Course Project
CS 594: Applied Combinatorial Optimization
Proposal Due Oct. 2

As discussed in class you will pick either the *Asymmetric Traveling Salesman Problem* (ATSP) or *Graph Coloring* and perform an experimental study on that problem.

To get started you will write a "project proposal". This will be a relatively short document outlining how you intend to cary out your project.

Here is what you need to do:

(1) First download and read the paper "A Theoretician's Guide to the Experimental Analysis of Algorithms" by David Johnson. It is link (2) under "Misc Resources" on the course web page. This paper gives an excellent intro to the discipline and also give good guidance on how to pursue your research project. It will also, IMO, make you a more critical reader of other papers.

(2) Pick one of the suggested problems (ATSP or Graph Coloring).

(3) Propose a set of algorithms to implement. These may be algorithms from the literature (or refinements thereof); algorithms of your own invention. They may be exact (e.g., branch-and-bound) – in this case, the most interesting criteria is the *scalability* of the algorithm. Or they may be heuristic.

(4) Propose an experimental methodology for evaluating your implementations. What benchmarks are you going to use? How will you setup your experiments to assure statistical significance? What will you compare with?

Your proposal writeup will focus on items 2-4 above.
Additional requirements and comments:

• You may work in teams of size up to 3.

• All members of the team should be knowledgable about all aspects of the project, but some division of labor will be necessary. Give a rough division of labor in your proposal.

• Your project proposal should be in PDF so that I can post it to the web so your classmates will know what you are up to.

• If you decide to generate problem instances of your own, you might post them and I can put a link to your site on the course page.

• Try not to let your project get out of control. Focus on only a few algorithms and do a serious job on them.

• Negative results are ok. If the outcome of your project is "this algorithm from paper X doesn't really work very well," that is a contribution (if done properly).

• Good starting place for graph coloring algorithms: Link (3) in the graph coloring section of the course web page (a paper by D. Johnson).

• Good starting place for ATSP: Link (4) in the ATSP section of the web page (another document by Johnson).

Finally, if you want to do something that doesn't fit *exactly* within these guidelines, but is close, see me and we'll try to work something out.