

FORM 1 - COURSE SYLLABUS
Professor: Kenneth D Lawrence
Course: MGMT 630-101
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HD: MGMT 630-001 Fall 2016 - Eve
Time/Place: M 6:00 - 9:05 PM
Classroom: Kupf 104
Phone: 973-596-6425

Student Meeting Times:

Th 4:00 - 5:30 PM

Other Meeting Times: At agreed-to appointment times

I. COURSE OBJECTIVES

Introduction to the solution of complex decision making problems to be used in your future professional business career and in your management courses

II. COURSE DESCRIPTION

Introduction to statistical and mathematical techniques used in management decision making. Develop the concepts of management science and use its techniques with unrestricted focus. Management applications are made in finance, supply chain, marketing, and accounting.

III. COURSE DESCRIPTION

Introduction to statistical techniques and business analytics used in management decision making. Develop the concepts of statistical data analysis and use with the statistical package, Minitab 17.2 and LINGO 16 optimization package.

IV. COURSE LEARNING GOALS (1,2,3) AND LEARNING OUTCOMES (1.1, 1.2, 2.2, 3.1)

1. To draw conclusions about the given data and how it can be used in the modeling process with decision process in various aspects of management (Analytical and problem solving skills; communication skills; interpersonal skills; team dynamics; ethical skills).
2. To improve decision processes with decision process in areas of management decision making (Analytical and problem solving skills; communication skills; interpersonal skills; team dynamics; ethical skills).
3. To obtain reliable forecasts of variables of interest (Analytical and problem solving skills; communication skills; interpersonal skills; team dynamics; ethical skills).
4. To effectively use computerized-methods of quantitative analysis Minitab 17.2 and LINGO 16 software; Technological skills.
5. To effectively analyze realistic business cases requiring quantitative analysis and computerized methods of analysis (Analytical and problem solving skills; communication skills; interpersonal skills; team dynamics; ethical skills).

V. COURSE LERANING GOALS AND LEARNING OUTCOMES

1. To maximize the educational benefit of this course (an active learning course), the student has the responsibility to keep a timely and quality level of knowledge of all reading assignments, problem assignments, case assignments, and computer assignments, as well as be thoroughly prepared for each class. This requires the student, on an ongoing basis, to prepare outside the regular class meetings. Furthermore, LINGO 16 software provides a thorough and complete Help Command (with actual examples). Included by chapter are the following: learning outcome, LINGO 16 data files, Minitab 17.2, LINGO 16 tutorial, self-study quizzes.
 - b. Demonstrated knowledge of both Minitab 17.2 and LINGO 16 software is required.
 - c. There are no make-up quizzes, exams or projects.
 - d. To fulfill and complete the course requirements, all work must be completed.
 - e. Regular class attendance and participation are essential.
 - f. Participation in case projects, computerized exercise presentations, and a term project is required and is a significant part of the grade.
 - g. Incomplete grades are rarely given, only under the most special circumstances and must be completed within approximately one month from the normal closing of grades. Additionally, in order to qualify for an incomplete, at least 50% of the course must be completed.
- g. The NJIT Honor Code will be upheld.

VI. AUTHENTIC ASSESSMENT

1. The measures of performance in this class will be referred to as authentic assessments. That is, student performance is evaluated based upon realistic types of business problem assignments, given in a take-home environment (during the term projects, exercises and an examination.) This is in sharp contrast to the types of assessments based on short-answer questions in a timed environment. Clearly this type of assessment will provide the student the same type of environment as s/he will have during his/her professional business career.
2. During the term, case studies, the term project, quizzes, and examinations will consist of the following materials in the write-up and in-class presentations as part of a work group:
 - a. Detailed discussion of the business problem
 - b. Detailed discussion of the data analysis techniques used
 - c. Detailed discussion of the data used
 - d. Detailed discussion of the analytical techniques used
 - e. Detailed discussion of the computerized procedure used in LINGO 16 software
 - f. Discussion of the results of the analysis
 - g. A set of PowerPoint overheads

VII. Active Learning Process of MGMT 630 001

1. It is assumed that in this course, the students are active and informed participants in the groups that work on the quizzes and projects with regard to problems, cases, and computer exercises. Their individual work includes his/her active participation in the solution of presentations and write-ups of the quizzes and projects and the sole participation in the final examination process. The process of active learning serves to provide a realistic view of the educational process, which simulates the real business world environment, rather than a sterile, purely academic environment of learning material, memorizing processes and techniques and taking in-class examinations. In addition, the students become knowledgeable in the presentation of material through the use of PowerPoint presentations and in precise writing in a business-like manner of quizzes and projects, which correlate with the processes that are experienced by students in the workplace. This type of active learning process, rather than a pure lecture environment, parallels the environment found at the very best rated business programs in the United States and the world. Thus, this course is not directed toward the passive learner who wants a training course.

VIII. COURSE GRADE

A. Term Project Take Home

1. **Part 1**, Development of Data Structure for Use with the Term Perfect
2. **Part 2**, Term Project Forecasting with Time Series Models, (10% of grade)
3. **Part 3**, Term Project Forecasting with Advanced Time Series Models, (15% of grade)

Forecasting Term Project Data

1. Review Minitab tutorials (HELP) and run
2. Review Forecasting tutorials
3. Implement the help examples on the Minitab 17.2 Help command:
for time series models
4. Building a Minitab 17.2 worksheet for forecasting the price of your
assigned
Mutual fund.

B. During the Term Take Home Examination

1. **Part 1**, Use of LINGO 16 for the Linear Programming Model
2. **Part 2**, Simple Linear regression Modeling (10% of grade) with LINGO 16
3. **Part 3**, Linear Programming Modeling (15% of grade) with LINGO 16

C. Final Examination: Take Home (50% of grade)

1. The final examination will be sent to the students via E-Mail with appropriate directions and completion times. The completed final examination will be returned via E-Mail to **carpetfour@yahoo.com**. The format of the message must be with TXT (ASCII), with the questions answered in order 1, 2, ..., n. No attached files are accepted. The student's name and class must be given. Examinations submitted in any other format will not be accepted for grading. If it is sent in another format (i.e., Word, Excel, etc.), which cannot be read, then it is still considered late and therefore unacceptable.

2. In order to verify the timely arrival of examination answers, the student needs to cc the E-Mails sent to him/her. No other method of verification is acceptable.

3. Those examinations received after the due date will be penalized one letter grade for missing the due date of the examination. There is an additional letter grade penalty for each Day late. The letter grades for quizzes, projects, etc., will also will be penalized according to the schedule: first Day late: 1 letter grade; between 2 and 7 Days late, another letter grade; more than 7 Days later, an additional letter grade for each Day late is the penalty.

4. Lateness penalties, as described for examinations, will also be invoked for case studies and computerized exercises, term project, written and oral presentations and quizzes.

D. IMPORTANT NOTE: Using only printouts of the software or writing an answer to a question in case studies, term projects, quizzes, and exams is totally unsatisfactory. You must include detailed discussion and analysis as given in 14a-14f above.

E. Course Grades are based on (outcomes):

1. Timely and complete receipt of examinations
2. Complete and thorough receipt of examinations
3. Correct and quality receipt of examinations
4. Quality and timely presentations of examinations

F. Course Grade Components by Examination/Term Project

- a. Forecasting Grade component
1. Model Formulation
 2. Analysis of Integration of Fit Forecasting

Forecasting is the process of predicting what the future will be like. Quantitative forecasting techniques are based on statistical methods for analyzing quantitative historical data. Determining the appropriate forecasting model is a challenging task. The modelling process consists of model specifications, model building and model diagnosis.

Model Specification is the process of selecting the forecasting techniques to be used in a particular situation.

Model Building is the process of estimating the specified model's parameters to achieve an adequate fit of the historical data.

Model Diagnosis is the process of determining how well a model fits past data and how well the model's assumptions appear to be satisfied.

Two types of forecasting models will be examined. The first of these is regression modeling, and the second is time series modeling.

IX. COURSE SOFTWARE DOCUMENTATION

A. Minitab 17.2

Minitab 17.2 is to be downloaded to your PC from NJIT Information Services and Technology. The website is <http://lst.njit.edu/software/index.php>. Direct your questions on the download to 973-596-2900; then click on Help on the Minitab Menu Bar; then cursor down to Stat Guide and select Basic Stat, Regression, etc. Use of the Help function is essential.

Minitab 17.2 is a statistical package of choice across numerous sections of industries including education and finance. Correctly using Minitab statistical tools is an essential part of good decision-making and allows you to achieve target results while displaying fantastic charts, and a powerful analysis will also communicate your results more effectively.

Using time series modeling, we will look at forecasting data by:

1. Stationary time series
2. Trend modeling (linear, nonlinear)
3. Seasonal pattern
4. Cyclical pattern
5. Forecasting accuracy
6. Moving average
7. Exponential smoothing

Predictive analytics will be used to segment observations into smaller groups based on the observed variables.

Cluster analysis is an exploratory multivariate technique designed to uncover natural groupings of the rows in a data set. If data are two-dimensional, it can be very easy to find groups that exist in the data; a scatterplot will suffice. When data have three, four or more dimensions, how to find groups is not immediately obvious. The object of cluster analysis is to divide the data set into groups, where the observations within each group are relatively homogeneous, yet the groups are unlike each other.

A standard clustering application in the credit card industry is to segment its customers into groups based on the number of purchases made, whether balances are paid off each month, where the purchases are made, etc. In the cell-phone industry, clustering is used to identify customers who are likely to switch carriers. Grocery stores with loyalty-card programs cluster their customers based on the number, frequency, and types of purchases. After customers are segmented, advertising can be targeted. For example, there is no point in sending coupons for baby food to all the stores' customers, but sending the coupons to customers who have recently purchased diapers might be profitable. Indeed, coupons for premium baby food can be sent to customers who have recently purchased filet mignon, and coupons for discount baby food can be sent to customers who have recently purchased hamburger.

B. LINGO 16

Also, thorough and complete details in the use of for LINGO 16 software, and PowerPoints have been emailed to the class.

A student edition of LINGO 16 can be downloaded from LINDO systems.

LINGO is a comprehensive tool designed to make building and solving linear, quadratic, quadratically-constrained, second order cone, stochastic, and integer optimization models faster, easier and more efficient. LINGO provides a completely integrated package that includes a powerful language for expressing optimization models, a full featured environment for building and editing problems, and a set of fast build-in solvers. This is essential for the class.

LINGO 16 data analysis provides the student with a critical skill of significant value to potential employers.

Key Benefits of LINGO

Easy Model Expression:

LINGO will help you cut your development time. It lets you formulate your linear, nonlinear and integer problems quickly in a highly readable form. LINGO's modeling language allows you to express models in a straightforward intuitive manner using summations and subscripted variables. Models are easier to build, easier to understand, and therefore, easier to maintain.

Convenient Data Options:

LINGO takes the time and hassle out of managing your data. It allows you to build models that pull information directly from databases and spreadsheets. Similarly, LINGO can output solution information right into a database or spreadsheet, making it easier for you to generate reports in the application of your choice.

Powerful Solvers:

LINGO is available with a comprehensive set of fast, build-in solvers for linear, nonlinear, quadratic, quadratically constrained, second order cone, stochastic, and integer optimization.

Model Interactively:

One can build and solve models within LINGO, or one can call LINGO directly from an application written.

Extensive Documentation and Help:

LINGO provides all of the tools you will need to get up and running quickly. The LINGO User Manual can be printed and is available via the online Help; it fully describes the commands and features of the program. Its use is essential to the students.

X. COURSE MATERIAL

1. REQUIRED TEXT

Camm, Cochran, Fry, Ohlmann, Anderson, Sweeny, and Williams, Essentials of Business Analytics, Cengage Learning, Stamford, Connecticut, 2016, ISBN 13-978-285-18727-3

2. PowerPoints from Camm text

3A. YouTube Links on:

- a. Minitab use
- b. LINGO 16 use
- c. Forecasting Modeling
- d. Predictive Analytics and Clusters
- e. Time Series Modeling
- f. Linear and Integer Programming Models

3B. Minitab Help Commands:

- a. Data Manipulation
- b. File Construction
- c. Data Analysis
- d. Time Series Modeling

3C. LINGO 16

UCID - All students are required to have a UCID with is associated e-mail account. Course communication from the professor to the student will require its use as mandatory.

XI. COURSE TOPICS

Week	Topic	Camm Chapters
	I. Introduction:	
1,2,3	A. Linear Optimization Model	8
4,5,6	B. Time Series Analysis and Forecasting	5
	II. Regression:	
7,8,9	A. Integer Optimization Models	9
10,11	B. Nonlinear Optimization Models	10
	III. Predictive Analytics:	
12-14	A. Predictive Analytics	12-16

LINGO 16 is to be downloaded to your PC from NJIT Information Services and Technology. The website is <http://lst.njit.edu/software/index.php>. Direct your questions on the download to 973-596-2900; then click on Help on the Minitab Menu Bar; then cursor down to Stat Guide and select Basic Stat, Regression, etc.