Syllabus – Fall 2014

Department:	Industrial Engineering
Course Number/Section:	*INEN 2301 -01*
Course Title:	Applications of Quantitative Methods
Professor:	Ryan Underdown

Cheery Engineering Building Room 2202
Office phone: 880 8815,
Ryan.underdown@lamar.edu
Office hours: MTWTh 1:30- 3:30

Course Description

Quantitative Methods: Introduction and applications of linear algebra, probability and statistics, and differential calculus. Not open to students majoring in engineering.

Prerequisites

MATH 1314.

Required/Optional Texts and/or Course Materials

- College mathematics for the managerial, life, and social sciences, S.T. Tan – Sixth Edition, 2005, ISBN: 0-534-46530-7
- Statistics for Management and Economics, 9th Edition, Gerald Keller, South-Western Cengage, ISBN-10: 0538477490 ISBN-13: 9780538477499

Course Outcomes

Learning Outcomes:

- Students will have a working knowledge of linear equations and linear programming
- Students will be able to conduct statistical analysis of experimental results using current software
- Students will have a working knowledge of probability concepts

Core Curriculum Outcomes:

- Critical Thinking Skills: Students are able to explain the importance of methodical data collection and reducing variation. Students are able to set up statistical experiments and analyze the results for the purpose of making decisions in an industrial business environment.
- Communication Skills: Students write an extensive technical report, an executive summary and make an oral presentation or video production describing the performance of an organization.
- Empirical and Quantitative Skills: Students are able to set up and calculate linear equations and probability models. Students are able calculate results in a statistical experiment including measures of centrality, discrete and continuous variables, methods of estimation and hypothesis testing.

Policies

Disability accommodation: It is the policy of Lamar University to accommodate students with disabilities, pursuant to federal and state law, and the University's commitment to equal educational opportunities. It is the student's responsibility to register with Lamar's Disability Support Services (880-8347) as quickly as possible. Any student who feels s/he may need an accommodation based on the impact of a disability should contact the professor directly during the first week of the course.

Academic Honesty: Lamar University students will not cheat, lie, plagiarize, or tolerate those who do. Academic dishonesty will not be tolerated on any course assignments. **Should the student be found responsible for a dishonest incident, the course instructor will assign a reasonable penalty, which may include failure of the course.** If the student does not consent to the findings and/or penalty, the student must file an appeal with the department chairperson within five days, as specified in the student handbook (available at www.my.lamar.edu).

Attendance Policy: Attendance is expected at every class period unless pre-approval is obtained or circumstances preclude obtaining pre-approval. Online courses will have discussions that students will need to engage in order to obtain their grade points.

Drop: It is the student's responsibility to make sure that s/he is officially enrolled in this course. If, at any point, the student decides to not participate in this course, it is her/his responsibility to officially drop or withdraw from enrollment. Failure to do so may result in a failing grade. Drops after the course begins may carry financial penalty in that full reimbursement may not be possible.

Grading and Evaluation

Assignments:

- *Homework assessments*: The student will have assignments on blackboard throughout the semester. These assignments will prepare the student for the test and will review the contents of the textbooks. These assignments will give feedback immediately. They can be tried as many times as the student want and will not be part of the grade.
- *Final Project*: The analysis of the performance of a corporation based on numerical and non-numerical analysis oriented to develop the capacity to analyze and synthesize a complex situation. Three deliverables are expected: an extensive report, an executive summary and an oral presentation of 7 to 10 minutes.
- *Tests:* There are three tests in this course. Tests will cover the course materials including numerical problems, hypothetical situations to value the non-numerical aspects of decision making, including ethical values, and the capacity to analyze and synthesize complex situations by applying critical thinking.

Grading scale:

Activity	Weight
Test 1,2, 3 (20% each)	60%
Project	30%
Quizzes, Homework, discussions	10%
TOTAL	100 %

Total points	Letter grade granted
X>= 90	A
80<=X<90	B
70<=X<80	C
60<=X<70	D
Others	F/Q/W

The Policy for making up missed course work (including examinations): Missed or late course work can only be made up if pre-approval is obtained. Otherwise, a grade of zero is assigned for the missed work.

Course Outline

Class #	Topics - Planned
1	Intro to course, Intro to Linear Programming
2	Intro to Linear Equations
3	Linear problems
4	Ch4: Numerical Descriptive Techniques
5	Ch4: Problems
6	Work Problem 4.65 as a class
7	Ch5: Data Collection and Sampling
8	Ch6: Probability
9	Ch6: Probability
10	Test 1 at 7:00 PM CST
11	Ch6: Problems
12	Ch6: Problems
13	Ch6: Problems, Ch7: Random Variables and Discrete Probability Distributions
14	Ch7: Random Variables and Discrete Probability Distributions
15	Ch7: Problems
16	Ch8: Problems
17	Test 2 Review
18	Test 2 at 7:00 PM CST
19	Ch9: Sampling Distributions
20	Ch9: Sampling Distributions
21	Ch9: Problems
22	Ch10: Introduction to Estimation
23	Ch10: Introduction to Estimation
24	Ch10: Problems
25	Ch11: Introduction to Hypothesis Testing

26	Ch11: Introduction to Hypothesis Testing
27	Ch11: Problems
28	Ch11: Problems
29	Test 3 Review
30	Test 3 at 7:00 PM CST

Week	Topic	Student learning outcomes	Core curriculum outcomes	Required readings	Discussion	Assignments
1	Linear programming	Students will be able to identify, create and solve linear programming problems	Critical thinking: Students will be able to explain the importance of linear programming. Empirical and Quantitative Skills: Students will be able to use linear programming in real life situations.	Tan, Ch1, 2	How is linear programming used in real life?	Quizzes, Homework and discussion
2	Linear equations	Students will be able to identify, create and solve linear equations	Critical thinking: Students will be able to explain the importance of linear equations. Empirical and Quantitative Skills: Students will be able to use linear equations in real life situations.	Tan, Ch3, 4	How are linear equations developed in real life situations?	Quizzes, Homework and discussion
3	Numerical Descriptive Techniques	Students will be able to analyze data using basic descriptive techniques	Empirical and Quantitative Skills: Students will be able to compute measures of central location, coefficient of determination, coefficient of correlation	Keller, Ch4	What is the best measure of variation to make decisions of consistency	Quizzes, Homework and discussion
4	Data Collection and Sampling	Students will be able to collect data for an empirical study	Empirical and Quantitative Skills: Students will be able to select a data collection approach for given situations	Keller, Ch5	What data collection approach is best suited for a given real life situation?	Quizzes, Homework and discussion
5	Probability	Students will be able to calculate basic probability	Empirical and Quantitative Skills: Students will be able to calculate basic probability Critical thinking: Students will be able to compute and apply basic probability to real life situations	Keller, Ch6	Why is probability important in increasing productivity?	Quizzes, Homework and discussion

6	Random Variables and Discrete Probability Distributions	Students will understand the laws of expected value and marginal probabilities	Empirical and Quantitative Skills: Students will be able to compute and apply marginal probabilities.	Keller, Ch7	How can marginal probabilities be used to make decisions in real life situations	Quizzes, Homework and discussion
7	Continuous Probability Distributions	Students will be able to recognize and use continuous probability distributions	Critical Thinking Skills: students can recognize and apply continuous probability distributions	Keller, Ch8	Where are continuous probability distributions used in real life?	Quizzes, Homework and discussion
8	Sampling Distributions	Students will be able to use a sampling distribution for inference	Empirical and Quantitative Skills: Students make extensive use of sampling distribution for inference	Keller, Ch9	What situations will sampling distributions be used to make decisions in real life?	Quizzes, Homework and discussion
9	Introduction to Estimation	Students will be able to use point and interval estimators	Critical Thinking Skills: Students are able to interpret interval estimators	Keller, Ch10	When are interval estimators the most desired method of analysis?	Quizzes, Homework and discussion
10	Introduction to Hypothesis Testing	Students will be able to identify and compute tests of hypothesis	Critical Thinking Skills: Students are able to set up a test of hypothesis and interpret results, Empirical and Quantitative Skills: Students can compute test statistics	Keller, Ch11	When should a one tailed test be used and why?	Quizzes, Homework and discussion