COURSE SYLLABUS

COURSE:	AGEC 5403 Quantitative Methods for Agribusiness Applications Fall 2007
PREREQUISITE:	Graduate Standing or consent.
RELATED COURSES:	▪ Regression analysis: AGEC 4113 Agric Prices Forecasting, AGEC 5613 Econometrics I ▪ Math (linear) programming: INEG 3613 Intro Opns Rsch, INEG 5613 Optimization Theory I ▪ Computer simulation: INEG 4623 Intro Simul, INEG 5443 Dec Models
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MEETING TIME:	MWF 2:30 a.m.-3:20 p.m., AGRI 301
OFFICE HOURS:	▪ Tuesdays and Thursdays are the best time to see me. ▪ MWF between 10:30 and 2:30 are the worst times to see me. ▪ At other times during the week, you will find that I am generally in the office. ▪ An appointment is not necessary but a call may save you time if I have other commitments. ▪ I encourage you to see me for help with class materials and to ask questions during class because it enables everyone to hear and to learn from your questions.
TEXTBOOK:	Albright, S. Christian, Wayne L. Winston, and Christopher Zappe (AWZ). 2006. Data Analysis and Decision Making with Microsoft Excel. 3d edition. Thomson-Southwestern Publishing, Mason OH. (with datasets on Student CD-Rom).
NOTE (text, software):	The Palisade Decision Tools and StatTools Suite is a commercial piece of third-party add-in software developed for use with Excel 2003 which is packaged on a CD-Rom with copies of the AWZ text. AWZ references this Palisades software throughout the text and all examples of problem solving and "screen saves" in the text are based on the 2003 version of Excel. Nevertheless, most of the exercises be also done without this software using the stand-alone Excel. For those exercises which require the special features found on the add-in CD, an alternative, commercial, third-party Excel add-in, SIMETAR, will be available to AGEC 5403 students for use on the computers in the AEAB Computing Laboratory in 218 AGRI Building. SIMETAR contains many–if not most–of the features found on the Palisades CD.

Both, the Palisades software and SIMETAR run only with the Windows 2003 XP operating system with Excel 2003. They do not work with Windows Vista 2007 operating system or Microsoft Office 2007 which was introduced in early 2007. As of 17 August 2007, MS Office 2007 has been placed on all university General Access Computer Labs (GACL) including those in AFLS. Some computers in the AEAB Computer Lab in AGRI 218 will continue to run Windows XP with Office 2003 for the remainder of the fall semester 2007.

COURSE RATIONALE AND OBJECTIVES:

Primary Objective. The primary objective of the course is to provide students with knowledge of, and hands-on exposure to, the major tools used by agricultural economists and business consultants in researching and analyzing problems related to the management of agricultural businesses, farm firms, and large corporations. These tools include:

- regression analysis
- mathematical (linear) programming
- simulation modeling (risk analysis)

The course is application-oriented and operates under the premiss that an understanding of when and how to use quantitative tools is enhanced by solving and analyzing example problems with the aid of a computer. Although the course is taught from an applied perspective, a portion of the classroom materials is targeted at providing students with the conceptual basis which links the use of these tools to economic theory.

Course history. Over a number of years, the course has evolved from a theoretical treatment of the neoclassical theory of production economics to its present approach of applying quantitative techniques to solving management problems. Initially, the course had as its central topic the theory of the firm, i.e., production economics. As such, it dealt primarily with the producer side of microeconomic theory by developing those concepts which give rise to the supply curve in the competitive market model. Virtually all of the neoclassical treatment of the theory of the firm (with its corresponding calculus-based analytic solutions) has been eliminated from the course in order to devote more time to problem-solving applications using numeric and statistical techniques on the computer. Because the course has its roots in agricultural production economics, some of the examples may still be taught from the perspective of the farm-firm. However, as the course evolves, more business and agribusiness examples will supplement or replace farm-firm examples.

Changing needs and marketable skills. In part, the evolution of the course was dictated by the changing needs of the soon-to-be-employed graduate students who have enrolled in the course. An applied discipline like agricultural economics bears a responsibility of providing its graduates with marketable skills. As economic and business systems become increasingly complex, they require solutions to problems which are only analyzed with increasingly sophisticated quantitative techniques, which are, in turn, employed by increasingly better trained analysts and managers. Thus, the targeted output of the course is better trained students who will become the analysts and managers of tomorrow.

Major quantitative tools studied. The broad objective of the course is to provide an understanding of how the basic economic theory can be applied to do problem solving research. To

this end, the course is divided into three major sections, corresponding to three quantitative techniques:

(1) Estimation of linear regression models using Ordinary Least Squares. The linkage between raw empirical data and economic analysis is drawn by using linear regression to statistically estimate and economically interpret economic and business relationships.

(2) Optimization using mathematical programming. Linear programming problems are solved using the simplex algorithm to demonstrate how the theory of marginal analysis is effectively practiced when problems become too large or complex to solve using calculus.

(3) Risk and uncertainty. Students are introduced to stochastic Monte Carlo simulation and other alternative approaches researchers use (E-V analysis, decision theory, stochastic dominance) when the perfect knowledge assumption of the neo-classical model no longer holds.

Exposure to these and other topics will not only help students to read the literature, understand research findings, and interpret consultant reports, but more importantly, will teach them how to go about analyzing, solving, and comprehending current problems in agricultural and business economics.

COURSE PROCEDURES:

- **Grade Composition.** Weighting for the final course grade will be according to the following schedule:

Homework (6-9)	15% of final grade
Two Mid-term Exams	50% of final grade
Final Exam	35% of final grade

- **Percentile breaks**. The tentative percentile break points for grades will be:

Percentile Breaks	Grade Points	Percentile Breaks	Grade Points
Score (%) $\geq$ 90 = A	4.00	65 > Score (%) $\geq$ 60 = C	2.00
90 > Score (%) $\geq$ 85 = A-	3.67	60 > Score (%) $\geq$ 55 = C-	1.67
85 > Score (%) $\geq$ 80 = B+	3.33	55 > Score (%) $\geq$ 50 = D+	1.33
80 > Score (%) $\geq$ 75 = B	3.00	50 > Score (%) $\geq$ 45 = D	1.00
75 > Score (%) $\geq$ 70 = B-	2.67	45 > Score (%) $\geq$ 40 = D-	0.67
70 > Score (%) $\geq$ 65 = C+	2.33	40 > Score (%) = F	0.00

- **"Curved grades."** I reserve the right to adjust percentile breaks downwards, i.e, to use a "curve" in grading, and in fact, this is typically what happens in this course. Nevertheless, there will be no "curving" of an individual exam or homework exercise. If there is a curve, it will be applied during calculation of final grades. Final grades for individual "borderline" cases may be adjusted for class participation and attitude as well as trend and consistency in performance.

- **Final Grade**. Once the final exam has been given (see date below) the course is over. No additional, supplementary work over and beyond the materials described above in this syllabus will be accepted as evidence of proficiency in the materials covered in the course, nor for the purpose of altering the final grade. The final grade in the course will be based on materials submitted by the date of the final exam.

- **Exams.** Two mid-term exams and a final exam are typical for the course. All exams are closed-book in-class. A calculator may be used in all exams. Laptop computers, cell phones, and other hand-held electronic communication devices are not permitted during exams. Whereas mid-term exams cover materials from specific sections of the course, the final exam is comprehensive.

- **Final Exam Date**. Final comprehensive exam:
  Tuesday, 11 December 2007, 3:00 p.m. - 5:00 p.m.
  Friday, 26 October 2007, last day to drop course with W grade

- **Homework assignments and software.** Homework exercises are an integral learning tool in the course. Approximately 6 - 9 homework exercises will be assigned throughout the semester. These include a broad range of problems which require computer solution and presentation of results.

  Most of the homework assignments will employ spreadsheet software including statistical and numeric routines which come packaged with Microsoft Excel. These include regression analysis using Excel's Analysis Toolpak, linear programming using Excel Solver, and simple stochastic simulation using Excel paste functions.

  A number of the assignments–i.e., those for advanced, multi-variate, stochastic simulation–will require third party add-in software to Excel. This software is either (a) @RISK, which comes packaged with the AWZ textbook, or (b) SIMETAR, which will be available on some computers in the AEAB Computer Lab in AGRI 218. These exercises will need to be completed using Excel 2003 because these add-ins have not yet been upgraded to Excel 2007.

  In addition to problem solving exercises, extensive use will be made of spreadsheet software (Excel) for generating tables and graphics, and presentation software (Power-Point) for making presentations (time permitting). Students will be required to submit homework results using word-processing software (e.g., Word or WordPerfect). Professional presentation of results is expected in all homework exercises.

Students using university computer labs to complete homework assignments will need to complete them using Excel 2007 in spite of the fact that the textbook cites Excel 2003. Students who want to complete exercises in Excel 2003 may use the AEAB Computer Lab (or their own personal computer). For the portion of the course dealing with stochastic simulation, Excel 2003 will be the standard for both instructor and students.

- **Late homework exercises**. Homework exercises not turned in at class time on the due date will be assessed the following penalty: First day (i.e., within first 24 hour period) = 20% penalty; second day, 35%; third day, 45%. No credit will be given if assignments are turned more than three days late.

- **Lecture Notes and Website**. Normally, lecture notes in PDF format will be made available to students for downloading from the class WebCT website prior to class. In addition, distribution of other class materials may be made available over the class website. Students will need a university account to access class materials on the website.

- **Disability (ADA).** If you need accommodation due to a disability, please make arrangements to discuss this with me in my office.

- **Inclement weather.** Class will be cancelled whenever University offices are officially closed as a result of bad weather. You should always use your own best judgement about the risks of coming to class during bad weather in those cases when the University is not officially closed. If you are to miss class because of inclement weather, you should inform the instructor by email or telephone, before class begins.

- **Textbook and Readings**. The required textbook (AWZ) is listed above. If necessary, additional readings will be made available in the Reserved Reading Room in the AEAB Departmental Reference Room or as PDF files on the class website. A list of readings corresponding to topics covered in class is found under "Outline/Topics" below. **Topics in the table are tentative in that more time may be spent on some and less on others. Due to time constraints, some topics may not be covered at all.**

AGEC 5403 Quantitative Methods for Agbusiness Decisions

Course Outline, Topics, Readings[¶] - Fall 2007

Wk	Date	No	Lecture Subject or Topic	Readings (AWZ)	Exercise
		A	Introduction and Data		
1.1	20-Aug	0	Overview of course: Organization, operation, goals	Preface, (1.1-1.3 skim)	Excel_Tutorial.doc
1.2	22-Aug	1	Data concepts	2.1-2.2, 4.2, Rich Apps 1-2.pdf	
1.3	24-Aug	2	Summarizing data: visual	2.3-2.5, 2.7	Data 1
2.1	27-Aug	3	Summary measures of data 1	3.1-3.5, 12.3.4	
2.2	29-Aug	4	Summary measures of data 2; Excel autofilter	3.6-3.8, 3.10; 4.1-4.4	Data 2
		B	Regression Analysis		
2.3	31-Aug	1	Simple regression: Least squares model	11.1-11.3	
3.1	3-Sep		Labor Day Holiday		
3.2	5-Sep	2	Goodness of fit 1: R^2	11.4.3, 12.3.4	
3.3	7-Sep	3	Goodness of fit 2: RMSE	11.4.2, 12.3.4	Reg 1
4.1	10-Sep	4	Multiple regression	11.5	
4.2	12-Sep	5	Dummy variables 1: Intercept shifter	11.6, 11.6.1	
4.3	14-Sep	6	Dummy variables 2: Slope shifter, interaction	11.6.2	
5.1	17-Sep	7	Non-linear transformations 1: Polynomial	11.6.3	
5.2	19-Sep	8	Non-linear transformations 2: Log and CD	11.6.3	
5.3	21-Sep	9	Non-linear transformations 3: Isses, fit	11.6.3	Reg 2
6.1	24-Sep	10	Hypothesis testing 1: Infererence, significance	12.3	
6.2	26-Sep	11	Hypothesis testing 2: Infererence, significance	12.3	
6.3	28-Sep	12	Other regression topics	12.4, 12.5, 12.9.1, 12.10	
7.1	1-Oct		Exam 1: Periods 1.2 to 6.3		
		C	Linear Programming		
7.2	3-Sep	1	Introduction to linear programming	14.1, 14.2	
7.3	5-Oct	2	A minimization problem	14.3	
8.1	8-Oct	3	A maximization problem	14.3	
8.2	10-Oct	4	Linear programming in Excel		
8.3	12-Oct	5	Parametric programming	14.4	LP 1
9.1	15-Oct	6	Linear programming assumptions	14.5	
9.2	17-Oct	7	Miscellaneous issues and problems with LP	14.6	
9.3	19-Oct	8	Product mix models	14.7	
10.1	22-Oct	9	Blending models	15.3	
10.2	24-Oct	10	Transportation and trans-shipment models	15.4, 15.5	
10.3	26-Oct	11	Financial and investment models	15.6	LP 2
11.1	29-Oct	12	Other LP topics (integer LP, scheduling, etc.)	15.7-15.9	
11.2	31-Oct		Exam 2: Periods 7.2 to 11.2		
		D	Simulation and Risk		
11.3	2-Nov	1	Introduction to risk	7.2	
12.1	5-Nov	2	Introduction to simulation: An example	5.1, 16.1, 16.2	
12.2	7-Nov	3	A simulation example (cont'd)		
12.3	9-Nov	4	Decision rules and the payoff matrix	7.1, 7.2, 7.3	
13.1	12-Nov	5	Introduction to simulation	5.3, 5.4, 16.1, 16.2	Sim 1
13.2	14-Nov	6	Input probability distributions	16.3	
13.3	16-Nov	7	Simulation with built-in Excel tools	16.4	
14.1	19-Nov	8	Simulation with @RISK (or SIMETAR)	16.5	
14.2	21-Nov		Academic Holiday: Fall Break		
14.3	23-Nov		Thanksgiving Holiday		
15.1	26-Nov	9	Simulation with multiple sources of risk	16.5	
15.2	28-Nov	10	Simulation with correlated input distributions	16.6, 16.7	
15.3	30-Nov	11	Interpretation, presentation of results	17.1-17.4	Sim 2
16.1	3-Dec	12	Simulation of a financial portfolio (blended strategies)		
16.2	5-Dec	13	Dead Day		
16.3	11-Dec		Final Exam: 3:00 p.m. - 5:00 p.m.	Comprehensive	

[¶]Tentative course outline. Topics, dates, and length of time spent on each topic may change. Midterm exam dates may be revised given the actual class time to cover the lecture material. Readings = chapter sections in Albright,Winston, Zappe (AWZ) textbook *Data Analsyis and Decision Making,* 3e, 2006.