Math 412 Introduction to Graph Theory

Spring 2005 — Sections G13/G14 — University of Illinois

Tentative Schedule of Classes

Lec.	Sec.	Topics
1	1.1	course introduction, graph models, definitions
2	1.1	isomorphism, decomposition
3	1.2	walks, connection, bipartite characterization
4	1.2	airline application, Eulerian characterization
5	1.2/3	Eulerian graphs, decomposition, vertex degrees, counting
6	1.3	extremal problems, large bipartite subgraph
7	1.3	Mantel, induction trap, graphic sequences
8	1.4	digraphs, De Bruijn, kings
9	2.1	tree characterization, properties
10	2.1	distance, diameter, center, distance-sum
11	2.1/2	Bridg-It, Cayley's Formula
12	2.2	spanning trees
13	2.3	graceful labelings, Kruskal's Algorithm
14	2.3	Dijkstra's Algorithm, Chinese Postman problem, maximum matching
15	3.1	Hall's Theorem, König-Egervary Theorem
16	3.1	Gallai's Theorem, König's Theorem
17	3.2	augmenting path, weighted bipartite matching
18	3.2/3	stable matching, 1-factors
19	3.3	factors in graphs, applications
20	4.1	connectivity
21	4.1	edge-connectivity, bonds, blocks
22	4.1/2	Whitney, ear decomposition, digraphs, Robbins
23	4.2	Menger's Theorems
24	4.2/3	Menger applications, network flow to aug path or duality
25	4.3	duality, max-min, integral flows, applications
26	5.1	coloring definitions, examples, greedy coloring
27	5.1	interval graphs, Gallai/Roy, Brooks
28	5.2	Mycielski, Turán
29	5.2	color-critical, edge-connectivity, K_4-subdivision
30	5.3	chromatic polynomial
31	5.3	chordal graphs, perfect graphs
32	6.1	planar duals
33	6.1	outerplanar, Euler's formula, Platonic solids
34	6.2	Kuratowski's Theorem
35	6.2/3	planarity testing, 4 color theorem
36	6.3	crossing number, genus
37	7.1	edge-coloring
38	7.1	Vizing's Theorem
39	7.2	Hamiltonian cycles up to closure
40	7.2	Chvátal, Chvátal-Erdös
41	7.3	Tait, Grinberg