ISEN 603 – Advanced Logistics

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Description of the Course:

This is an advanced course focusing on several topics in logistics with a network design perspective. Topics include facility location-allocation, production/distribution system design, multi-commodity flow network design,vehicle routing, location/routing, and inventory lot-sizing models. The emphasis will be on mathematical modelling, analysis and efficient solution methodologies. A good background in optimization (linear and integer programming) and some programming experience with C++ are very beneficial. Please see the instructor if you have questions.

There are three components of this course:
The first component involves lectures in which the instructor covers several fundamental models, exact and heuristic solution algorithms, and analysis. However, you are expected to come to the class prepared by reading and familiarizing yourself with the topic. Once this component is finished, an exam is given on the covered material.

In the second component, you are required to first find three published research articles (recent ones, you will be shown the resources to do this efficiently) on each of three of the topics (your choice of three, but the instructor can help to decide) from the course outline below. For this purpose, you should utilize the "Topics and Some Literature" section below. Although extensive, it provides you a starting point and means to search the literature to find recent articles. This component is also initiated with the first component, and by the end of the fourth week of semester, you should provide the instructor with a list of your 9 papers. Following a template provided by the instructor, you prepare short summaries of these 9 papers (at most 1-page each). Then we pick 2 papers from your 9 papers (either from the same topic or from two different topics) and you prepare and deliver a presentation of these two papers.

The third component involves an implementation (likely by using C++) of one of the algorithms we cover in the first component. This will be conducted as a group project. Your implementation should be able to read the input data from an input file, execute the algorithm to solve the associated problem and present the results in an easily understandable output file. You are also required to prepare a documentation of your implementation outlining the problem and the algorithm first, and then presenting the data structures and components (procedure, subroutines, etc) of the whole program.

Grading: The grading for the class will be based on a
Component 1: Midterm Exam (40% - based on approximately the first half of the semester),
Component 2: Term Paper and Presentations (30% - topics selection, preparation, presentation, report, must use LaTeX(templates provided),
Component 3: Implementation Project (30% - completeness, correctness, efficiency, documentation).

Course Outline:

1. Uncapacitated Facilities Location-Allocation Problems
2. Capacitated Facilities Location-Allocation Problems
3. Production/Distribution System Design
4. Closed-Loop Supply Chain Network Design
5. Multi-commodity Flow Network Design
6. Hub-and-Spoke Network Design Problems
7. Vehicle Routing Problems
8. Integrated Location-Routing Problems
9. Uncapacitated/Capacitated Lot Sizing

References (No textbook):

1. G. Ghiani, G. Laporte and R. Musmanno, Introduction to Logistics Systems Planning and Control, 2004, John Wiley and Sons, West Sussex, England.
2. J. Bramel and D. Simchi-Levi, Logic of Logistics: Theory, Algorithms, and Application for Logistics Management, 1997, Springer-Verlag, NY.
3. M.S. Daskin, Network and Discrete Location: Models, Algorithms and Applications, 1995, John Wiley and Sons, NY.
4. P.B. Mirchindani and R. L. Francis (Eds.), Discrete Location Theory, 1990, John Wiley and Sons, NY.
5. R.K. Ahuja, T.L. Magnanti and J.B. Orlin, Network Flows: Theory, Algorithms, and Applications, 1993, Prentice-Hall, NJ.
6. P. Toth and D. Vigo (Eds.), The Vehicle Routing Problem, 2001, SIAM, Philadelphia, PA.
7. D. Simchi-Levi, P. Kaminsky and E. Simchi-Levi, Designing and managing the supply chain: concepts, strategies, and case studies, 2003, McGraw-Hill, NY.
8. S. Chopra and P. Meindl, Supply Chain Management: Strategy, Planning and Operation, 2001, Prentice-Hall, NJ.
9. D. J. Bowersox, D. J. Closs, M. B. Cooper, Supply Chain Logistics Management, 2002, McGraw-Hill, Boston.

Methodologies:

Commonly used methodologies for the topics above include Branch-and-Cut and Branch-and-Price Methods, Benders Decomposition, Lagrangian Relaxation, Dual-based Methods, and Heuristic Techniques.

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 the Department of Student Life, Services for Students with Disabilities in Room 126 of the Koldus Building, or call 845-1637.

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.