PBIS 189: Spring 2020
Statistics in the Modern World
Introduction to Statistics (XM)

PBIS 189-001	8:00 – 9:00	MWF	Swart 203
PBIS 189-002	9:10 – 10:10	MWF	Swart 203

We live in a complex world awash in data of all types, from political polls to consumer surveys to medical studies. It is challenging to make sense of all of the information with which we are bombarded daily, but having an understanding of the practice of statistics can help. Statistics is the discipline that focuses on analyzing data and making decisions based upon data. Good statisticians understand how to properly collect, organize, analyze, and interpret numerical information that comes from data. Because data can arise from so many different sources, applications of statistics show up in almost every field of study, including environmental sciences, business and economics, social sciences, and health sciences. In this course, we will explore the world of statistics, by examining the basic ideas and techniques of this discipline.

Contact Information

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Office Hours: *See https://www.uwosh.edu/faculty_staff/szydliks/schedule.shtml*.

Course Materials

Text: *Workshop Statistics: Discovery with Data, 4th Edition* (2012*),* by Allan Rossman and Beth Chance. We'll use this book for many of our class activities, so bring it to class every day!

Technology: We will use the TI-84 calculator in class (generally speaking, the TI-83 Plus should be adequate as well). We'll use online applets to help us to understand statistical concepts, and we'll work a little bit with spreadsheets (MS-Excel or Google Sheets) for statistical calculations with larger data sets.

Canvas: I will use the Canvas content management system to provide information on class materials and activities: news updates, assignments, brief descriptions of class activities, handouts, and study guides. You can find links to course policies and other administrative information (especially the syllabus) on Canvas as well.

USP Explore Course Overview

PBIS 189 is an Explore course for the University Studies Program (USP). The Explore classes are designed to provide a solid foundation for the rest of your education here, no matter which major you choose.

At UW Oshkosh, the foundation to your learning is a liberal arts education. **Liberal Education** is an approach to learning that 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.

In this Explore course, you will have the opportunity to further investigate one of the Signature Questions that are the focus of your Quest courses. These three "Signature Questions" are central to a UW Oshkosh education:

- How do people understand and engage in community life?
- How do people understand and create a more sustainable world?
- How do people understand and bridge cultural differences?

Our Signature Question: *How do people understand and engage in community life?*

Civic knowledge consists of an awareness and understanding of the various political and social processes that impact the nature and quality of life in local, state, national, or global communities. It also encompasses the cultivation of skills which may be useful in public life, like effective communication and ethical reasoning. Civic engagement means having an appreciation for and applying the values gained from civic knowledge in real world settings, directed at improving the quality of life in the communities of which one is a part. Civic knowledge and civic engagement emphasize learning, reflection, and action in order to create better communities.

PBIS 189 is an "Explore Math" (XM) course within the Nature category of 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. This means that it will be an active, problem-solving class. Some class time will be spent on lecture over necessary background material, but a substantial amount of class time will be spent on actual problem-solving, both individually and in groups, and in presenting solutions to problems.

PBIS 189 will broaden your understanding of the world and equip you with transferable skills especially given our emphasis on problem solving. We will investigate a range of mathematical and statistical topics, including 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.. Many of these topics may be completely new to you. Nevertheless, the course material will be accessible to anyone with an active curiosity, a willingness to work hard, and a decent background in basic algebra.

Specific Course Learning Objectives

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.
- Perform and interpret calculations involving confidence intervals.
- Demonstrate an understanding of the basics of hypothesis testing.

What else will you get from this course?

PBIS 189 is a mathematics course, and you can expect that you will be exposed to many new mathematical and statistical ideas this semester. When you finish the course, I expect you to understand this content. However, from a broader perspective, I also expect you to gain a better understanding of what statistics is *about* and what the practice of statistics is about. With this in mind, broader course objectives for PBIS 189 include:

- Understanding how statistics can be used to collect, organize, analyze, and interpret numerical information that comes from data.
- Cultivating your expertise in critical thinking, abstract reasoning, problem solving and creativity.
- Deepening your understanding of what it means to "think statistically," and becoming more effective at it.
- Gaining a better understanding of what makes a sound mathematical argument, and strengthening your ability to make such an argument.
- Developing skills associated with the scientific method, including rational inquiry, data collection, analysis, theory formulation, and hypothesis testing.
- Continuing to develop effective written and oral communication skills.

Note that most of our course objectives involve developing intellectual resources that form the heart of a liberal arts education. None of these objectives will be easily met, and in fact, some require a lifetime to master. Nevertheless, I expect you to make great strides this semester towards achieving them!

As a Quest I course, PBIS 189 also has course objectives related to our signature question on Civic Learning. There are many ways to approach this signature question; we will focus on the social construct of knowledge. With that in mind, course objectives related to Civic Learning include the following:

- Recognition that knowledge is dynamic, changing, and consistently re- evaluated.
- Developing adeptness at critical thinking, conflict resolution, and cooperative methods
- Developing skills in deliberation, dialogue, and community building

Assignments and Grading

Exams: There are 3 evening exams in the course, held in **Swart 217** from 6:00--9:00 pm on the following dates:

- Thursday, March 5
- Tuesday, April 14
- Thursday, May 14

Arrangements for conflicts due to **University sponsored activities** must be made at least one week in advance.

Attendance: Attendance in this course is required, and will compose 5% of your grade. You will be allowed 2 absences without penalty. For each subsequent absence, you will lose one-half of a percentage point from your attendance grade. Note: arriving late to class or leaving early counts as one-half of a miss. You are expected to be active participants in class every day.

Quizzes: There will be weekly quizzes on the course material. Missed quizzes cannot be made up, though the lowest quiz/homework grade will be dropped at the end of the semester.

Homework: Extensive homework will be assigned, and I will collect some, but not all, of it. I will post solutions to selected problems on the Canvas platform.

Course Grades

Grade Weights

3 evening exams (22% each)	66%
Quizzes, homework, and other class assignments	29%
Attendance	5%
Total	**100%**

Grading Scale

	Grade-	Grade	Grade+
A	90%	93%	
B	80%	83%	88%
C	70%	73%	78%
D	60%	63%	68%
F	0%		

Please contact Steve if you have any questions about your current grade in the course.

On Class Participation

PBIS 189 is a Problem Based Inquiry Seminar. Much of the course will be spent on processes rather than skills or answers and our approach will be intuitive and investigative. Throughout the course, I expect you to be intensely involved in the process of mathematical enquiry, including investigation, questioning, conjecturing, reasoning, and making mathematical arguments. Speaking or asking questions during discussions can be nerve-racking, and fear of making a foolish comment might sometimes make you feel inhibited to the point of nonparticipation. Please do not feel that you have to speak in order to gain my approval or to show me that you are a diligent student. It is acceptable to say nothing in a class session and there will be no presumption of failure on your part in such situations. *I do not equate silence with mental inertia.* When you have an insight on a topic, a question, a clarification, or even the germ of an idea, I want you to offer your contributions to the class, but I don't want you to do this just for the sake of appearances. In some cases, we might have prolonged periods of silence that might or might not be broken, and we should feel comfortable with that. When you feel like saying something, just speak up.

Resources for Success

Office Hours: My current schedule of office hours can be found at *https://www.uwosh.edu/faculty_staff/szydliks/schedule.shtml*. I am available at other times as well. Just ask!

Early Alert: Your development through the class is important to me, and I will provide you with regular feedback through homework, quizzes, and classroom discussions. Early Alert is a program that provides you with an early report on your performance in the class. Early Alert will indicate if you have academic performance or attendance issues and specific steps you can take and resources available to help you improve. It is common for students to be unaware of or over-estimate their academic performance in classes so this will help you be aware early on of your progress and provide strategies for success in the classroom. You will receive an email during the 5th week of classes. It is important to read the entire email carefully.

Writing Center: The Writing Center helps students of all ability levels improve their writing. Trained peer consultants help writers understand an 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 stop by to see whether a consultant is available. For more information, view their website (*https://www.uwosh.edu/wcenter*), call 920-424-1152, email *wcenter@uwosh.edu*, or visit them in Suite 102 of the Student Success Center.

Polk Library: The campus 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 University Studies Program classes. Phone: 920-424-7329; email: mulveyt@uwosh.edu. You may also set up a research advisory session with a librarian at: rap@uwosh.edu.

CAR: The Center for Academic Resources (CAR) provides free, confidential tutoring for students in most undergraduate classes on campus. CAR is located in the Student Success Center, Suite 102. Check the Tutor List page on CAR's website (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 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.

Other Course Policies

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

Drop Deadline: The last day to drop the course is Wednesday, March 18, 2020. Late withdrawals are typically approved only when there are extenuating circumstances beyond your control which occur after the drop date. If at any point you are concerned about your progress in the class, please contact me.

Collaboration: You and your colleagues in PBIS 189 are a *learning community*. You should support each other's intellectual development by forming study groups, by meeting with each other outside of class, and by solving problems together. I encourage collaboration! Copying, however, is not acceptable. Unless otherwise indicated on an assignment, you should feel free to discuss any of the problems in the class with any other student within this learning community. Talk about the ideas, ask questions, explain your thinking processes, and challenge each other. However (unless otherwise instructed) you should write up any problem solutions on your own. They should ultimately be your work and your solution to the problems, not someone else's.

Cell Phones: Though they are very useful tools, cell phones can also be a distraction in the classroom. If you find it necessary to use the phone for non course-related activities (e.g. sending or receiving texts or calls), please leave the classroom, so as to minimize disruption to the classroom environment. Out of respect for your colleagues, do not make phone calls, listen to music, watch videos, or text within the classroom environment.

The Fine Print

PBIS 189 Catalog Description: Descriptive statistics/elementary probability/basic problems of statistical inference: estimation, confidence intervals, hypothesis testing, regression and correlation.

Accommodations: The University of Wisconsin Oshkosh supports the right of all enrolled students to a full and equal educational opportunity. It is the University's policy to provide reasonable accommodations to students who have documented disabilities that may affect their ability to participate in course activities or to meet course requirements. Students are expected to inform instructors of the need for accommodations as soon as possible by presenting an Accommodation Plan from either the Accessibility Center, Project Success, or both. Reasonable accommodations for students with disabilities is a shared Instructor and student responsibility.

The Accessibility Center is part of the Dean of Students Office and is located in 125 Dempsey Hall. For more information, email accessibilitycenter@uwosh.edu, call 920-424-3100, or visit the Accessibility Center Website at https://uwosh.edu/deanofstudents/accessibility-center/.

Academic Integrity: From the University of Wisconsin System disciplinary code (Section 14.01):

> *Students are responsible for the honest completion and representation of their work, for the appropriate citation of sources, and for respect of others' academic endeavors.*

Examples of academic misconduct include submitting others' work as your own, copying on an exam, using unapproved resources on assignments, and intentionally assisting another student in any of these activities.

You can always ask questions about academic dishonesty and how to avoid it; you may not commit it. Plagiarism and other forms of cheating may lead to failing grades on assignments assignment or the entire course. Details on university academic dishonesty policies can be found at https://uwosh.edu/deanofstudents/student-conduct/academic-misconduct/.

Disclosure: In the event of disruption of normal classroom activities due to events external to the usual operation of the course, information pertaining to the completion of this course will be given. It is possible that the format for this course may be modified to enable completion of the course. In that event, you will be provided an addendum to the course syllabus.

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/.