Algorithms and Complexity (CS 350)
Winter 2017

Course Objective:

- Techniques for the design and analysis of algorithms. Case studies of existing algorithms (sorting, searching, graph algorithms, dynamic programming, matrix multiplication fast Fourier transformation). NP-completeness.

Course Goals:

- To develop a group of useful algorithms which can be used to solve common problems. The development of tools and principles for analyzing the time and space used by these algorithms. The course will include case studies of existing algorithms (sorting, searching, graph algorithms, greedy programming, string alignment and approximation algorithms). An introduction to NP-complete sets and approximation algorithms for some languages in NP is given.

  Upon the successful completion of this course students will be able to:
    - Analyze the running time and space complexity of algorithms.
    - Use the big Oh notation. (e.g., $O(n \lg n)$.)
    - Describe how to prove the correctness of an algorithm.
    - Use the mathematical techniques required to prove the time complexity of a program/algorithm. (e.g., limits and sums of series.)
    - Perform inductive proofs.
    - Prove and apply the Master Theorem.
    - Describe the notions of P, NP, NPC, and NP-hard.
    - Compare the rates of growth of functions.
    - Apply algorithmic complexity principles in the design of programs.
    - Design divide and conquer and dynamic programming algorithms.

Class Homepage:

- In D2L

Instructor:

- **Chris Gilmore**
- **Office:** FAB 120-07
- **Email:** grimjack@pdx.edu

Office Hours:

- The hour before class and by appointment

Prerequisites:

- CS 250, 251, and 311; passed with grades of C or better

Meeting Time and Location:

- Monday/Wednesday 18:40-20:30PM, Engineering Building 103

Textbooks:

- **Required:** Anany Levitin, Introduction to the Design and Analysis of Algorithms 3rd Edition, Addison Wesley, 2011.

Grading:

- **Exams**: 55%
    - Midterm: 25%
    - Final: 30%
- **Term Paper/Project**: 25%
- **Homework assignments**: 15%
- **Class participation**: 5%

Homework Policies:

- **Submission Policy:**
    - Each assignment must be submitted electronically in word format by 12pm on due day.
    - Each submission must contain the name, email address, and ID of the student, the assignment number, and the date and time of the submission.
- **Late Policy:**
    - Each student has three late days that they can use during the quarter with no penalty (one assignment three days late, or three assignments one day late, etc.). Once late days are used up, no credit will be given for late assignments.
- **Collaboration Policy:**
    - You are encouraged to discuss homework problems with your

classmates. However, everyone must write up his or her own solution sets. Furthermore, any collaboration must be acknowledged by writing the names of your collaborators on the front page of the assignment. Copied assignments or code, or unacknowledged collaboration will be considered academic misconduct, an ethical breach of trust, and I will deal with such cases harshly.

(Policies follow the style set by Prof. Steve Keckler and Prof. Doug Berger of the University of Texas at Austin.)

Class Schedule:

- The class schedule can be found in D2L, in the Course Content area.

Academic Integrity:

- Academic misconducts will be handled according to the rules of the Department of Computer Science, Maseeh College of Engineering and Computer Science, and Portland State University.