

## Computer Science 310: Advanced Algorithms

TR 2:10am-3:25am in HWE 334

Fall 2018

**Instructor:** Dr. Kris Ghosh, HWE 315, [ghoshk@cofc.edu](mailto:ghoshk@cofc.edu)

**Office hours:** MW 1:30pm-2:30pm, TR 1-2pm or by appointment and whenever my office door is open.

**Catalog description:** A course that covers algorithms, focusing on computational complexity, approximation, classification, and optimization. Algorithms covered include evolutionary and genetic algorithms, gradient descent techniques, discrete optimization, branch-and-bound, dynamic and stochastic programming, combinatorial optimization, and approximation algorithms.

**Course objective:** To expose students to a variety of techniques for designing and analyzing algorithms as illustrated on problems that have practical, pedagogical and theoretical origins.

**Textbook:** *The Design and Analysis of Algorithms*, 3rd edition, Anany Levitin, Pearson, 2012, ISBN 13: 978-0-13-231681-1.

**Other resources:** Can be found in the library or online. Reading different explanations or views of the same technique may be helpful.

### Class policies:

- Attend every class and arrive on time. Stay until the end of class, if you know you must leave early, please let me know before class, unless an emergency arises.
- Bring a notebook, your textbook and something to write with to each class.
- Participate in class discussions inside and out of the classroom

### Exercises/homework:

- Homeworks, programming assignments, and exams are independent efforts, unless specified otherwise. If in doubt, work alone.

### Grading:

Midterm Exams (2 Exams)	40%
Final Exam ( <i>Comprehensive</i> )	25%
Homework Assignments	30%
Quizzes (Pop/Announced)	5%

- Top 70% of the total Quizzes will be considered for final grades. For example, if there are 9 quizzes, then top 6 quiz scores will be considered.
- To pass the course, students must earn a passing grade (70% or greater) on portions of the course: tests, final exam, assignments. If this is satisfied, final grades will be computed based on the following distribution: Midterm Exams (40%), final exam (25%), assignments (30%) and Quizzes (5%)
- There will be 3 tests (2 Midterms and Final), tentative dates for these will be posted on OAKS this week.
- Cumulative final exam, scheduled by CofC (Check the schedule for finals)
- There will no makeup quizzes. There has to be documentation for makeup exams.
- Assignments will be accepted electronically **only**.
- Attendance will be taken everyday.

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The grade-score table.

A	90-100
B+	85-89
B	80-84
C+	75-79
C	70-74
D+	65-69
D	60-64
F	0-59

### Learning outcomes:

- analyze the running time of algorithms for classic problems in various domains;
- apply algorithmic technique such as divide and conquer, dynamic programming, greedy techniques, backtracking, branch and bound, approximation techniques to solve problems
- identify algorithmic techniques appropriate to new problems
- analyze the complexity of problems
- distinguish tractable, intractable and unsolvable problems (P, NP, NP-Complete)

### Disability Accommodation:

Any student who feels that he or she may need an accommodation because of a disability should contact me individually to discuss your specific needs. Please contact the College of Charleston, Center for Disability Services <http://disabilityservices.cofc.edu/> for additional help.

### How to report an Absence:

Student should come to 67 George Street to discuss absences and fill out the appropriate forms. Student will need documentation for health, personal and emergency situations. Athletic Teams or School-sponsored trips will have documented list of students participating on letterhead as early in the semester as we get the information from the organization. We would like all information on scheduled outings to reach at least two full weeks in advance. We will then turn the information back to the coach or advisor.

### Academic Integrity:

Lying, cheating, attempted cheating, and plagiarism are violations of our Honor Code that, when identified, are investigated. Each incident will be examined to determine the degree of deception involved. Incidents where the instructor determines the student's actions are related more to a misunderstanding will be handled by the instructor. A written intervention designed to help prevent the student from repeating the error will be given to the student. The intervention, submitted by

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form and signed both by the instructor and the student, will be forwarded to the Dean of Students and placed in the student's file.

Cases of suspected academic dishonesty will be reported directly by the instructor and/or others having knowledge of the incident to the Dean of Students. A student found responsible by the Honor Board for academic dishonesty will receive a XF in the course, indicating failure of the course due to academic dishonesty. This grade will appear on the student's transcript for two years after which the student may petition for the X to be expunged. The student may also be placed on disciplinary probation, suspended (temporary removal) or expelled (permanent removal) from the College by the Honor Board.

Students should be aware that unauthorized collaboration--working together without permission--is a form of cheating. Unless the instructor specifies that students can work together on an assignment, quiz and/or test, no collaboration during the completion of the assignment is permitted. Other forms of cheating include possessing or using an unauthorized study aid (which could include accessing information via a cell phone or computer), copying from others' exams, fabricating data, and giving unauthorized assistance.

Research conducted and/or papers written for other classes cannot be used in whole or in part for any assignment in this class without obtaining prior permission from the instructor.

Students can find the complete Honor Code and all related processes in the Student Handbook at <http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php>.

### Tentative Schedule

Topics	Duration
Algorithm Analysis	1 week
Non Recursive and Recursive Analysis	1 week
Search and Sorting	4 weeks
Trees	1 week
Dynamic Programming	1 week
Graph Algorithms	2 weeks
P, NP and Approximation Algorithms	3 weeks