PBIS 189: Problem-Based Inquiry Seminar - Statistics (3 credits)
Spring 2020

Instructor: Dr. John Beam
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Office Hours: Mon 5:00-6:00
Tue 1:00-2:00
Wed 5:00-6:00
Thur 3:00-4:00
Also by Appointment

Course Meeting Times: Sect 003C: Tue, Thur 9:40-11:10 (Swart 240)
Sect 004C: Tue, Thur 11:30-1:00 (Swart 240)

Prerequisites: A grade of C or better in Math 103 or placement into a higher numbered course is required.

Textbook: *Workshop Statistics: Discovery with Data* (4th edition) by Rossman & Chance

Technology: In class we will use a variety of tools for calculations and data display, such as applets from the textbook authors' website, Microsoft Excel, and the TI-84 Plus calculator. You should have a calculator to use for homework and quizzes; I recommend either the TI-83 Plus, TI-84, or TI-84 Plus. I will not allow the use of cell phones during quizzes.

Instructional Format: This course being a *problem-based inquiry seminar*, it will be centered around interactive problem solving as opposed to straight lectures. You are expected to be engaged in the process of mathematical and statistical inquiry. You will be asked to investigate, question, conjecture, reason, analyze and communicate. Although I will present some of the material in the course, many of the ideas will be student generated, involving cooperative group work and class discussions.

Course Description (from the Undergraduate Bulletin): Descriptive statistics/elementary probability/basic problems of statistical inference: estimation, confidence intervals, hypothesis testing, regression and correlation.

Learning Outcomes for PBIS 189 (developed by the Mathematics Department): This course focuses on critical thinking and active learning. Students will be engaged in problem solving and will come to understand that a "problem" is a situation that is unfamiliar and one for which a solution is not immediately evident. Being stuck is a natural state of problem solving and an essential part of improving thinking. PBIS courses offer the opportunity to develop the ability to

distinguish problem solving and critical thinking from exercises and routine thinking and to identify attitudes and beliefs that are conducive to success in challenging situations (and those which are not). The intent is to provide a strong intellectual experience that will enhance the university experience and form a solid base for life-long learning.

Upon successful completion of the course, students are expected to have the ability to:

- Identify and classify variables, identify research questions in a study.
- Construct and interpret bar graphs and dot plots
- Identify confounding variables and identify sampling biases in observational studies.
- Explain and implement a random sampling scheme, and understand random assignment.
- Produce and interpret two-way tables from categorical data.
- Produce and interpret stemplots and histograms from quantitative data.
- Calculate and interpret measures of center and spread.
- Understand basic probability concepts such as sample space, and empirical estimates.
- Explain and calculate probabilities from normal distributions.
- Understand and describe the principle of sampling variability.
- Perform simulation analyses to understand the sampling distribution of the mean.
- Perform and interpret calculations based on the Central Limit Theorem.
- Calculate and interpret a confidence interval for a population proportion.
- Explain the reasoning and perform the calculations for a test of significance for a population proportion.
- Calculate and interpret a confidence interval for a population mean.
- Explain the reasoning and perform the calculations for a test of significance for a population mean.
- Conduct all aspects of a t-test of significance for a population mean.

The University Studies Program and Liberal Arts Education: At UW Oshkosh, the foundation to your learning is a liberal arts education. In this sense, "liberal" means "broad", and "arts" means "skills", so that someone educated in the liberal arts is able to think critically and make connections to a variety of disciplines and fields. A liberal arts education empowers individuals and prepares them to deal with complexity, diversity, and change. It provides students with a broad knowledge of the wider world (e.g. science, culture, and society) as well as in-depth study in a specific area of interest. The field of statistics is vital to a liberal arts education, as data is collected and analyzed in virtually every discipline.

The University Studies Program (USP) provides students with an assessable, common intellectual experience that also embraces the traditional breadth of a liberal arts education. PBIS 189 is part of the USP, in the Nature category of the Explore component of the program. The ability to analyze, break down and solve a mathematical problem and then to apply the knowledge and skills thus gained is an essential part of what the USP and in turn a liberal arts education aim to achieve.

Course Grades

Attendance and Participation: Your individual contributions -- your attendance and active participation during class activities and discussions -- are critical to our collective experience as a class, and will account for 10% of your course grade.

Homework: I will assign reading and problems to work on prior to most class meetings. At the beginning of each class, I will collect your written homework that I assigned for that day. I will look it over for evidence that you gave the assignment a good effort (but not for "correctness" of your solutions). These homework assignments will account for 20% of your course grade.

Quizzes: Five quizzes, each worth 14% of your course grade, are tentatively scheduled as follows:

Quiz 1: Thursday, February 20
Quiz 2: Thursday, March 12
Quiz 3: Thursday, April 9
Quiz 4: Thursday, April 23
Quiz 5: Thursday, May 14

Summary:

10%	Attendance and participation
20%	Homework
70%	Five Quizzes

Grading Scale: Course grades will be assigned according to the following approximate cutoffs:

	Grade -	Grade	Grade +
A	90%	93%	
B	80%	83%	87%
C		70%	77%
D		60%	67%
F		below 60%	

Early Alert: The registrar's office will send an e-mail to students approximately five weeks into the course, reporting on academic performance and attendance up to that point.

Academic Policies

You are expected to behave with integrity and honor. The official UWO policy regarding academic misconduct can be found at:
https://uwosh.edu/deanofstudents/student-conduct/academic-misconduct/

Students are advised to see the following URL for disclosures about essential consumer protection items required by the Students Right to Know Act of 1990:
https://uwosh.edu/financialaid/resources/consumer-information/

It is the policy and practice of UW Oshkosh to create inclusive learning environments. If there are aspects of the instruction or design of this course that result in barriers to your inclusion, please notify me as soon as possible. You are also welcome to contact Services for Students with Disabilities at 920-424-3100 or accessibilitycenter@uwosh.edu. For more information, visit the Services for Students with Disabilities website at:
http://www.uwosh.edu/deanofstudents/disability-services