

GRADUATE STUDY IN ALGORITHMS, COMBINATORICS, AND OPTIMIZATION

During the recent decades, one of the most rapidly growing areas of research in applied mathematics, computer science, and operations research has been that dealing with discrete structures. This has been most evident in the fields of combinatorics, discrete optimization and the analysis of algorithms. Increasingly, work in each of these subjects has come to depend on knowledge in all of them. Indeed, many of the most significant advances have been produced by researchers in more than one, if not all three, of these areas.

The Georgia Tech doctoral program in Algorithms, Combinatorics, and Optimization (ACO) is designed to foster such interactions. This multidisciplinary program is sponsored jointly by the College of Computing, the H. Milton Stewart School of Industrial and Systems Engineering, and the School of Mathematics.



For the second year in a row, the three components of the ACO Program were ranked in the top 10 by the US News and World Report. ISyE was ranked No. 1 in the nation for the last 16 years. Discrete Mathematics and Combinatorics was ranked No. 7 and Computer Science Theory was ranked No. 9 in the 2009 graduate rankings. Both programs also ranked in the top ten for 2008.

Program Description

The ACO program at Georgia Tech is arranged to bring together the study of discrete structures and the design and analysis of algorithms in areas such as graph theory, integer programming, combinatorial optimization, and polyhedral theory. It is intended for students possessing a strong background in one or more of the fields represented by the sponsoring units.

Each student in the program will have a single home department chosen from among the College of Computing, the H. Milton Stewart School of Industrial and Systems Engineering, and the School of Mathematics. Courses for the program are from all three of these units.

The program core consists of courses in Design and Analysis of Algorithms, Theory of Linear Inequalities, Advanced Combinatorial Optimization, Algebra, Graph Theory, and Probability Theory.

A student's thesis research may be carried out under the direction of any member of the program faculty regardless of departmental affiliation. Research topics may therefore be chosen from a wide range

of subjects in combinatorics, complexity and the analysis of algorithms, and combinatorial optimization. Students are expected to defend a research proposal after successful completion of the written comprehensive examination.

Graduates of the program have found postdoctoral, faculty, and other research positions at prestigious institutions including, Berkeley, Cornell, Princeton, Stanford, Toronto, Urbana-Champaign, Waterloo, Yale, D.E. Shaw, Google, IBM, Microsoft etc.

Research Activities

Research areas being investigated by faculty of the ACO program include such topics as structural and topological graph theory; graph coloring; probabilistic methods in combinatorics; extremal combinatorics; computational complexity; the design and analysis of algorithms; approximation algorithms; randomized algorithms; spectral methods, convex geometry and functional analysis, learning theory; coding theory; voting theory; algorithmic game theory; internet mathematics; Markov chain Monte Carlo algorithms; discrete mathematical biology; linear, integer and convex programming; semidefinite





programming; stochastic optimization; discrete mathematical modeling; large scale networks; convex analysis and optimization; airline crew and fleet scheduling; and interior point methods.

The ACO program sponsors a colloquium and seminar series which bring visiting speakers to the campus each term, and the participating departments hold weekly research seminars in many areas such as probability, the theory of computing, discrete optimization, combinatorics and graph theory. The individual departments also host a number of visiting faculty members each year in subjects related to the program.



Program Faculty

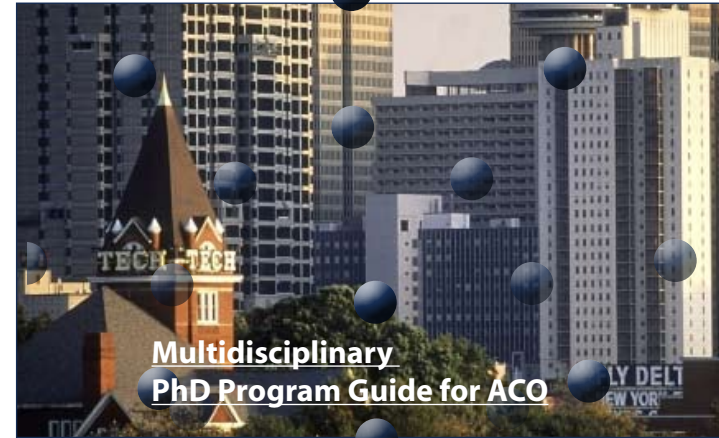
The ACO Program boasts a list of over 45 academic faculty with teaching and research interests spanning the entire spectrum of the field. Importantly, ACO faculty members have distinguished themselves by winning a host of prestigious prizes, awards, and honors, including the Polya prize, the Fulkerson prize (3), Guggenheim Fellowships (2), the John von Neumann Theory prize (2), the Dantzig prize (2), the Lanchester prize (4), and the Beale-Orchard-Hayes prize. Three ACO faculty hold membership in the National Academy of Engineering and several have won CAREER/PYI awards, and Sloan Fellowships.

Admission into the ACO Program

Students apply to the ACO program at Georgia Tech through any one of the three sponsoring units. To be considered for admission in ACO, a student must be admitted to the doctoral program in one of these units. Decisions concerning admissions to the ACO program are made by the Coordinating Committee for the program, and are based on those materials supplied in support of the application for graduate admission.

Contact the Director of Graduate Admissions at one of the three units, specifying an interest in Algorithms, Combinatorics, and Optimization. For addresses and additional information visit our web site at:

www.aco.gatech.edu



**Multidisciplinary
PhD Program Guide for ACO**

