CSE 441T/541T Advanced Algorithms **August 27, 2008**

Course Overview and General Information

Your primary source for class information, homeworks, labs, and handouts is the class web site, **http://cs.wustl.edu/~pless/441**. Please check this site regularly for course announcements.

- **Where and When**: Mondays and Wednesdays 1:00-2:30 PM in Cupples II 217; weekly review and recitation sessions at a time and place to be announced.
- **Prerequisites**: CSE 241, or equivalent undergraduate training in algorithms and data structures, complexity analysis, and basic proof techniques.
- **Your Instructor**: Dr. Robert Pless
- **Your Teaching Assistants**:
  - Nathaniel Roman (*ngr1@cec.wustl.edu*)
  - David Ross (*dyross@wustl.edu*)
  - Richard Speyer (*richard.speyer@wustl.edu*)
- **Contact Info**: You can contact the instructor and/or TAs by any of the following means:
  - The prefered way to ask questions is to visit me or the TA's during the course office hours. My experience is that it is difficult to express and answer questions over e-mail. The office hours are kept up to date on the course website.
  - You may also send e-mail directly to me or any of the TA's. I try to answer questions within a day or two, and i do *not* promise to be more responsive close to assignment due dates.
- **Office Hours**: See the course website.
- **Textbook**: Algorithm Design, Jon Kleinberg.

1 Course Philosophy

This course is about the design and analysis of algorithms, with a strong emphasis on *optimization*. That is, given a problem with (possibly) a multitude of feasible solutions and a measure of how good each feasible solution is, we want to find the *best* solution. The problems will be combinatorial in nature; that is, they will have discrete (as well as possibly continuous) components.

The only way I know to achieve proficiency in solving combinatorial optimization problems is through experience, i.e. by thinking your own way to a solution. My goal as instructor is to point out some basic structures that are common to large classes of optimization problems, to work through examples that show you how these structures can be exploited to produce efficient algorithms, and finally to "turn you loose" to attack new problems by yourself.

In addition to my lectures, I will supply you with a number of worked examples in the form of "practice problems." The problems and their solutions may be downloaded separately from the web site. *Please work these problems yourself* before looking at the solutions – they are the best way to build and check your understanding. If you come seeking help with the homework, the first thing I'll ask is how you've fared with the practice problems.

You should expect to spend at least 10-14 hours on each homework, including time to work the practice problems. For each homework problem, you will need to understand what is being asked, see *how* to apply the basic structures (e.g. greedy choice, dynamic programming) that you have learned, devise an efficient solution, and write both a clear, concise description of your solution *and* a formal proof justifying both its correctness and its time complexity. *Please start early* on the homeworks. Be prepared to put aside some of the problems and come back to them. Steady mental effort, perhaps spaced over a period of hours or days, is usually rewarded.

2 CSE 441 vs. CSE 541

This course is actually *two courses* in one. Both courses share the same set of lectures and much of the homework and exam material. However, students taking the more advanced course, CSE 541, will be expected to complete additional, more challenging homework and exam problems. Students taking 441 are not required to do the extra problems but may choose to do them for extra credit.

Anyone may sign up for either CSE 441 or CSE 541. If you sign up for 441, you may switch to 541 up until the due date for the first homework. If you sign up for 541, you may switch to 441 any time up until the late drop deadline (November 16th).

3 Homeworks

There will be approximately five homework assignments. Assignments will be distributed in PDF form from the course web page; you can use Adobe's free Acrobat Reader, XPdf, or GV/GSView to read them.

Assignments must be turned in **at the beginning of class on the due date** or placed in a turn-in box outside Jolley 530 by 12:30 PM on the due date. Assignments turned in anywhere besides the above locations (including my mailbox) will not be counted unless prior arrangements have been made with me, since my TAs and I won't be able to tell whether homeworks appearing in random locations were turned in on time. Homeworks turned in at the end of class will be accepted or rejected at the instructor's whim (seriously, I will decide on a policy for this once I see whether people are skipping class to do their homeworks).

Do not assume that I will bring a stapler to class, or that your favorite printer will be working five minutes before class time. Late homeworks **will not** be accepted, as I plan to hand out solutions on the day that they are due. I expect your solutions to be clear, concise, neat, and easy to read – if the TAs and I cannot understand your argument, we will mark it wrong. Time spent typesetting your homework in, e.g., LaTeX or Word is much appreciated and will likely make it easier for you to make corrections as you're writing the solutions.

If you feel your assignment was graded incorrectly, please take the matter up with the TAs before talking to me. My TAs work hard, and I prefer to support their decisions.

4 Exams and Grading

There will be two 80-minute exams held in class during the semester, plus one cumulative final exam given during the finals period.

Your final grade in the course will be weighted roughly as follows:

1. each homework: 11%
2. each exam: 15%

Exams are always closed-book and closed-notes. However, you may use one 8.5×11 crib sheet (both sides) if desired.

I will be asking for student volunteers to help grade the homeworks. If you have solved a homework problem and want to grade it, you must write up your solution and explain it to me in person *before* its due date. Graders will be chosen on a first-come, first-served basis, and will mark the homeworks at an evening grading meeting run by the TAs. I usually need *two* student graders per problem.

Depending on how well I feel you did at grading a problem, you may receive extra credit up to the value of the problem you grade. Each student may volunteer to grade one problem (on one problem set) during the semester. I will try not to allow repeat grading, but that depends on student availability.

5 Policy on Collaborations and Academic Integrity

Please see the separate document on this subject on the course web site. You are expected to be familiar with this document and to attest (by your signature) that you have followed the course collaboration policy on each homework you turn in.