**Computer Science 5032**

***Accelerated Algorithms and Advanced Data Structures***

**Syllabus**

**Instructor:**

Mark Steven Gilland

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**Materials:**

# Textbooks

*Data Structures and Algorithms in C++*, 3rd ed. (ISBN: 0534491820) by Adam Drozdek. Course Technology/Cengage Learning

# Software

Programmer's text editor (such as Visual Studio Code)

Compile Environment for Linux based Compiling

# General Statement

Computer Science undergraduate core for graduate students needing background. Covers programming techniques, data structures, and algorithms.

# Course-Level Learning Outcomes

After completion of the course, students will have met the following student learning outcomes:

* Be familiar with basic techniques of algorithm analysis
* Be familiar with writing recursive methods
* Be familiar with advanced data structures such as balanced search trees, hash tables, priority queues and the disjoint set union/find data structure
* Be familiar with several advanced sorting algorithms including quicksort, mergesort and heapsort
* Be familiar with some graph algorithms such as shortest path and minimum spanning tree
* Master analyzing problems and writing program solutions to problems using the above techniques

# Degree Level Outcomes

* attain the ability to apply knowledge of computing and mathematics appropriate to the discipline.
* attain the ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.
* attain the ability to communicate effectively with a range of audiences.
* attain the ability to use current techniques, skills, and tools necessary for computing practice.

# Scheduled Topics

Complexity analysis (to be worked in throughout)

Sparse Tables, Skip Lists, Self-Organizing Lists Priority Queues

Binary trees, Balancing Trees, Self-Adjusting Trees

Heaps

B-Trees

Tries

Graphs (paths, cycles, spanning trees), Eulerian and Hamiltonian Graphs,

Graph Coloring, NP-Complete problems

Decision Trees

Efficient Sorting Algorithms

Hashing

Data Compression

# Course Website

* Homework, resources, and current scores for the course will be posted at:

<http://cscade.cs.astate.edu>[.](http://cscade.cs.astate.edu/)

* Additional information is available on the course github at:

<https://github.com/gilland-astate/accelerated-fall2021>

# Attendance Policy

Attendance will be taken each day. If you must miss a class, it is your responsibility to cover the material that was covered in class on that day. Check the course website and contact the course instructor if you must miss a class. If you must miss an exam, quiz, or other in-class assignment, you should alert the instructor before the class meeting; failure to do so may result in your being unable to make up the work. Any arrangements for make-up exams, quizzes, or other in-class assignments will be expected to result in completion of the work within three business days of the absence except in extreme circumstances.

# Grades

Homework will be assigned regularly to reinforce the lecture material. The homework due dates will be posted with the assignment. Assignments will be graded according to the criteria posted at http://wiki.cs.astate.edu/index.php/CS482V\_Grading\_Guidelines. Late homework will not be accepted.

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| **Grade Breakdown** |  | **Grading Scale** |
| Class Participation | 10% | 90 - 100 A |
| Homework | 25% | 70 – 89 B |
| Exams | 40% | 50 – 69 C |
| Final Exam | 25% | < 50 F |
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# Classroom Courtesy

Please be respectful of others and realize that this is a learning environment. Discussion is encouraged, but please try to remain on-topic. Always be on time for class (excessive tardiness will count as absence). Although you are encouraged to discuss problems and assignments with each other, cheating (including, but not limited to, plagiarism) is unacceptable and will not be tolerated. If you are caught cheating, you will receive a zero score for that assignment and the Department and/or University may choose to take further action (See the Academic Misconduct Policy in the ASU Student Handbook. Turn off or silence all cell phones and other noisy electronic devices (including music players) during class. All electronic equipment is prohibited during exams, and all caps or hats which cover the eyes must be removed or turned backward. Students who become disruptive to the class will be asked to leave.

# Additional Information

Students who require academic adjustments in the classroom due to a disability must first register with ASU Disability Services. Following registration and within the first two weeks of class, please contact me to discuss appropriate accommodations. Appropriate arrangements can be made to ensure equal access to this course.

Official grades must be obtained from the Student Self-Service website, or in. Neither the department secretaries nor I can discuss grades over the phone. You can track your progress in this course from the "Grades" section of the CSCADE [(](file:///C:\Users\steve\Downloads\()[http://cscade.cs.astate.edu)](http://cscade.cs.astate.edu/) website.

Any other questions should be directed to the course instructor through email. This is a general policy statement and is subject to change by the instructor. More policies and information are available on the course website. Please read and be familiar with the information there as well.