Course Number: 3460:635  
Course Name: Advanced Algorithms and Complexity Theory  
Course Credits: 3  
Schedule: Alternate Springs  

Syllabus Date: October 10, 2007  
Prepared By: Dr. Duan (modified by Dr. Pelz)  

Prerequisites: Admission to Computer Science master’s program or permission.  


Bulletin Description: Topics include a number of advanced topics in algorithms including network flows, matrix operations, linear programming, fast Fourier transform, number-theoretic algorithms, string comparison, computational geometry, singular value decomposition, NP-complete and intractable problems, and approximation techniques.  

Detailed Description: The course focuses on a number of advanced topics in algorithms including network flows, matrix operations, linear programming, fast Fourier transform, number-theoretic algorithms, string comparison, computational geometry, singular value decomposition, NP-complete and intractable problems, and approximation techniques. The focuses are on both fundamental techniques and their applications. Applications include string matching and its role in biological sequence alignment; flow network and its application in microarray data analysis; singular value decomposition and its application in data compression and visualization.  

Course Goals: To introduce students to the advanced techniques in the design and analysis of algorithms and some state-of-art applications.  

Topics: Topics include network flows, matrix operations, linear programming, fast Fourier transform, number-theoretic algorithms, string comparison, computational geometry, singular value decomposition, NP-complete and intractable problems, and approximation techniques.  

Computer Usage: Typically 3 or 4 programming assignments involving maximum flow algorithm, Gaussian elimination, RSA algorithm, and string comparison.  

References:  