textbook:

- Cormen, Leiserson, Rivest and Stein, *Introduction to Algorithms* (Fourth Edition), MIT Press, 2022.

References:

- Dasgupta, Papadimitriou and Vazirani, *Algorithms* (First Edition), McGraw-Hill Education, 2006.
- www.cplusplus.com

Discussion Sections:
The topics covered include review of course materials, additional examples, and homework tips.

Grading:
All grades will be *curved* according to the class median. Thus, it is your relative score (compared to the rest of the class) that really matters, rather than your absolute score. For this course, I expect to center the median at a B, but the final grade will depend on my assessment of the class as a whole.

- Homework (42%) – 7 in total and *the one with the lowest score will be dropped automatically*
- Quizzes (8%) – 4 in total, in lecture, schedule TBD
- Midterm (20%) – in lecture, Date TBD
- Final (30%) – Date TBD

Homework:
Homework assignments will be posted on Blackboard. They must be turned in *online on Gradescope*. *No late homework will be accepted*, except for legitimate excuses communicated to the instructor before the due dates and backed by written, dated documentation. The assignment with the lowest score will be automatically dropped when it comes to computing your overall score.

Homework assignments will be completed in C++17. Unless otherwise stated, you may use any development environment you wish (e.g Netbeans, Eclipse, XCode, Visual Studio), as long as it is fully ANSI C++ compatible. You should make sure that your code compiles and runs on Gradescope. Sample test cases will be provided for sanity check.

Policy on Collaboration:
We take cheating and plagiarism very seriously. At the same time, we recognize the value of team work and collaboration. All homework assignments will be either *individual assignments* or done *in pairs* (details will be specified in the homework pdf). *We will run code clone detectors on your code*! You may use other reference texts and web sources, subject to the following *strict* conditions:

1. You must clearly acknowledge all sources at the top of your homework submission including any website (e.g. Stack Overflow) or AI assistant (e.g. ChatGPT in which case you are required to include details of the prompts that you

use) that you may have consulted to come up with your solution. Note that copying code or answer verbatim from such sources is considered plagiarism and a violation of our policy on collaboration.

2. You must write all answers in your own words/code, and you *may not* share code with any of your classmates (unless it is a pair-programming assignment in which case you may work with your partner).
3. You may not use any human resource outside of class including web-based help services and outside tutors.
4. You must be able to fully explain your answers upon demand.
5. You may not collaborate in any way on exams.

Failure to meet any of the above conditions will be considered cheating in this class. BU's Academic Conduct Code applies: https://www.bu.edu/academics/policies/academic-conduct-code/. Violations of our policy on collaboration will result in an automatic zero on the homework assignment and disciplinary actions taken by the college and the university. If you are not sure whether something is permitted by the course policy, ask me! It will be much more awkward to explain your actions after the fact to the disciplinary committee.