

LAGUARDIA COMMUNITY COLLEGE
CITY UNIVERSITY OF NEW YORK

DEPARTMENT OF MATHEMATICS, ENGINEERING, AND
COMPUTER SCIENCE

MAT 121 - ELEMENTARY STATISTICS II

3 Lecture Hours, 3 Credits

Pre-Requisite: MAT 120

Course Description:

As a sequel to MAT120 (Elementary Statistics I), this course develops the methods of statistical inferences including estimation, hypothesis testing, and making decisions. Among the topics studied are: inferences for one and two population means, inferences for one and two population standard deviations, inferences for one and two population proportions, chi-square procedures, descriptive and inferential methods in linear regression and correlation, and analysis of variance.

Purposes and Goals:

Upon the completion of this course, students should be sufficiently prepared to:

1. Perform basic statistical analysis of real-life data sets.
2. Transfer to four-year colleges and universities and pursue upper division courses and academic programs.
3. Review statistical analyses that involve the statistical procedures and methods that are presented in this course.
4. Communicate statistical ideas and analyses to audiences who may have, little or no knowledge of statistics.

Instructional Objectives:

1. To reinforce the students' basic understanding of the hypothesis testing procedure and theory of Estimation.
2. To provide an extensive examination of hypothesis testing, which will include:
 - Formulation of hypothesis;
 - Determination of decision rules for given significance levels;
 - Testing procedures (use of normal, t-distribution, chi-square distribution, F-distribution);
 - Analysis of Type I and II errors.
3. To introduce the students to regression and correlation analysis.
4. To familiarize the students with one-way analysis of variance method for testing more than two population means.

Performance Objectives:

As a result of successful completion of this course, students should be able to:

1. Make statistical inferences by comparing the means, and proportions of two populations.
2. Perform hypothesis tests and construct confidence intervals for the standard deviation of a normally distributed random variable using the chi-square distribution.
3. Perform hypothesis tests and construct confidence intervals for two population standard deviations based on the F-distribution.
4. Apply the chi-square goodness-of-fit test to make inferences about a distribution of a qualitative variable or discrete quantitative variable that has only finitely many possible values.
5. Apply the chi-square independence test to decide whether two variables of a population are statistically related.
6. Determine the probable form of the relationship between dependent and independent variables and to obtain an equation that can be used for prediction of future values.
7. Determine correlation coefficients for dependent variables and to identify and characterize linear correlation.
8. Apply one-way analysis of variance methods for comparing the means of more than two populations.

Attendance:

Students are expected to attend all class meetings. Students are responsible for all information, material, and assignments covered in class regardless of class attendance. Students should consult the college catalog to find out the terms and conditions under which a WU, and incomplete, or an F grade may be given by an instructor.

Textbooks:

1. *Fundamentals of Statistics*; Third Edition, Michael Sullivan, III; Pearson Prentice Hall (Pearson Education, Inc. Copyright 2011, 2008, 2005)

Course Grading:

Course final grade will be determined in the following manner:

Test #1	15%
Test #2	15%
Test #3	15%
Quizzes /Assignments/Projects	20%
Final Examination	35%

Course Content Outline

Some topics are given in the Student Resource CD that is attached to the back cover of the textbook. The chapters are given in the CD as PDF documents.

The *Writing Assignments (WA)* are given by the instructor.

LESSON	TOPIC	SECTION	PAGE	EXERCISES
1-2	<u>Estimating the Value of a Parameter Using Confidence Intervals</u> (<i>Chapter 9</i>) Confidence Intervals For a Population Proportion Point Estimates, Confidence Intervals and their Interpretations, Determining Sample Size necessary for estimating a population proportion	9.3	436 - 440	Pg 441-443 # 1-7, 19, 20, 22, 24-27,30;
3	Confidence Interval About a Population Standard Deviation: Chi-square distribution, Critical values from a Chi-square distribution, Construct and interpret confidence interval for a population variance and standard deviation	C.2 Student Resource CD	CD-7 – CD-11	CD-12 – CD-13 # 1-9, 11, 12, 15
4	<u>Hypothesis Tests Regarding a Parameter</u> (<i>Chapter 10</i>) The Language of Hypothesis Testing: Null and alternate hypothesis, Type I and Type II errors, Decision and Conclusions, P-value	10.1	455 - 461	Pg 461-462#1, 2, 4, 7-11, 16-18, 24-26, 32-35; WA #2,4 page 9, 10
5-6	Hypothesis Tests For a Population Mean - Population Standard Deviation is Known Classical approach & P-value Methods, Confidence Interval Method	10.2	463 - 475	Pg 476-478# 2, 3, 7, 9, 10-13, 19-22, 24, 29, 30;
7	Hypothesis Tests for a Population Mean – Population Standard Deviation (σ) Unknown) Choosing the Appropriate Distribution; Finding P-Values with a Student t Distribution	10.3	481 - 487	Pg 487-489 # 1-7, 13, 15-18, 23 WA#1, 3, page 9, 10

8	Hypothesis Tests for a Population Proportion Classical approach and P-value approach	10.4	492 – 497	Pg 498-499 # 1, 3-11, 14-16; WA: Project I, II, page 16, 17
9	Hypothesis Tests for a Population Standard Deviation: Critical values, P-value Method and Confidence Interval Method	C.3 Student Resource CD	CD-13 – CD-16	Pg CD-16 – CD-18 # 1-7, 9-12, 18
10-11	<u>Inferences On Two Samples</u> (<i>Chapter 11</i>) Inferences About Two Means: Dependant Samples Hypothesis Tests, Confidence Interval estimator	11.1	508 - 516	Pg 516-519 # 1-10, 11-17 (odds), 18 – 20; WA # 16, page 12, 13, 14
12-13	Inference About Two Means: Independent Samples: Hypothesis Tests, Confidence Interval, Exploring the Data Sets	11.2	521 - 528	Pg 529-530 # 1- 9(odds), 10-13; WA # 17, page 14, 15
14	Test # 1			
15-16	Inferences About Two Population Proportions: Hypothesis Test, Confidence Interval, Determining sample sizes (optional)	11.3	534 – 543 543 - 544	Pg 544-546 # 1-13 (odds), 15 – 17, 19-20, 23, 31-32
17	Comparing Variances in Two Samples: F-distribution, Hypothesis Test, Exploring the Data	Instructor Supplement		WA # 5, page 10
18-19	<u>Describing the Relation Between Two Variables</u> (<i>Chapter 4</i>) Scatter diagram and Correlation Draw and interpret scatter diagrams, Linear Correlation Coefficient r, Properties of r, Compute and interpret r, Determine whether there is a linear relation between two variables	4.1	178 - 187	Pg 188-190 # 1-5, 7, 9-14, 17, 23, 24, 25
20-22	Least-Square Regression: Find the least square regression line, y-intercept and Slope, Prediction with regression equation, Interpreting the Regression equation, Residuals and Least Square	4.2	195 - 203	Pg 204-205 # 1-4, 9, 10, 11-17 (odds), 21, 22

	property			
23-24	Coefficient of Determination: Explained and Unexplained Variation, Coefficient of Determination	4.3	209 - 212	Pg 213-214 # 1-5, 7, 9; WA #10-12, 15, page 12
25	Test # 2			
26-28	Additional Inferential Procedures (<i>Chapter 12</i>) Goodness-of-Fit Test: Finding Expected Frequencies, p-value	12.1	557 - 565	Pg 566-567 # 1-5, 7, 8, 11, 14-16, 19; WA # 6.1, 6.2, 6.3, pg 11
29-31	Tests for Independence and the Homogeneity of Proportions: Test of Independence, p-value, Test of homogeneity of proportions	12.2	570 - 581	Pg 581-5 # 1-3, 5, 8, 11, 12, 14, 15; WA # 7, 8, 9, page 11
32-34	Comparing Three of More Means (One-Way Analysis of Variance) Requirements to perform a one-way ANOVA, Testing three or more means using one-way ANOVA	C.4 Student Resource CD	CD-19 – CD-27	Pg CD-29 – CD-33 # 1-11, 15, 19, 20, 21
35	Test #3			
36	Final Examination Review			
37	Final Examination			