Brooklyn College
Department of Computer & Information Sciences

CISC 7214 [*715X] Algorithms and Complexity
37½ hours plus conference and independent work; 3 credits

Definitions of P, NP, and NP-complete complexity classes and the relationship between these classes. Approximation algorithms and their efficiency. Other complexity classes. Current models and paradigms of computation. The P? = NP question is discussed and explored. Advanced topics from contemporary research.

Course Outline:

Week 1: P and NP complexity classes.
Week 2: NP-complete problems.
Week 3: Cook's theorem (SAT is NP-complete.)
Week 4-6: Reductions to other NP-complete problems.
Week 7: Midterm.
Week 8: Polynomial approximation algorithms.
Week 9: Space complexity and Savitch's theorem.
Week 10: Logarithmic time and space.
Week 11: Oracles and hierarchy theorems.
Week 12: Complexity issues in cryptography.
Week 13: Probabilistic algorithms and primality testing.
Week 14: Advanced topics in complexity theory.

Bibliography and References:

- T.H. Cormen, C.E. Leiserson, R.L. Rivest, C. Stein; Introduction to Algorithms, second edition, MIT Press, Cambridge, Massachusetts, 2001.
- M.R. Garey and D.S. Johnson; Computers and Intractability- A guide to the Theory of NP-Completeness. W. H. Freeman, 1979.
- C.H. Papadimitriou; Computational Complexity. Addison-Wesley, 1994.
- Michael Sipser; Introduction to the Theory of Computation ITP Publishing Company, Boston, 1996.
- T. Baker, J. Gill, R. Solovay; "Relativizations of the P?=NP Question," SIAM J. Computing 4, Pgs 431-442, 1975.