

MIDDLESEX COUNTY COLLEGE
EDISON, NEW JERSEY

MATHEMATICS DEPARTMENT

Date: November 9, 2009

Course Title: Statistics II

Course No. MAT 124

Class Hours: 3

Laboratory Hours: 0

Credit Hours: 0

Department Head Approval: _____
Maria DeLucia, Ph.D.

Dean Approval: _____
Reginald Luke, Ph.D.

Prerequisite: MAT 123

Textbook of Course:

Author: Allan Bluman

Title: Elementary Statistics: A Step by Step Approach, 7th Edition

Publisher: McGraw Hill

Catalog Course Description:

Continues the study of hypothesis testing, introduces chi-square analysis, analysis of variance, linear regression and correlation, and non-parametric statistics. Familiarizes students with models and methods used in data analysis. Students will plan an experiment and make inferences about a population based upon sample data collected.

Behaviorial Objectives

The student will demonstrate through quizzes, examinations, homework and projects the ability to:

1. interpret the significance level of a hypothesis test
2. perform one sample and two sample tests on large and small samples

3. compute and use a pooled estimate of a parameter
4. determine what constitutes a “large” sample when dealing with averages
5. understand the concept of degrees of freedom
6. use sample statistics to estimate the population parameters with confidence intervals
7. test two variables to determine if they are statistically independent
8. predict the value of a variable from the best fit line
9. use analysis of variance methods to answer questions about population means
10. determine when to use non-parametric tests on data
11. examine specific non-parametric methods
12. collect, organize, analyze, and interpret data collected
13. use effective written and verbal communication skills when gathering and sharing information

COURSE OUTLINE MAT 124

<u>Chapters</u>	<u>Topics</u>	<u>Approximate Number of Weeks</u>
7	Confidence intervals - one population	3
8	Hypothesis Testing - one population	3
9	Inference from Two Samples	3
10	Correlation and Regression	2
11	Multinomial Experiments and Contingency Tables	1
12	Analysis of Variance	1
13	Non-Parametric Statistics	<u>1</u>
Total		14 Weeks

SUGGESTED DAY BY DAY OUTLINE - MAT 124

Please note that some exercises in certain sections of the book make reference to the Excel or Minitab. It is up to you, depending on time, how you use these exercises. It is perfectly acceptable to re-order the topics.

<u>DAY</u>	<u>SECTIONS</u>	<u>COMMENTS</u>
1	Review of MAT 123	Review descriptive statistics, basic graphs (histogram, box plot, stem & leaf, cumulative frequency polygon), normal curve, central limit theorem. Might want to also do assessing normality (section 6-2). Might want to take 2 days reviewing.
2	7 - 1	Confidence interval for the mean when the population standard deviation is known. Sample size required is also to be included.
3	7 - 2	Introduction to T distribution. Confidence intervals for the mean when the population standard deviation is unknown.
4	7 - 3	Confidence interval for proportions. Sample size for proportions.
5	7 - 4	Introduction to Chi-square distribution; confidence intervals for standard deviation and variance.
6	Review	
7	Test 1	Chapter 7 and review material
8	8 - 1	Introduction to hypothesis testing
9	8 - 2	Hypothesis Testing for the mean - population standard deviation is known
10	8 - 3	Hypothesis testing for the mean - population standard deviation is unknown
11	8 - 4	Hypothesis test for proportions
12	8 - 5	Hypothesis test for variances or standard deviations
13	9 - 3	Inferences for 2 means – dependent samples

14	Test 2	Chapter 8
15	9 - 2	Inferences for 2 means - independent samples T test
16	9 - 4	Inference for 2 proportions
17	9 - 5	Inference for 2 variances or standard deviations
18	10 -1	Review of scatter plots, finding coefficient of correlation, if you want to use the TI to obtain results rather than hand calculations, that is acceptable; determining if coefficient of correlation is significant or not
19	10 - 2	Regression equation
20	Test 3	Chapter 9
21	10 - 3	Coefficient of determination, standard error of the estimate, prediction intervals
22	11 - 1	Goodness of fit
23	11 - 2	Contingency tables and tests of independence
24	12 - 1	One way ANOVA; may want to do the shorter formula for equal samples (not in this text book)
25	13 -1	Introduction to non-parametric tests
26	13-2 and 13-3	Sign test and Wilcoxon Rank sum test
27	Review for final	
28	Final exam	

If you find that you have some time at the end and wish to continue with non-parametric statistics, please do so.

Other considerations:

1. The course description states: **Students will plan an experiment and make inferences about a population based upon sample data collected.**

Typically what is done, students are divided into small groups of 4 or 5 students, near the start of the semester. As a group, they decide on two variables that they think might have a relationship. Some common sets are:

1. heights and shoe sizes of one gender

2. heights and weights of one gender
3. distance traveled to MCC and the time it takes
4. number of hours worked per week and the number of hours studied per week
5. number of hours studied per week and GPA

Students individually collect their own data (everyone collects the same number of data pairs - usually 20 to 30) and work with it throughout the semester. To avoid procrastination, usually the projects are completed in a minimum of 2 parts; three parts is better. The following is one way that the parts could be divided; additional work could be required.

Part I

1. descriptive statistics for each variable
2. graphs (histogram and box plot minimum) for each variable
3. scatter plot of data
4. short essay

Part II

1. confidence intervals for each variable - mean and standard deviation
2. hypothesis test using some population value assigned by professor - mean and standard deviation
3. confidence interval for the difference between student's mean and the mean of the student in the group that is furthest away
4. corresponding hypothesis test for #3
5. hypothesis test comparing the student's standard deviation and the standard deviation of the person furthest away

Part III

1. ANOVA
2. complete regression analysis
3. essay

2. Students are paying for a laboratory fee; therefore, when the class meets in the computer lab, the computers should be utilized. Some ways that this can be accomplished:

1. use the internet to download data
2. use the internet to go to various statistics-activity related sites
3. use either Excel, Minitab, Fathom or SPSS (all are installed) to obtain descriptive statistics, graphs, and inferential results; these can be included in the projects to make a more professional presentation