

University of Delaware -- Computer and Information Science

CISC621 -- Fall 2011

Algorithm Design and Analysis

Instructor: Dr. Errol L. Lloyd
101J Smith Hall
831-2711 (secretary)
Email: elloyd@udel.edu

Office Hrs: Tuesday: 2:30-3:30
Thursday: 10:30-11:30
Or by appointment
Or by dropin

Text: Cormen, Leiserson, Rivest and Stein, *Introduction to Algorithms* (3rd edition)
McGraw-Hill & MIT Press.

Course information source:

<http://www.cis.udel.edu/~elloyd/cis621.html> -- the course webpage. Copies of assignments, announcements, problem solutions, etc may be found here.

Homework: There will be 16 homework problems given out in five homework sets of three problems each, except for the 5th homework which will have four problems. The problems will range in difficulty from easy to extremely difficult.

There will be two types of problems: individual and group, with there being eight problems of each type.

- **Individual problems** are to be solved by *you*. This means that things such as working with other people, asking students who have taken the class previously, etc are considered cheating and dealt with accordingly.
- **Group problems** will be solved by your assigned group. In this case, you can only talk with members of your group about the problems.

For both individual and group problems the following are considered cheating and will be dealt with accordingly: looking the solution up in any source other than the text; looking up the solution by locating a paper in the literature; looking in any way at solutions from prior years or from other courses; posting the problem on the Internet, seeking a solution; etc. You *may* ask others for clarifications of the problem statement. If in doubt, ask the instructor.

Exam: There will be two midterm exams, tentatively scheduled for Thursday October 20 and Thursday December 1, and a final exam during the final exam period. The midterm exams will be "facts" oriented, and the final exam will be problem oriented.

Grading: Homeworks - 45% more or less

Individual problems: 20%
Group problems: 20%
Group participation: 5% or more*

Mid term Exams - 20% each
Final Exam - 15%

Class participation - this is the more or less

* Proper group participation and contributions are mandatory. Failure to do so will result in failure of the course.

Any appeals for re-grading of homeworks or exams must be initiated within one week of when the paper was returned to you.

Objectives of the course:

1. To give the student the basic tools, experience and confidence needed to effectively analyze algorithmic problems and solutions to those problems.
2. To give the student a good working knowledge of important algorithms and data structures in a number of domains.

Topics to be covered (tentative list):

Josephus Problem
Heaps and 2-3 trees
Fibonacci Heaps
Amortized complexity
Union/Find – average and worst case
Sorting and selection
Minimum spanning tree algorithms
NP-completeness - definitions, implications, reductions
Traveling Salesperson Problem - approximations
Shortest path problems - Dijkstra's and Floyd's algorithms
Matrix multiplication, Strassen's algorithm
Polynomial multiplication and evaluation;
Fast Fourier Transform
Dynamic programming

If time permits;

Network flow
Linear programming
Parallel algorithms