SY301: Data Structures

Course Policy

Contact Information

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Learning Outcomes

1. Be able to perform complex programming tasks.
2. Understand the fundamentals of algorithm analysis.
3. Recognize and apply the canonical ADTs (Lists, Queues, Stacks, Trees, Priority Queues, Maps, and Graphs) appropriate for solving a problem.
4. Demonstrate the ability to implement the canonical ADTs with arrays, linked lists, binary trees, hash tables, balanced trees, and other similar structures.
5. Be proficient in defining and coding recursive algorithms, including recognizing when recursive solutions are appropriate.
6. Understand the role of algorithmic complexity and data structure choices in the cybersecurity domain, and understand the ramifications of data structure and algorithmic choices.

Course Web Page

http://courses.cyber.usna.edu/SY301/

The website will contain all course notes, homework assignments, labs, and project assignments.

Course Topics

- Big-O notation
- Asymptotic analysis of algorithms
- Simple data structures (arrays, linked lists, stacks, queues)

- Recursion and recurrence analysis
- Binary trees (AVL trees, B-trees, treaps)
- Hash tables
- Binary heaps, priority queues
- Simple graph theory (breadth-first search, depth-first search, Dijkstra's algorithm)
- Sorting algorithms

Textbook

The course is self-contained, all necessary notes and assignments will be available on the course website. If you wish to purchase a textbook as an additional reference, *Introduction to Algorithms* by Cormen, Leiserson, Rivest and Stein is one of the best computer science textbooks ever written and it happens to cover all the material we will talk about in this class.

Grading

Labs: Labs are assigned every week and usually due one week later. They may be completely collaboratively.

Homework: Homework assignments will be occasionally given to reinforce non-programming concepts from class. They will be included on the course calendar and are expected to be completed even if your instructor does not mention them in class, so check the website. These assignments will be the main way to check if you understand the material that will be on the exams, so please take them seriously and seek help if you are having trouble. You may collaborate on homework.

Projects: There will be one project per 6-week period of the class. No collaboration or online assistance is allowed on these projects. You may use general online references like Wikipedia, Wolfram, etc., but not sites like Stack Exchange or Quora where you are just asking for the answer to your specific project. If you are unsure whether a reference is appropriate, ask your instructor. All references besides the course website **must be cited** when you submit your project.

Late policy: Homework assignments will not be accepted late unless prior arrangement with your instructor has been made (due to illness, MO, etc.) Labs and Projects may be submitted late with a 20% grade penalty per day.

Course Grade Breakdown:

	6-Week Grade	12-Week Grade	Final Grade
6-Week Exam	45%	20%	12.5%
12-Week Exam		25%	12.5%
Final Exam			20%
Projects	30%	30%	30%
Labs	20%	20%	20%
Homework	5%	5%	5%

Collaboration

You are allowed to collaborate with other students for homework and labs, subject to the following conditions:

1. You can only collaborate with students currently enrolled in SY301.
2. All collaboration **must be cited** on your assignment when you submit it. Do not forget to do this as uncited collaboration is the same as plagiarizing another student's work.
3. Solutions are written on your own, in your own words/code. It is never appropriate to even look at another student's code, let alone copy it as your assignment.

Collaboration should take the form of discussions and high-level problem solving/planning. All students should contribute to this collaboration, or else it is not collaboration it is someone else doing your assignment for you.

No collaboration of any kind is allowed on projects. These are your opportunity to show your instructor that you have fully mastered the course material.

Violation of any of these conditions will be considered a violation of the Brigade Honor Concept and will be forwarded to the Brigade Honor Staff.

Dr. Travis Mayberry

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Course Coordinator

CDR Tracy Emmersen

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Department Chair