

## PSYC 251 – Advanced Statistics

### I. Course Description

From the Benedictine University Undergraduate/Adult Accelerated Catalog (2003-2004): “ANOVA designs, correlation, regression, nonparametric tests, survey and experimental research techniques, social and behavioral measurements and multivariate analysis. “ Prerequisite: One of MAT-124, MAT-125, PSYC-150 or MGT-150 (2005-2006 On line catalog for Benedictine University). The number of hours for this course is three.

### II. Textbook and Materials

Required text: *Understandable Statistics, Eighth Edition*, by Charles H. Brase and Corrinne P. Brase; Houghton Mifflin Company; Boston, New York; 2006.

Required materials: scientific calculator, graph paper, folder for assignments.

### III. Goals, Objectives, and Student Learning Outcomes

The overriding goal of the course is the utilization of probability and statistics and the application of the material to the real world is the focus of the course. Awareness of that utilization within the world around us will be a focus along with learning how to calculate meaningful statistical numbers for that usage. The outcome will be that the student will have a better awareness of the use and application of statistics in the world around them. For the course, objectives are listed below. For specific sections covered, see the Topical Course Outline with Learning Objectives and Outcomes Section.

#### Course Based Student Learning Objectives

Upon completion of the course, students will be able to demonstrate their mastery of the following learning outcomes

- **Objective one:** Students will be able to identify and explain terminology that is related to statistics and probability in their own words and apply those concepts to real world data and general datasets for effective communication of statistical ideas.
- **Objective two:** The student will learn to interpret and analyze data in order to provide appropriate graphical representations illustrating the underlying dataset.
- **Objective three:** The student will be able to calculate and interpret statistical measures and apply those concepts to data of all types.
- **Objective four:** The student will be able to read and interpret statistical problems and calculate statistical measures appropriate to communication and explanation of the dataset with numbers, graphical representations and words.
- **Objective five:** The student will be able to construct a survey, collect data, research the survey topic and communicate the results in a written document using words, graphical representations and numeric statistical measures appropriate to fully explain the dataset.
- **Objective six:** The student will be able to interpret probabilistic models and apply those concepts to problem solving with probability problems; Communication of those results numerically, graphically and verbally is an overall goal.
- **Objective seven:** The student will be able to interpret when to use statistical distributions when working with datasets and calculate the appropriate statistical measures for that application.

### IV. Teaching Methods

Teaching methods used will vary depending on the material presented. Methods used include: collaborative classroom problem solving, classroom discussion of topics, small group problem solving, computer laboratory assignments where applicable and as time permits, in class problem solving with discussion, writing assignments dealing with statistics, homework assignments with problem solving in probability and statistics, a comprehensive survey assignment with critical analysis of results using the statistics used in the course, individual presentation of work and survey assignment, reflective applications of the material to the real world and future career and short assessment papers on the student's current level of understanding and areas of concern. Lecture will be employed as needed.

### V. Course Requirements

**You should spend approximately 2.5 hours of outside preparation for each hour of class time. This translates to ten hours per week of outside preparation for this class.**

Attendance policy: Attendance is mandatory. If you cannot attend class, it is your responsibility to make up the work missed for classes missed. Additionally, there will be an overall letter grade penalty for those missing greater than 20% of the classes and this will be at the discretion of the instructor.

Homework: Homework will be assigned for each section covered in class. Group projects and writing projects may be assigned for each chapter. The student will also complete chapter definitions to build their knowledge of the terminology used in the field of statistics. The student will need to turn in the homework for chapters tested on the Chapter Test day. If there is a problem with this, please discuss this with me. There will be a late penalty for work turned in after the deadline.

Computer Projects: Projects will be assigned which are designed to be used with Microsoft Excel. There will be time in class to at least begin the project. Projects are due the week after having been assigned. There will be a penalty for work turned in after the deadline.

Critical Thinking Reports: Each week you will analyze an article, advertisement, or commercial in which statistics are used. Try to find examples where statistics are used incorrectly, or contain some fallacy in the logic. Write ½ - 1 page describing your article and your conclusions. You will present your work to the class with a 2-3 minute presentation. Your article should be current, and should have occurred during the week. There will be a penalty for work turned in after the deadline.

Chapter Tests: Chapter tests will be given one week after the chapter has been presented, and are due the next class period. This gives you one full week to complete the test. Tests turned in after the due date will be penalized 10 points for each week that the test is late. If you are absent on the day the test is given out, it is your responsibility to contact the instructor and make arrangements for acquiring the test.

Critical Analysis Survey Assignment: Each student will write a survey and distribute it. This will allow the student to see where their newly gained knowledge can be used in a hands-on environment. In lieu of a final examination, each student will be given problems to solve involving his/her survey.

## VI. Means of Evaluations

Homework	20%
Computer Projects	20%
Critical Thinking Reports	10%
Chapter tests	30%
Critical Analysis Survey	20%

Grading scale:

A:	90% and above
B:	80% - 89%
C:	70% - 79%
D:	60% - 69%
E:	less than 60%

## VII. Topical Course Outline with Learning Objectives and Outcomes:

**Chapter Eight objectives:** The student will need learn to calculate, interpret and illustrate on a Gaussian curve a confidence interval based on varying conditions on the initial assumptions. They will learn to determine the variables needed for calculation and clearly document those assumptions. The student will need learn to vary the margin of error or alpha level and explain the differences. There are five sections in this chapter and the coverage of the sections will vary by semester.

**Chapter Nine objectives:** The student will learn to fully illustrate, document and calculate a hypothesis test including assumptions according to a prescribed step by step method. Full documentation of each step is necessary to promote full understanding of the overall result. The student needs to be able to write up the final result into a paragraph that describes the purpose of the test. Language of statistics is a critical element for full understanding of this method as terminology is utilized throughout the step by step method. This is a necessary and critical part of the Critical Analysis Survey Assignment. There are seven sections in this chapter and coverage of these sections will vary by semester.

**Chapter Ten objectives:** The student will learn to fully illustrate, document and calculate the variables for linear regression and a linear correlation coefficient. The student will learn to interpret, analyze, apply and explain the regression parameters and provide predictions for future results. Graphing of data points will be required. Application of these parameters may be required in the Critical Analysis Survey Assignment. There are five sections in this chapter and coverage of these sections will vary by semester.

**Chapter Eleven objectives:** The student will learn to calculate using a Chi-Square distribution and the situations when that distribution applies. The student will also calculate using One Way and Two Way ANOVA and to determine when these apply. There are six sections in this chapter and the sections will be covered as time permits.

**Chapter Twelve objectives:** The student will learn to calculate using nonparametric statistics including Sign Test for Matched Pairs, The Rank Sum Test and Spearman Rank Correlation. There are three sections in this chapter and sections will be covered as time permits.

**Plagiarism:** Plagiarism simply stated is utilizing the ideas or work of another and claiming them as your own. In the academic and professional realm, this is not a very ethical action. Give credit where credit is due. If a student is caught plagiarizing, the student will be asked by the instructor regarding the work provided. The student will be given the opportunity to resubmit the assignment if the student believes that this was an error or misunderstanding. If this happens again with the same student, the student will receive a zero on that assignment and no recourse will be available.

## VIII. Americans with Disabilities ACT (ADA)

Benedictine University provides individuals with disabilities reasonable accommodations to participate in educational programs, activities, and services. Students with disabilities requiring accommodations to participate in class activities or meet course requirements should contact the Director of the Resource Center as early as possible.

## IX. Assessment: Classroom Assessment Techniques

Goals, objectives, and learning outcomes that will be assessed in the class are stated in this syllabus. Instructor will use Assignment Assessments, where, at the beginning of each class session, the students are asked to assess the assignment, and Minute Paper, where the students are asked at the end of each class to spend one minute to write down what was the most memorable or difficult topic from the day's class. The purpose of these classroom assessment techniques is to provide continuous improvement of instruction. Students are required to take part in all assessment measures.

## X. Office Hours

Tuesday and Thursday: 9:00 am – 10:30 am and 2:30 pm – 4:00 pm. Available other times by appointment.