MATH 441: MATH MODELING: DISCRETE OPTIMIZATION PROBLEMS
January 2013

SCHEDULE: Section 201, 14:00-15:30 TTh in Lasserre 102

INSTRUCTOR: Richard Anstee   Office: Math Annex 1114, phone 604-822-6105
                                        email anstee@math.ubc.ca   Home: phone 604-325-8877

OFFICE HOURS: 1:30-2:30 MWF, but you can try anytime (I usually arrive by 9:00)

WEBSITE: http://www.math.ubc.ca/∼anstee/math441/math441.html

Optional TEXT: *Optimization Modeling with LINDO*, L. Schrage, 5th edition.

OUTLINE:

LINEAR PROGRAMMING review and examples	2 weeks
INTEGER LINEAR PROGRAMMING branch and bound, examples	3 weeks
NETWORK FLOWS examples including critical path method	3 weeks
DYNAMIC PROGRAMMING examples, discounting, stochastic models	1 week
QUADRATIC PROGRAMMING examples	1 hour
GRAPH ALGORITHMS colouring, matchings, travelling salesman problem	3 weeks

GRADING: 50% assignments, 50% project (no final exam)

COURSE PHILOSOPHY: This course can be described as a capstone course. It gives students a chance to use their mathematical common sense. We do introduce some new material. The group project provides a 'research' experience and as such has been designated as a course to fulfil the Arts degree (B.A.) research intensive course requirement.

ASSIGNMENTS: There will be about 7 assignments often using computer software available in the Lab, sometimes hand computation, but always involve abstracting a 'real world' problem into a standard discrete optimization problem. The software typically used is LINDO and LINGO (for linear and integer linear programming in a Windows environment) although the students are free to use other software. (Not all software provides sensitivity analysis so be careful in your choice). LINDO and LINGO will be available in the LSK 121 or LSK 310.The hours the lab is open are given on department website. Students may work together on assignments but must write up their solutions independently. Copying is forbidden. Any 2 (or more) assignments with some virtually identical answers deemed the result of copying will be given 0 total credit. The students are reminded of the plagiarism policies of the University.

PROJECT: The project will be done in groups of 2 or 3 students. A list of suggested projects will be given but you are invited to consider alternative projects of your own choosing. The groups and projects must be chosen by Feb. 4 with the first progress report due by Feb 26. The project is due by April 1 (some flexibility is available if arranged with me in advance). Consultation with me is encouraged at all stages. Groups may choose a project that uses existing software or, if they have the computing expertise, may choose a project with a programming component. I will mark it on a variety of criteria including the quality of the final write up.

ATTENDANCE: Attendance in lectures is especially important in this course since we use a case study approach where the learning will be accomplished as we develop solution strategies in class. To a large extent, we do not introduce a lot of new Mathematics but show how your Mathematical maturity can be applied.

MISSED WORK: From time to time students may be unable to finish assignments. In the case of the Final Project, the students should contact the Faculty of Science office and the missed project will be handled in a formal way. In the case of assignments, please contact me before class time on the due date, and given your reasons for the missed work. Assuming the reasons are

legitimate and an extension is not possible, I will note that you will be missing the assignment. In such circumstances your grade is computed out of a smaller number than 100 and then scaled appropriately to get a grade out of 100. For example, if an assignment counts 6% and a student informs me in advance of legitimate reasons for missing the assignment, the student would have a grade computed out of 94 and then this would be scaled to a grade out of 100 by multiplying by 100/94. Without advance notice (to me by email or phone message to Math Office etc) the default will be a grade of 0 in the missed work but you may contact me. A student must finish a significant amount of term work in order to pass.