COMP 496ALG Fall 2015

Algorithm Design and Analysis

Class Section Number: 19186

INSTRUCTOR: Diane Schwartz

# OFFICE: JD 4401

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OFFICE HOURS: TTH 9:30 – 10:30

PREREQUISITES: Comp 256/L and Comp 282 with C- or better

COURSE DESCRIPTION: Analyze algorithms in terms of time and space complexity for best/average/worst case execution times using asymptotic notation; apply standard algorithmic approaches, including greedy, divide and conquer and dynamic programming, to algorithmic design. Review classical algorithms, including searching, sorting and graph algorithms.

REQUIRED TEXTBOOK: Algorithm Design by Kleinberg and Tardos, Addison Wesley, 2006.

GRADING: The following weights will be applied to calculate your final grade:

 Midterm Exams (2) 40% (20 % each)

 Final Exam 25%

 Programming Projects 20%

 Quizzes (based on homework problems) 10%

 Attendance 5%

Plus and minus grading will be used. Your final percentage score will be mapped onto a letter grade as follows: 90 – 100% (A-, A); 80-89%(B-,B,B+); 70-79% ( C or C+); 65-69%( C-); 60-64%( D); Below 60% (F).

There will be three individual programming projects and quizzes based on assigned homework problems. Homework problems will not be collected.

Class attendance counts for 25 points and will be weighted as 5% of your grade. You will get the full 25 points if you miss no more than 3 class meetings. Absences beyond 3 class meetings, will cause you to lose 5 of the 25 points per missed class. If you miss 8 or more classes you will get 0 points for attendance. To be counted as attending class you need to sign the attendance sheet at the beginning of class, participate in the classroom activities and remain in class until the end of class.

COURSE OBJECTIVES

A successful student will be able to:

1. Define the time and space complexity of algorithms, using asymptotic notation.
2. Appropriately apply algorithmic strategies, including brute-force, greedy, divide and conquer and dynamic programming to solve problems.
3. Identify and use well-known graph algorithms, including network flow, shortest-path and minimum spanning tree algorithms.
4. Discuss classic algorithms for problems such as searching and sorting.
5. Be able to apply a variety of algorithmic problem solving strategies and analysis to real world problems.

Academic Integrity

Students are expected to read and abide by the University's Academic Honesty statement printed in the current catalog. Academic dishonesty will result in a zero on the assignment and can result in class failure.

Class Etiquette

1. No use of cell phones, lap tops or other communication/computer devices is allowed. You should have your full attention on the class.
2. Please do not eat in class. Don’t bring in breakfast, lunch, dinner or snacks to eat in class. Bottles of water, small sodas or cups of coffee or tea are ok.
3. Come to class on time and do not leave early. The attendance sign-up sheet will be available only at the beginning of class.
4. Full participation in class activities is expected.

COURSE OUTLINE (Tentative)

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| **Lectures** | **Topics** | **Text Reading** |
|  |  |  |
| 8/25, 8/27 | Introduction to algorithms | Chap 1 |
| 9/1, 9/3 | Analysis of algorithms and asymptotic notation | Chap 2 |
| 9/8, 9/10 | Basic Graph Algorithms and Analysis | Chap 3 |
| 9/15, 9/17 | Basic Graph Algorithms and Analysis | Chap 3 |
| 9/22, 9/24 | Greedy Method  | Chap 4 |
| 9/29, 10/1 | Greedy Method; **MIDTERM 1 on Oct 1** |  |
| 10/6, 10/8 | Greedy Method | Chap4 |
| 10/13, 10/15 | Divide and Conquer Methods | Chap 5 |
| 10/20, 10/22 | Divide and Conquer Methods  | Chap 5 |
| 10/27, 10/29 | Dynamic Programming | Chap 6 |
| 11/3, 11/5 | Dynamic Programming | Chap 6 |
| 11/10, 11/12 | Network Flow; **MIDTERM 2 on Nov 12** | Chap 7 |
| 11/17, 11/19 | Network Flow | Chap 7 |
| 11/24 | Network Flow | Chap 7 |
| 12/1, 12/3, 12/8 | Time Permitting: NP-Completeness, Approximation Algorithms, Backtracking | Chap 8, 11 ( parts) |
| **Final Exam Dec 10**8:00 am – 10:00 am | Final Exam covers material from the entire course |  |

**See course Moodle site for programming projects and homework assignments and other information.**