COSC-320 Advanced Data Structures and Algorithm Analysis

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Prerequisite: COSC 220 and MATH 210, both completed with a grade of C or better.

Reference Textbooks:

- *Data Structures with C++ using STL, 2nd Edition (Links to an external site.)* by William Ford and William Topp; Prentice-Hall, 2002
- Introduction to Algorithms (fourth Edition), by Thomas H. Cormen Ronald L. Rivest and Cliff Stein , published by MIT Press and McGraw-Hill

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Course Web Page

Most information for the course is posted on MyClasses@SU course website. Please check the course web site pages frequently, at least once a week day.

The Department's syllabus for this course is posted at
http://faculty.salisbury.edu/~mathcosc/courses/c320.pdf

Description

This course will explore advanced data structures and algorithm analysis. Advanced data structures and efficient algorithm design techniques will be discussed. Topics include principles of computational complexity; binary search trees, hashing, heaps, priority queues, red-black trees, searching and sorting algorithms, divide and conquer, greedy algorithms, dynamic programming, graph representation, BFS and DFS, shortest path, and spanning tree algorithms. All the assignments will require programming in C++. However, please note that the emphasis of the course will be on design of data structures and algorithms and not on esoteric features of C++.

This course is very intensive and will require a tremendous amount of your time. We will cover many new concepts and techniques. Here are some methods to follow to help you succeed in the course:

- Work on the course consistently and daily. Don't let the material pile up.
- Read ahead in the text, handouts, and slides. This will prepare you for the lectures and help you develop questions to ask.
- Understand the text's and the instructor's code. Write short programs to test your knowledge.
- Start homework and Lab early so you will have time to discover problems and get help.
- Whenever possible, write test programs to exercise as much textbook and homework code as you can.
- Immediately work on any homework, lab, quiz, or exam question that you did incorrectly. Make sure you can get it right.

Topics covered: (depending on class progress)

- Asymptotic Analysis
- Recursion
- Trees, Binary Trees, tree traversals, Binary Search Trees, Red-Black trees
- Sets and maps
- Hashing functions and hashing tables
- Heaps and Heap Sort, Priority Queues
- Graphs, Graph Traversal, Graph-Minimization
- Divide and Conquer Algorithms
- Greedy Algorithms
- Dynamic Programming
- Selected optional topics

Grading

Your grade for this course will be based on the attendance, labs, in-class assignments, midterm, final and course project

Grade Distribution:

Homework and quizzes: 5%
Lab assignments: 15%
Course Project: 20%

Exams: 60%

Midterm 1:	15%
Midterm 2:	20%
Final:	25%

Your final letter grade will be based on the standard formula:

Grade Scales

A	90-100
B	80-89
C	70-79
D	60-69
F	0-59

I truncate averages and reserve the right to raise any grade on the basis of class participation or extenuating circumstances.

Attendance & Class Participation:

- Attendance is a vital part of the learning experience and each student is requested to be presented for each class meeting time.
- Excused absences include illness, athletic team commitment, family emergencies and a death in the family. Please notify me by email BEFORE the class meeting and explain your situation. You also need to provide the proof document for your absence within one weeks of your absence.
- If you are absent for more than 10 minutes in a class (eg. being late or leave early) without excused explanation, you will be counted as one absence.
- Laptop and mobile device are forbidden in classroom unless directed by instructor. If you use any electronic device without instructor permission, you will be counted as absence.
- The absent students are fully responsible for missing lecture materials and class announcement (eg. assignments due date, exam and tests dates, and etc.)
- If you attend and participate all classes, 2 points will be added to your final grade. If you have only one absence, 1 point will be added to your final grade.
- You are allowed at most three unexcused absences without penalty. After that, 1 point will be deducted from the final grade for each unexcused absence

Assignments

- All assignments are due at the beginning of the class on the date they are due. Late assignments will not be accepted and will receive a 0% grade.
- All assignments are to be your own work unless directed otherwise by your instructor. The Academic Integrity rules must be followed for all your assignments.
- Each quiz (if any) and homework are equally weighted for grading

Exams and Quizzes:

- Quizzes are optional and depend on class progress. Pop quizzes may be given without notice. The quizzes will be given most likely when students are not coming to class prepared and willing to participate.
- No make-up quizzes will be given. The make up tests are only given to extremely cases. Please notify me by email BEFORE the test time and explain your situation. You should immediately contact the Office of Academic Affairs to show your proof documents. After

I get an approval notice from the Office of Academic Affairs, I'll accommodate you for your test. An un-approval missing test will result in a grade of zero.
- Mobile devices are forbidden in tests/quizzes unless indicated by your instructor. If you do not turn off your mobile device in the test without the permission of your instructor, you will receive 0% for your test/quiz.

Academic Integrity

Cheating in any form will not be tolerated. Academic honesty is absolutely required of you. Your name on any work you turn in such as tests, assignments, and labs certifies that the work was done within the integrity guidelines for this course. If you fail to follow the academic integrity, you will received grade 0% and be reported to the Office of Academic Affairs.

Here are the guidelines:

- For homework, programming, and lab assignments, you may discuss homework and labs in a general way with other students, but you can NOT share solutions and code. All assignments are to be your own work. If you get any help from your classmates, tutors, and Internet, you must state clearly in your assignments. (I may deduct points depending how much help you get) If you discuss your work with others (including help others), you also need to state clearly in your assignments when you turn in your assignments.
- For exams and quizzes, you are welcome and encouraged to study with other students before exams and quizzes time, but examinations and quizzes are to be your own work, not your neighbor's and not your notes.

Student Academic Misconduct Policy can be found at
https://www.salisbury.edu/administration/academic-affairs/misconduct-policy.aspx

Henson School of Science & Technology Course Repeat Policy
The detailed information can be found in https://www.salisbury.edu/academic-offices/advising-center/henson.aspx

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Other available resources:

Student Disability Support Services: http://www.salisbury.edu/students/dss/
University Writing Center: http://www.salisbury.edu/uwc/
Supplemental Instruction: http://www.salisbury.edu/achievement/SI/sihome.html
Mathematics and Computer Science Tutoring Program: https://www.salisbury.edu/academic-offices/science-and-technology/math-and-computer-science/tutoring-center.aspx

The Center for Student Achievement : http://www.salisbury.edu/achievement/

Salisbury University is committed to fostering a culture of diversity, inclusion, and fairness on our campus.

The Department of Mathematics & Computer Science believes that every person deserves to be treated with respect. We are dedicated to fostering a teaching and learning environment in which all people feel free to share their unique experiences, backgrounds, perspectives, ideas, and identities.

Given the pandemic, the University may need to change our modes of course delivery. If this is the case, this syllabus may be modified in terms of types of assignments, assessments, etc. as appropriate.

As part of the University's commitment to returning to normal operations, more than 85% of courses (including this one) are being delivered as face-to-face or hybrid experiences. Faculty have designed their courses for the indicated modality and are not expected to deliver instruction remotely for courses scheduled to be taught in-person. Should you need to miss class due to illness or other life-event, please let your instructor know and consult the course syllabus for the instructor's policy on absences. The Student Emergency Absence Policy also describes policies and procedures for unexpected events that interfere with class attendance.