CSC721 **Fall 2011**

Algorithms

Professor: Torgersen

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Office Hours: Monday and Wednesday 2:00 to 3:30 and by appointment.

Text: Algorithms Sanjoy Dasgupta, Christos Papadimitriou, Umesh Vazirani, Algorithms

Goals:

1. The Classes $\mathcal{P}$ and $\mathcal{NP}$, $\mathcal{NP}$-complete problems. Polynomial time mapping reductions.
2. Overview of Algorithm design strategies
   (a) Divide and conquer / Balancing
   (b) Backtracking
   (c) Greedy algorithms
   (d) Dynamic Programming
3. Review of Complexity
   (a) Asymptotic measures
4. Commonly used algorithms for important problems.
   (a) Graph Algorithms, minimal spanning tree, shortest paths, etc
   (b) RSA Encryption
   (c) The Fast Fourier Transform and applications. 2-D FFT
   (d) Matrix multiplication and related problems
   (e) LUP decomposition and implications to matrix operations
   (f) QR Factorization (if time allows).
   (g) Newton's method, Quasi-Newton type methods, (if time allows)
   (h) Integer multiplication
   (i) Pattern matching.
   (j) Union-Find problem (if time allows)
5. Correctness proofs and time complexity analysis

Expectations:

1. Class participation.
2. Communicate if things get complicated.
3. Your best effort.

Grading:
Two exams (50%), a few programming assignments (20%), as many take home problem sets as we can produce (30%). Programming assignment(s) **must** be submitted ready to compile and run on Linux (x86) or Solaris (sparc or x86).

Disability Notice:
If you have a disability that may require an accommodation for taking this course, then please contact the Learning Assistance Center (758-5929) within the first two weeks of the semester.

Pandemic Planning Notice:
The University has requested that faculty collect personal contact information as part of emergency planning and preparation. The information you provide is strictly confidential.