

ECON/MBBE/TPSS 429
Spreadsheet Modeling for Business and Economic Analysis
Spring 2009
MW 3:30-4:45 p.m., Moore 119

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Office Hours: TTR 1:30-2:30 p.m. and by appointment

Catalog Description:

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 and either ECON 321 or NREM 310; or consent. **DS**

Course Objectives: 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*, 5th Edition. South-Western, Thomson, 2008.

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. Your homework assignments should be prepared in two parts: a narrative part answering the questions (in MS Word or handwritten) and an Excel attachment if appropriate. Turn in your assignments through *Laulima's Assignment* functionality before class (3:15 p.m.) on the due date. **NO** late homework will be accepted.

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 18**.

The grade will be distributed as follows:

2 Midterms @ 100 points	200
Class Project	100
14 Homework Assignments @ 10 points	140
Class Participation	60
TOTAL	500

Tentative Schedule

Date			Topics	Assigned Readings
Jan	12	M	Introduction to Modeling & Decision Analysis	Ch 1
	14	W	Introduction to Optimization & Linear Programming (LP)	Ch 2
	19	M	<i>Holiday: Martin Luther King, Jr. Day</i>	
	20	T	<i>Last Day to Drop Classes and Switch Sections (Without "W" Grade)</i>	
	21	W	Modeling & Solving LP in a Spreadsheet Using Excel SOLVER	Ch 3 pp. 45-62
	26	M	LP Applications: Make vs. Buy Decisions; Investment Problems	Ch 3 pp. 63-72
	28	W	LP Applications: Transportation; Blending	Ch 3 pp. 72-84
Feb	2	M	LP Applications: Production & Inventory Planning, Multi-Period Cash Flow A.	Ch 3 pp. 85-102
	4	W	LP Applications: Data Envelopment Analysis	Ch 3 pp. 102-113
	9	M	LP Sensitivity Analysis I: Sensitivity Report, Shadow Price, Reduced Costs	Ch 4 pp. 136-152
	11	W	LP Sensitivity Analysis II: Spider Tables/Plots, Solver Table	Ch 4 pp. 152-163
	16	M	<i>Holiday: Presidents' Day</i>	
	18	W	Transshipment Problem; Shortest Path Problem; Equipment Replacement	Ch 5 pp. 177-193
	23	M	Generalized Network Flow Problems: Maximal Flow; Minimal Spanning Tree	Ch 5 pp. 194-211
	25	W	1st Midterm	
Mar	2	M	Integer Linear Programming	Ch 6 pp. 232-243
	4	W	Employee Scheduling Problem; Budgeting Problem	Ch 6 pp. 243-254
	9	M	Fixed Charge Problem; Minimum Order/Purchase Size; Quantity Discount	Ch 6 pp. 254-275
	11	W	Goal Programming	Ch 7 pp. 296-307
	13	F	<i>Last Day for In-Person Restricted Withdrawal (With "W" Grade)</i>	
	16	M	Multiple Objective Linear Programming	Ch 7 pp. 307-322
	18	W	Nonlinear Programming: Economic Order Quantity; Location Models	Ch 8 pp. 339-355
	18	W	Turn in Project Proposal	
	23	M	<i>Spring Break Mar 23-27</i>	
	30	M	Nonlinear Network Flow; Project Selection; Optimize Financial Spreadsheet	Ch 8 pp. 355-368
Apr	1	W	Portfolio Selection; Evolutionary Solver: Beat the Market; Traveling Salesman	Ch 8 pp. 368-390
	6	M	2nd Midterm	
	8	W	Input-Output Analysis I	Schaffer
	10	F	<i>Good Friday</i>	
	13	M	Input-Output Analysis II	Schaffer
	15	W	Prediction with Regression Models: Sales Forecasting	Ch 9
	20	M	Time Series Forecasting: Moving Ave; Exponential Smoothing; Seasonality	Ch 11
	22	W	Risk Analysis and Simulation; Crystal Ball	Ch 12 pp. 559-594
	27	M	Simulation Analysis: Inventory Control; Project Selection	Ch 12 pp. 595-618

	29	W	Decision Analysis I: Decision Trees: Value of Perfect Information	Ch 15 pp. 724-765
	4	M	Decision Analysis II: Utility Theory, Analytic Hierarchy Process	Ch 15 pp. 766-785
May	6	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>