OR/CS 647 Network Analysis
Tentative Syllabus

Week	Topics	Text Pages	Other Resources
1	Course overview, definitions and examples of network problems, Review simplex method for linear programming, fundamental theorem of LP	pp.1-38 pp.802-814	Practice problems 1.7,1.8,1.9
2	Unimodularity, basic definitions and results, key theorem (and converse) relating LP bases to rooted spanning trees		Bazaraa, Jarvis, and Sherali
3	Implications of key theorem for solving network LPs, Network simplex method and example		
4	Finding feasible starting solutions (Big M and 2-phase methods), Introduction to bounded variable problems		
5	Example of bounded variable network simplex, overview of classical network models: transportation, assignment, shortest path, maximum flow. Circulation networks and dual.	Section 9.9	11.17
6	Data structures for network simplex, Out of kilter algorithm and example		11.1, 11.2, 11.7, 11.4 9.22 Phillips and Garcia-Diaz Bazaraa, Jarvis, and Sherali
7	Applications of network models, equipment replacement, bottleneck assignment, workers for time dependent tasks, hiring/training workers	Read Chapter 19	Journal Readings assignment
8	Modeling conventions using Glovers' approach, Midterm exam, PERT/CPM overview		Glover, Klingman and Phillips text
9	PERT/CPM detailed discussion, LP models for critical path and crashing analysis		Ragsdale (OR 380 textbook)
10	Assignment and transportation problems		Bazaraa, Jarvis, and Sherali
11	Dual of transportation problem, special cases, degeneracy, shortest path problems		Bazaraa, Jarvis, and Sherali
12	Dijkstra's method, label setting and		

	label correcting methods, Generalized network models	Chapter 15	
13	Solving generalized networks, finding starting BFS		
14	Networks with side conditions, Lagrangian relaxation, subgradient optimization	Chapter 16	

References

Ahuja, Magnanti and Orlin, **Network Flows**, Prentice-Hall, 1993.

Bazaraa, Jarvis and Sherali, **Linear Programming and Network Flows**, Wiley (2^{nd} or 3^{rd} edition will be okay).

Glover, Klingman and Phillips, **Network Models in Optimization and Their Applications in Practice**, Wiley (1992).

Phillips and Garcia-Diaz, **Fundamentals of Network Analysis**, Prentice-Hall, (1981).

Ragsdale, **Spreadsheet Modeling and Decision Analysis, 4^{th} ed.**, Southwestern Publishing (2004).