

**TPSS/MBBE 342 Agribusiness Decision Making Tools
ECON 429 Computer Programming for Economic Research
Spring 2006**

MW 10:30 to 11:20, Kuy 308; F 10:30-11:20, AgSci 215 (Computer Lab)

Instructor: PingSun Leung (psleung@hawaii.edu; <http://www.ctahr.hawaii.edu/LeungP/>)
Office & Phone: Gilmore 111, 6-8562
Office Hours: MW 1:30-3:00 and by appointment
Teaching Assistant: Matias Boll (mboll@hawaii.edu); Gil 108, 6-6787

Catalog Description:

TPSS/MBBE 342 Introduction to quantitative decision-making methods for effective agribusiness management in resource allocation, scheduling, logistics, risk analysis, inventory, and forecasting. Emphasis on problem identification, model formulation and solution, and interpretation and presentation of results. Prerequisites: NREM 220 or ECON 130 or consent.

ECON 429 Introduction to use of computers for economics and agricultural analysis. Employment of BASIC, electronic spreadsheets, software packages for statistics, regression and linear programming. Pre: 130 and 321, NREM 220, and NREM 310.

Course Objectives: TPSS/MBBE 342 and ECON 429 is a *spreadsheet modeling* course introducing modern management science techniques for economic and business decision analysis. It is an applied management science course for undergraduate students focusing on agribusiness management and is one of the 5 required courses for the Agribusiness Certificate Program. It also provides undergraduate students in economics the use of spreadsheet models for economic analysis. The overall goals are:

- (a) to provide a one-semester introductory survey of modern management science techniques that can assist economists, agribusiness/business managers and industry analysts to make sound business and economic decisions;
- (b) to develop practical knowledge and hands-on experience in solving common economic and management problems faced by agribusiness/business firms;
- (c) to gain proficiency in formulating and implementing problems in a computer model with emphasis on spreadsheet model;
- (d) to generate information for decision making from computer models and to evaluate the information provided to improve decision making.

Skills and Knowledge to be Acquired:

Business management and economic decision analysis is the essence of this course. Students will come to understand and apply modern management science techniques for sound decision-making in resource allocation, scheduling, logistics, risk analysis, inventory control, and forecasting. Students will learn to formulate and solve problems utilizing several MS Excel decision analysis add-ins. Most examples of the applications of management science concepts and techniques introduced in lectures and utilized in computer assignments will be from scaled-down 'real world' case studies. The final class project will also allow students to gain first-hand experience by applying the management science techniques learnt in a 'real world' agribusiness/business management and economic situation.

Required Text:

Ragsdale, C.T. *Spreadsheet Modeling and Decision Analysis*, 4th Edition. South-Western, Thomson, 2004.

Reference Texts:

Anderson, J.R., J.L. Dillion and B. Hardaker. *Agricultural Decision Analysis*. Iowa State Press, 1977.

Bender, F.E., G. Kahan and W.C. Mylander. *Optimization for Profit: A Decision Maker's Guide to Linear Programming*. The Haworth Press, 1992.

Hardaker, J.B., R.B.M. Hurine and J.R. Anderson. *Coping with Risk in Agriculture*. CABI, 1997.

Hazell, P.B.R. and R.D. Norton. *Mathematical Programming for Economic Analysis in Agriculture*. Macmillan, 1986.

Rae, A.N. *Agricultural Management Economics*. CAB International, 1994.

Schaffer, William A. [Regional Impact Models](#), A WebBook, 1999, Regional Research Institute, West Virginia University, 81pp.

Winston, Wayne L. and S. Christian Albright. *Practical Management Science: Spreadsheet Modeling and Applications*, 2nd Edition, Duxbury Press, 2001.

Course Organization and Administration:

The sequence of topics follows the general outline of the required text closely. Agribusiness/business applications will be supplemented by materials from the reference texts particularly the one by Rae, other related publications and personal experience of instructors. Class meetings are lecture oriented. However, you are required to read the assigned materials before each class meeting in order to *participate* by raising questions and generating discussion. You are required to complete 14 *homework assignments* and prepared to discuss the solutions on the due date.

There will be *two midterm exams*. Exams will be closed book and notes. However, you are allowed to bring an 8.5" by 11" paper on which formulas and other information can be recorded. Also, calculators may be used. Exam questions will be similar to examples in the texts, problems discussed in class and homework assignments. Each exam will covered only topics after the last exam.

You are also required to prepare a written report on a *project* using one of the discussed methods in some real world situations related to agribusiness/business management or economic planning. Please turn in your project proposal by **March 15**.

The grade will be distributed as follows:

| | |
|---------------------------------------|------------|
| Midterms and Final Exams @ 120 points | 240 |
| Class Project | 120 |
| 14 Homework Assignments @ 10 points | 140 |
| Class Participation | 100 |
| TOTAL | 600 |

Tentative Schedule

| Date | | | Topics | Assigned Readings |
|------|-----------|----------|---|-------------------|
| Jan | 9 | M | Introduction to Modeling & Decision Analysis | Ch 1 |
| | 11 | W | Introduction to Optimization & Linear Programming (LP) | Ch 2 |
| | 13 | F | Lab HW#1 | |
| | 16 | M | <i>Holiday: Martin Luther King, Jr. Day</i> | |
| | 17 | T | <i>Last Day to Drop Classes and Switch Sections (Without "W" Grade)</i> | |
| | 18 | W | Modeling & Solving LP in a Spreadsheet Using Excel SOLVER | Ch 3 pp. 45-62 |
| | 20 | F | Lab HW#2 | |
| | 23 | M | LP Applications: Make vs. Buy Decisions; Investment Problems | Ch 3 pp. 64-74 |
| | 25 | W | LP Applications: Transportation; Blending | Ch 3 pp. 74-88 |
| | 27 | F | Lab HW#3 | |
| | 30 | M | LP Applications: Production & Inventory Planning, Multi-Period Cash Flow A. | Ch 3 pp. 88-107 |
| Feb | 1 | W | LP Applications: Data Envelopment Analysis | Ch 3 pp. 107-119 |
| | 3 | F | Lab HW#4 | |
| | 6 | M | LP Sensitivity Analysis I: Sensitivity Report, Shadow Price, Reduced Costs | Ch 4 pp. 143-159 |
| | 8 | W | LP Sensitivity Analysis II: Spider Tables/Plots, Solver Table | Ch 4 pp. 160-171 |
| | 10 | F | Lab HW#5 | |
| | 13 | M | Transshipment Problem; Shortest Path Problem; Equipment Replacement | Ch 5 pp. 185-199 |
| | 15 | W | Generalized Network Flow Problems: Maximal Flow; Minimal Spanning Tree | Ch 5 pp. 201-219 |
| | 17 | F | Lab HW#6 | |
| | 20 | M | <i>Holiday: Presidents' Day</i> | |
| | 22 | W | Review | |
| | 24 | F | 1st Midterm | |
| | 27 | M | Integer Linear Programming | Ch 6 pp.244-253 |
| Mar | 1 | W | Employee Scheduling Problem; Budgeting Problem | Ch 6 pp. 255-267 |
| | 3 | F | Lab HW#7 | |
| | 6 | M | Fixed Charge Problem; Minimum Order/Purchase Size; Quantity Discount | Ch 6 pp. 268-290 |
| | 8 | W | Goal Programming | Ch 7 pp. 313-324 |
| | 10 | F | Lab HW#8 | |
| | 10 | F | <i>Last Day for In-Person Restricted Withdrawal (With "W" Grade)</i> | |
| | 13 | M | Multiple Objective Linear Programming | Ch 7 pp. 325-338 |
| | 15 | W | Nonlinear Programming: Economic Order Quantity; Location Models | Ch 8 pp. 354-371 |
| | 15 | W | Turn in Project Proposal | |
| | 17 | F | Lab HW#9 | |
| | 20 | M | Nonlinear Network Flow; Project Selection; Optimize Financial Spreadsheet | Ch 8 pp. 371-393 |
| | 22 | W | Portfolio Selection; Evolutionary Solver: Beat the Market; Traveling Salesman | Ch 8 pp. 394-408 |
| | 24 | F | Lab HW#10 | |
| | 27 | M | <i>Spring Break Mar 27-31</i> | |

| | | | | |
|-----|----|---|---|-------------------|
| Apr | 3 | M | 2nd Midterm | |
| | 5 | W | Prediction with Regression Models: Sales Forecasting | Ch 9 |
| | 7 | F | Lab HW#11 | |
| | 10 | M | Time Series Forecasting: Moving Ave; Exponential Smoothing; Seasonality | Ch 11 |
| | 12 | W | Input-Output Analysis I | Schaffer |
| | 14 | F | <i>Good Friday</i> | |
| | 17 | M | Input-Output Analysis II | Schaffer |
| | 19 | W | Risk Analysis and Simulation; Crystal Ball | Ch 12 pp. 595-621 |
| | 21 | F | Lab HW#12 and 13 | |
| | 24 | M | Simulation Analysis: Inventory Control; Project Selection | Ch 12 pp. 621-646 |
| | 26 | W | Decision Analysis I: Decision Trees: Value of Perfect Information | Ch 15 pp. 754-794 |
| | 28 | F | Lab HW#14 | |
| May | 1 | M | Decision Analysis II: Utility Theory, Analytic Hierarchy Process | Ch 15 pp. 797-817 |
| | 3 | W | Course Summary; Project Report | |

Some Useful Web-sites

Cliff Ragsdale's Text Web-site

<http://ragsdale.swlearning.com>

Institute for Operations Research and Management Sciences (INFORMS) [General and will lead to many other useful web-sites]

<http://www.informs.org/>

Courses on Operations Research

<http://mat.gsia.cmu.edu/course.html>

Data Envelopment Analysis (DEA) Web-site

<http://www.warwick.ac.uk/~bsrlu/index.html>

OR Notes by JE Beasley of the Imperial College (very comprehensive and useful as supplements)

<http://mscmga.ms.ic.ac.uk/jeb/or/contents.html>