Course Outline: Math 4022 – Introduction to Graph Theory

Instructor : Prasad Tetali, office: Skiles 234,   email: tetali@math.gatech.edu
Office Hours: Mon. 1:30 – 3:00 pm, Thurs. Fri. 2:00 – 3:00 pm (tentative)

Suggested Text books: (1) *Introduction to Graph Theory*, by Doug West (2nd edition, Prentice-Hall, 2001). (2) *Graph Theory with Applications*, by J.A. Bondy & U.S.R. Murty (North-Holland, 1976.): available for free download on the internet:
http://www.ecp6.jussieu.fr/pageperso/bondy/books/gtwa/gtwa.html

Syllabus: Based on material in Chapters 1 – 6. Familiarity with basic material in Chapter 1 will be assumed. Some sections will be omitted (e.g. Sec. 3.3), and time permitting, a couple of sections from other chapters (e.g. Secs. 7.1 and 8.1) in the book will be covered. The emphasis will be on the following Fundamental Theorems and Algorithms.

Theorems:
- The Matrix-tree theorem
- Hall's matching condition and Tutte's theorem
- Connectivity and Menger's theorems
- Max-flow Min-cut theorem
- Vertex coloring and Brooks' theorem
- Edge coloring and Vizing's theorem
- Planarity and Kuratowski's theorem
- Intro to Extremal graph theory: Turán, Ramsey theorems

Algorithms:
- Shortest paths algorithm
- Minimum spanning tree algorithms
- Bipartite Matching (the Hungarian algorithm)
- Ford-Fulkerson algorithm

Most topics will be discussed for about a week. Time permitting, rudiments of random graph theory will be covered.

Course Objective.
- To develop interest in graph theory and its many applications

General grading policy : Homeworks 20%,   Tests 50%,   Final exam 30%

Test 1: **Sept. 19th** (Wed.)   **Test 2**: **Oct. 22nd** (Mon.)   **Test 3**: **Nov. 19th** (Mon.)

No make-up tests will be allowed.
Homeworks will be assigned, collected and graded. You are strongly advised to solve all the homework problems; Late submission of HWs is discouraged with a penalty of 20%.