

## **PSYC 150: STATISTICS I**

### **I. Course Description**

From the Benedictine University/Springfield College in Illinois Academic Catalog: "Basic course in statistical technique; includes measures of central tendency, variability, probability theory, sampling, estimation and hypothesis testing. For Business Majors." (2004-2005 General Catalogue No. 60, p. 71) 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, 3.25" floppy disk or flash drive for saving computer work.

### **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.

#### **A: Goals**

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 overall course outcome will be that the student will have a better awareness of the use and application of statistics in the world around them.

**B: Objectives:** Springfield College is committed to preparing students for a life of learning, leadership and service in a diverse world. As a result of the College's Associate Degree Programs, graduates will develop:

#### Content Knowledge (Lifelong Learning)

- **CK-1** Know and apply the central concepts of the subject matter
- **CK-2** Use current research to support assumptions and beliefs
- **CK-3** Use technology to enhance learning

#### Communications Skills (Lifelong Learning and Leadership)

- **CS-1** Communicate effectively in oral and written forms

#### Problem-Solving Skills (Lifelong Learning and Leadership)

- **PS-1** Use inquiry and collaboration to solve problems
- **PS-2** Seek information and develop an in-depth knowledge base, grounded in Research on Teaching
- **PS-3** Use self-reflection to enhance personal growth and understanding of content

#### Social Responsibility (Service and Leadership)

- **SR-1** Evaluate how choices and actions affect others
- **SR-2** Make ethical and informed decisions
- **SR-3** Develop good citizenship

#### Global Perspectives (Diversity)

- **GP-1** Recognize the importance of diversity of opinion, abilities and cultures

#### Self Direction and Personal Growth (Lifelong Learning)

- **SD-1** Develop a sense of intellectual curiosity

#### **C: Course Based Student Learning Objectives.**

Upon completion of the course, students will be able to demonstrate their mastery of the following learning outcomes, addressing the following CLSO's (in parenthesis)

- **CBSLO-1:** 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. (CK-1, CS-1, PS-3, SD-1)
- **CBSLO-2:** The student will learn to interpret and analyze data in order to provide appropriate graphical representations illustrating the underlying dataset. (CK-1, CK-2, CS-1, PS-1, PS-3, SD-1)
- **CBSLO-3:** The student will be able to calculate and interpret statistical measures and apply those concepts to data of all types. (CK-1, CK-2, CK-3, PS-1, PS-2, PS-3, SD-1)
- **CBSLO-4:** 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. (CK-1, CK-3, CS-1, PS-1, PS-2, PS-3, SD-1)
- **CBSLO-5:** 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. (CK-1, CK-2, CK-3, CS-1, PS-1, PS-2, PS-3, SD-1)
- **CBSLO-6:** 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. (CK-1, CK-3, CS-1, PS-1, PS-3, SR-1, GP-1, SD-1)
- **CBSLO-7:** 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. (CK-1, CK-3, CS-1, PS-1, PS-3, SD-1)

#### 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 assigned/due. 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 chapter covered in class. Homework is due with the chapter test. 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.

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.

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 Analysis Survey Assignment: Each student will write a survey and distribute it. The student will then write up the survey results using statistics, present the results in class and turn that paper in for a final grade. This will allow the student to see where their newly gained knowledge can be used in a hands-on environment. **There will be a full letter grade penalty for late projects.**

Final exam: The final exam will be comprehensive. A review sheet will be provided prior to the exam.

#### VI. Means of Evaluations

Homework	10%
Computer Projects	10%
Writing projects	10%
Chapter tests	30%
Critical Analysis Survey	20%
Comprehensive Final	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 One objectives:** The student will learn to classify data in terms of the language of statistics and will learn to describe simple random sampling, systematic sampling, cluster sampling and stratified sampling and provide examples for these items. Language from this section is critical to further understanding of the future materials in this course. There are three sections included in this chapter.

**Chapter Two objectives:** The student will learn to group data into tables and construct graphs from those tables. More specifically, the student will learn to create and interpret a histogram, pie chart, line graphs, a stem and leaf diagram and other miscellaneous graphs. The student will want to be able to identify patterns in these graphs for use in their Critical Analysis Survey Assignment. Graphing is a critical skill to statistics. Graphing will also be presented in computer laboratory assignments as time permits. There are three sections in this chapter.

**Chapter Three objectives:** The student will need to be able to fully illustrate, calculate, interpret and explain calculations for mean, median, mode and standard deviation for all types of data sets provided. In this section this includes individual data points and grouped data. Students will also learn to illustrate and calculate inter-quartile ranges and provide a Box and Whiskers plot illustrating these derivations. Assignments will also be presented in the computer laboratory assignments as time permits to simplify calculations. There are four sections in this chapter.

**Chapter Four objectives:** The student will need to apply the rules of probability of a discrete sample space to determine the likelihood of an event. The student will need to know the difference between discrete and continuous data sets and what it means to be a sample space. Independence and dependence of the sample space will need to be identified. Language for the chapter is critical for full understanding. Participatory experiments will be performed in class during this chapter which makes attendance during this section critical. There are three sections in this chapter though lectures will not depend on the text due to the presentation the text provides.

**Chapter Five objectives:** The student will learn to determine a sample space for a given binomial experiment and determine the probability of any given event in the sample space and fully illustrate and calculate the mean and standard deviations for this type of experiment. The student will need to be able to classify experiments as to whether they are of a binomial nature or not. Graphing of histograms is a critical skill to success in this chapter as well as language. Only three sections of this chapter will be covered.

**Chapter Six objectives:** The student will learn to distinguish between discrete and continuous data sets. The student will learn to construct a Gaussian curve and illustrate the probability of a normally distributed variable on that curve. The student will learn to know the properties of the Gaussian curve and illustrate the Empirical Rule on a Gaussian curve. The student will need learn to fully illustrate and calculate z-scores and find the area under the curves associated with those scores within the Normal Curve Tables provided in the textbook. The student will learn when to utilize the Gaussian curve and the z-score. Language and graphing skills are critical to student success. This chapter contains four sections.

**Chapter Seven objectives:** The student will need learn to state and apply the Central Limit Theorem and determine which type of sampling distribution applies to the dataset. Calculation and fully illustration of method for sample means and standard deviations and graphing using the appropriate mode will be skills the student will need to demonstrate. There are three sections in this chapter but coverage of the sections will vary by semester.

**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.

**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 instructor 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 a 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 4:30 pm – 6:00 pm. Available other times by appointment.