

Statistics – PBIS 189 - Spring 2020

67-189-005

MWF

12:40 – 1:40 PM

Swart 102

Prerequisite: Mathematics 103, with a grade of C or better, or placement.

Statistics – the study of data. We generate data by our purchases, our Internet browsing, our clicks in web pages. Soon we will see political polls. Statistics helps us to make sense of the data we are inundated with on a daily basis. Statistics helps us to not only gather data, but also to display that data, and to analyze that data. Since data arises from many sources, applications of statistics show up in almost every field of study, including the social sciences, health sciences, business and economics, and environmental sciences. In this course, we will explore statistics by examining its basic ideas and techniques.

Catalog Description: Descriptive statistics/elementary probability/basic problems of statistical inference: estimation, confidence intervals, hypothesis testing, regression and correlation.

Course Description: PBIS 189 is an Explore Math (XM) course within the Nature category for the University Studies Program (USP). It is designed to bring the excitement of contemporary mathematical ideas to the nonspecialist and to help develop the ability to problem solve and to reason mathematically. It is a general education course intended for students whose major program does not require algebra or calculus.

PBIS 189 is also a Problem based Inquiry Seminar. The class will engage in active problem solving. Some class time will be spent on lecture to introduce necessary background concepts, however, a significant part of class time will be spent on actual problem solving, both individually and in groups, and in presenting solutions to problems.

PBIS 189 will provide you with transferable skills that will serve you well in whatever field of study you pursue. We will investigate topics such as: data distributions, sampling methods, experimental design, summarizing data (i.e. “descriptive statistics”), basic probability, normal distributions, sampling distributions, and the Central Limit Theorem, confidence intervals, and the essentials of hypothesis testing. Some of these may be unfamiliar to you. Do not worry! The course material is accessible to anyone with an active curiosity, a willingness to work hard, and a background in basic algebra.

Learning Objective: This course focuses on critical thinking and active learning. Students 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. 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.

Liberal Arts Education: PBIS 189 is part of the University Studies Program (USP) as an EXPLORE course in the NATURE category. The Explore classes are designed to provide a solid foundation for the rest of your education here, no matter your chosen field of study. For further information, visit the University Studies Program website at uwosh.edu/usp.

Liberal Arts Education empowers individuals and prepares them to deal with complexity, diversity, and change. It provides students with broad knowledge of the wider world (e.g. – science, culture, and society) as well as in-depth study in a specific area of interest. A liberal education helps students develop a sense of social responsibility, as well as strong and transferable intellectual and practical skills such as communication, analytical and problem solving skills, and a demonstrated ability to apply knowledge and skills in real world settings.

Someone educated in the Liberal arts is a responsible member of society, is engaged in the community, and is able to understand the issues of the day. They are problem solvers, and have learned *how* to learn new skills and knowledge. Specifically, the field of Statistics is crucial to a Liberal Arts education, as data is collected and analyzed in a variety of careers. Being able to gather, analyze, and draw conclusions from data is a crucial component of an educated member of a global society.

Instructor: Michael (Mike) Skowronski
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Office Hours: M: 10:20 – 11:20
 T: 1:50 – 2:50
 W: 10:20 – 11:20
 R: 3:00 – 4:00
 F: 10:20 – 11:20
Others by appointment.

Text: *Workshop Statistics*, 4th Edition, by Allan J. Rossman and Beth Chance. **Please bring to class every day.**

Calculator: TI-83, TI-83 Plus, or TI-84 Plus graphing calculator by Texas Instruments is **required**. Bring your calculator to class every day. Other graphing calculators may cause you difficulty as I may be unable to accommodate you.

Course Topics:

UNIT 1 Collecting data and Drawing Conclusions

- TOPIC 1 Data and Variables
- TOPIC 2 Data and Distributions
- TOPIC 3 Drawing Conclusions from Studies
- TOPIC 4 Random Sampling
- TOPIC 5 Designing Experiments

UNIT 2 Summarizing Data

- TOPIC 6 Two-Way Tables
- TOPIC 7 Displaying and Describing Distributions
- TOPIC 8 Measures of Center
- TOPIC 9 Measures of Spread
- TOPIC 10 More Summary Measures and Graphs

UNIT 3 Randomness in Data

- TOPIC 11 Probability
- TOPIC 12 Normal Distributions
- TOPIC 13 Sampling Distributions: Proportions
- TOPIC 14 Sampling Distributions: Means
- TOPIC 15 Central Limit Theorem and Statistical Inference

UNIT 4 Inference from Data: Principles

- TOPIC 16 Confidence Intervals: Proportions
- TOPIC 17 Tests of Significance: Proportions
- TOPIC 18 More Inference Considerations
- TOPIC 19 Confidence Intervals: Means
- TOPIC 20 Tests of Significance: Means

UNIT 5 Inference from Data: Comparisons

- TOPIC 21 Comparing Two Proportions
- TOPIC 22 Comparing Two Means
- TOPIC 23 Analyzing Paired Data

Grading Scale:	A:	93 – 100	A-:	90 – 92
	B+:	87 – 89	B:	83 – 86
	B-:	80 – 82	C+:	77 – 79
	C:	70 – 76	D:	60 – 69
	F:	Below 60		

Grading:	Exams (3)	75% (25% each)
	Homework	15%
	In-Class	10%

Exams:	Exam 1:	FRIDAY, MARCH 6
	Exam 2:	WEDNESDAY, APRIL 8
	Exam 3:	WEDNESDAY, MAY 13

Attendance:

It is important to attend class regularly. It is your responsibility to obtain the notes when you were absent. If you know of an absence in advance, please contact me as soon as possible. **If the reason for your absence cannot be documented or excused, you will receive a grade of zero for any quiz or activity that is missed.**

Homework:

Homework will be assigned for the purpose of class discussion and for collection to be graded. I may also assign some for practice and provide answers as needed. **If you miss class it is your responsibility to find out if any homework was assigned.**

“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/consumer-information/>

ACCOMMODATIONS FOR DISABILITIES:

It is the University’s policy to provide, on a flexible and individual basis, reasonable accommodations to students who have documented disabilities that may affect their ability to participate in course activities or to meet course requirements. Students with disabilities must be registered with Services for Students with Disabilities or Project Success and receive an Accommodation Recommendation form to receive accommodations. Services for Students with Disabilities are located in 125 Dempsey Hall.

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 dean1@uwosh.edu. For more information, visit the Services for Students with Disabilities website at <http://www.uwosh.edu/deanofstudents/disability-services>.

ACADEMIC MISCONDUCT:

As a UW Oshkosh student, it is your responsibility to be informed about what constitutes academic misconduct, how to avoid it and what happens if you decide to engage in it.

Examples of academic misconduct include (but are not limited to):

- plagiarism (turning in work of another person and not giving them credit),
- stealing an exam or course materials,
- copying another student's homework, paper, exam
- cheating on an exam (copying from another student, turning in an exam for re-grading after making changes, working on an exam after the designated time allowance)
- falsifying academic documents

<https://www.uwosh.edu/deanofstudents/university-policies-procedures/academic-misconduct>

Resources for Success:

Office Hours: See this syllabus. I am available at other times. **Just ask!**

Early Alert: Early Alert is a program that provides you with an early report of your progress in classes. I participate in this. For the spring semester, Early Alert begins March 4th and concludes on March 8th. Early Alert will identify if you have issues with academic performance and / or attendance issues. An email will be sent to you identifying resources and steps you can take to help you improve. I post grades on Canvas so you can monitor your course progress. I believe you can set up with Canvas to receive alerts when grades are posted. You will receive an email during the 5th week of classes. I choose to send an email even if you have no academic or attendance issues. Please read this email carefully.

Writing Center: The Writing center helps students of all ability levels improve their writing. Trained peer consultants help writers understand and assignment, envision possibilities for a draft, and improve their writing process. They even help writers learn to identify their own proofreading errors. Students can make a free appointment or drop in to see whether a consultant is available. For more information, visit their website (www.uwosh.edu/wcenter), call 920-424-1152, email wcenter@uwosh.edu, or visit them in Suite 102 of the Student Success Center.

Reading Study Center: The Reading Study Center is an all University service whose mission is to facilitate the development of efficient college-level learning strategies in students of all abilities. The center offers strategies for improved textbook study, time management, note taking, test preparation, and test taking. For more information, email readingstudy@uwosh.edu, view the website (www.uwosh.edu/readingstudycenter), or visit them in Nursing Ed Room 201, or call 920-424-1031.

Polk Library/Information Literacy: Polk Library offers many professional librarians who can help you find library resources for your research. Specifically, Ted Mulvey, the Information Literacy Librarian, is available to assist you as you access, evaluate, and use information in USP classes. Phone: 920-424-7329, email: mulvey@uwosh.edu. You may also set up a research advisory session with a librarian at: rap@uwosh.edu.

Center for Academic Resources: The Center for Academic Resources (CAR) provides free, confidential tutoring for students in many undergraduate classes on campus. CAR is located in the located in the Student Success Center, Suite 102. Check out the Tutor List page at www.uwosh.edu/car for a list of tutors. If your course is not listed, click on a link to request one, stop by SSC 102, or call 920-424-2290. To schedule a tutoring session, simply email the tutor, let him/her know what class you are seeking assistance in, and schedule a time to meet.

FINAL REMARKS:

I look forward to meeting and working with all of you. I encourage you to work with one another and to utilize all the **FREE** resources available to you (CAR, my office hours, and each other). I also suggest that you check your email and Canvas periodically as I use these resources to post announcements and to record grades.

Please be patient as this is my first time teaching PBIS 189. I have taught statistics (MATH 201) in the past and am actually teaching two sections this semester, so the concepts will not be difficult. It will take me a couple of weeks to get into a routine and a balance between lecture and small group activities.

I intend to treat all of you fairly and with respect. You need to do the same. All smart phones should be in silent mode or off while class is in session. If your phone needs to be kept on for an emergency, then please leave the room to respond.

DO NOT hesitate to schedule an appointment if my office hours conflict with your availability.

I live very close to the University and usually come in on days off or well before my first class. Feel free to stop by, or email if you have any concerns.

I have met students in the evening and on weekends in my office or Reeve Union if they had to miss class for a family emergency, illness, or a University commitment. If you are reluctant to ask questions in class you can send an email or stop by my office asking me to solve a specific problem at the beginning of class. **Your success is my top priority!**