SPRING 2014 - ISEN 661 – Network Based Planning and Scheduling Systems

Dr. Halit Üster, ETB 4039, uster@tamu.edu, 458–2357

Course Description and Objectives:

Network flow problems appear as integral components of large-scale and realistic network design models for tactical and strategic decision-making in a wide range of industrial applications involving movement of raw materials, work-in-process, finished products, parcels/packages, information or passengers over geographical areas. Furthermore, various decision problems that are not on networks, such as production/inventory planning, manufacturing and workforce scheduling problems and project management, can be perceived and formulated as network flow problems.

In this course, we will review several such applications with a focus on their mathematical modelling and solutions on networks. We will cover well-known network flow problems including the shortest path problem, the maximum flow problem, the minimum cost flow problem, and the multi-commodity flow problem.

Our goals are to provide a sound and applicable knowledge of theory and practice of solving network flow problems with an emphasis on network flow algorithms and to help students in developing a good understanding of algorithm development and analysis.

Prerequisites: INEN622 (or equivalent background)

Tentative Outline:

1. Introduction, Definitions, Applications
2. Algorithm Design and Analysis
3. Shortest Path Problem
4. Maximum Flow Problem
5. Minimum Cost Flow Problem
6. Minimum Spanning Trees
7. Generalized Flows
8. Multi-commodity Flows
9. Network Design Applications

Textbook:

R.K. Ahuja, T.L. Magnanti and J.B. Orlin, Network Flows: Theory, Algorithms, and Applications, 1993, Prentice-Hall, Englewood Cliffs, NJ.

References:

1. V. K. Balakrishnan, Network Optimization, 1995, Chapman and Hall, London, UK.
2. D. P. Bertsekas, Network Optimization: Continuous and Discrete Models, 1998, Athena Scientific, Belmont, Mass.
3. J. R. Evans and E. Minieka, Optimization Algorithms for Networks and Graphs, 1992, Marcel Dekker, NY.
4. D.T. Phillips and A. Garcia-Diaz, Fundamentals of Network Analysis, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1981 (Waveland Press, Inc., Prospect Heights, Illinois, 1990.)
5. D. Solow, How to Read and Do Proofs: An Introduction to Mathematical Thought Processes, John Wiley & Sons, 2004.

Office Hours: My official office hours are 11:00-12:00 TR. However, you can stop by anytime when I am in the office. Alternatively, you can make an appointment by phone or e-mail. I encourage each one of you to ask any questions you might have on the material during the lecture or right after the class. It is very much to your benefit to get these points cleared as soon as they occur. You are also strongly encouraged to come and see me in the office whenever you have problems.

Grading: You will be regularly assigned study problems which are not to be graded. There will be three exams (80 points each), quizzes (80 points) and small projects (80 points) with a total of 400 points. The following grading scheme will be used: A: 400–360; B: 359–320; C: 319–280; D: 279–240. If a test, quiz or project deadline is missed you must have a written authorized excuse. Tentative exam dates are as follows:

1^{st} exam	February 18, Tuesday
2^{nd} exam	April 1, Tuesday
3^{rd} exam	April 24, Thursday

Students with Disabilities:

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. (For additional information, visit `http://disability.tamu.edu`)

Scholastic Dishonesty:

The Texas A&M University Regulations define several categories of Scholastic Dishonesty: (1) Acquiring or attempting to acquire information; (2) Providing information on homework, quizzes or exams; (3) Plagiarism; (4) Conspiracy to commit any of the above; (5) Fabrication of Information; and (6) Violation of Departmental or College policies. The University definition of Scholastic Dishonesty will be strictly adhered to. Please see `http://www.tamu.edu/aggiehonor` for further information.