Math 261: Statistics for the Classroom

Course Syllabus for MATH 261.001, Spring 2014 at Boise State University

I. COURSE INFORMATION

Instructor:	Joe Champion, Ph.D.
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Office location:	Math Building Room 233D
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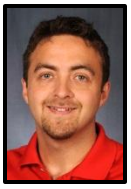
Office Hours for Students:	TBD & by appointment
Meeting place:	Math Building Room 107
Meeting times:	Tues & Thurs 12-1:15 p.m.



II. COURSE DESCRIPTION

This course addresses the statistical processes of formulating questions, collecting and analyzing data, and interpreting results. Through activities and projects, students will use 21st century statistical methods while learning about social and classroom issues affecting the teaching and learning of secondary statistics. Class discussions focus on secondary curriculum standards and connections to mathematical content, especially algebra and probability.

Catalog Description: Activity-based treatment of statistics designed to extend preservice teachers' understanding of statistics and its connections to other areas of mathematics. Topics may include: simulations, hypothesis testing, dynamic statistical software and technology. It is recommended that this course be taken prior to MATH 361. PREREQ: MATH 147.

III. COURSE TOPICS

1. Sampling and Experimentation: Planning and conducting a study
2. Exploring Data: Describing patterns and departures from patterns
3. Anticipating Patterns: Exploring random phenomena using probability and simulation
4. Statistical Inference: Estimating population parameters and testing hypotheses
5. Solving Problems: Using probability and statistics to analyze real-world situations
6. Reasoning with Statistics: Drawing conclusions and understanding their limitations
7. Communicating Results: Presenting quantitative data in written and oral form
8. Representing Information: numerical, graphical, and algebraic description of data

Data Collection
- Sampling
- Observational Studies
- Experiments

Descriptive Statistics
- Organizing & Displaying Data
- Summarizing Data
- Describing the Relation between Two Variables

Probability Distributions
- Probability
- Discrete Probability Distributions
- Continuous Probability Distributions
- Sampling Distributions

Inferential Statistics
- Estimating the Value of a Parameter
- Testing Claims Regarding a Parameter or Parameters
- Inferences on One Sample
- Inferences on Two Samples
- Inferences on Categorical Data
- Inference on the Least-Squares Regression Model and Multiple Regression
- Inference on More than Two Samples

IV. LEARNING OUTCOMES

After successful completion of this course, students will be able to:

1. **Statistical Literacy** – explain terms, graphs, interpretations, and symbols used to communicate statistics to general and technical audiences.
2. **Statistical Reasoning** – select among and apply 21st century statistical methods; interpret statistical results while accounting for limitations of data.
3. **Statistical Thinking** – communicate why and how statistical investigations are conducted, especially the "big ideas" that underlie statistical practices.
4. **Civic Engagement** – reflect on the use of statistics to understand and have an impact on social issues affecting secondary students.

V. REQUIRED TEXTBOOKS and MATERIALS

Required:	iPad or similar tablet (all students may borrow an iPad for the semester)
	graphing calculator (TI-83/84/Nspire recommended)
Recommended Text:	Sullivan, M. (2010). *Statistics: Informed decisions using data* (**3rd Ed**.). Upper Saddle River, NJ: Pearson.

Note: Though optional, you may find the recommended text worthwhile as a reference, especially if you have limited statistics experience. The course notebook is aligned to the chapters in the text.

VI. MAJOR COURSE REQUIREMENTS and ASSESSMENTS

Final course grades will be a weighted average of means using the following category weights:

Classwork, Quizzes & Homework	10%
Midterm Exams (2)	40%
Statistical Consulting Service Project	30%
Final Exam	20%

We'll use the traditional letter grade cutoffs (90-100% A, 80-89% B, 70-79% C, 60-69% D, below 60% F). Plus and minus grades will be used for final grades within 2.5% of the cutoffs.

Classwork, Quizzes, & Homework – includes individual, collaborative and cooperative explorations of mathematical ideas, reflections, and discussions. In-class points are earned through active engagement, preparation, and thoughtful communication. Collaboration on homework is encouraged, but students must submit their own original work. Quizzes may be announced or unannounced and will typically allow the use of any resources you bring to class.

Midterm Exams – two individual exams with focus on explanations of concepts and procedures. These may include extended take-home performance tasks. Missed exams may only be made up in extreme circumstances.

Statistical Consulting Project – a small group of your peers to gain deeper insight into statistics in the secondary classroom by working as statistical consultants for a local non-profit community partner. For more information, see the Service-Learning section.

Final Exam – comprehensive summative evaluation of individual course knowledge. The exam is scheduled by the university and may not be retaken or made-up if missed. If you have a conflict with the scheduled time, please see me two weeks prior to discuss scheduling.

» The final exam is scheduled for **TBA, May 12-16, TBD to TBD**

VII. SERVICE-LEARNING

"Service Learning is a teaching strategy that integrates course content with relevant community service. Through assignments and class discussions, students critically reflect on the service in order to increase their understanding of course content, gain a broader appreciation of the discipline, and enhance their sense of civic responsibility."
– Boise State Service Learning Program

This is an officially designated Boise State Service-Learning course, and we are fortunate to have the support of the Service-Learning program in our partnerships with local community organizations. The main service component of the course is the **Statistical Consulting Project** (30% of course grades). A few important notes about the project:

- Scheduling of your out-of-class work will be flexible. Each student will contribute 20-25 scheduled hours as consultants, including at least 8 hours of direct engagement with the community partner (e.g., data collection, meetings with staff or clients).
- Each student will have different opportunities to contribute to their consulting project. Your group will work with the instructor and the community partner to negotiate the consulting tasks, including the questions, methods, and goals of your efforts.
- To assess your learning, each student will complete reflection surveys before, during, and after the project. Each group will submit dated logs of your work, a formal statistical report, a summary report for general audiences, and a formal presentation to the community partner. Evaluation will use rubrics posted on Blackboard.

Your service learning experiences will be critical to the course. The statistical tools we learn about will be based on the ones needed in the consulting projects, and class discussions will give everyone opportunities to share and learn about authentic statistical practices.

Benefits of the Service-Learning for You

- Increased knowledge of statistics through hands-on experience.
- Flexible opportunities to choose tasks based on your strengths and interests
- Interaction with people of diverse cultures and lifestyles
- Increased sense of self-efficacy, analytical skills, and social development
- Valuable experience for future careers
- Meaningful involvement with your local community

Register for Service Learning - You will receive an email invite from OrgSync with instructions for how to register their service learning project. Alternatively, go to the Service-Learning site (servicelearning.boisestate.edu/students) and follow the links to register.

VIII. CLASS POLICIES

Attendance/Tardiness. Since this course relies on teamwork, you're expected to attend every class session, arrive on time, and complete all in-class activities. If you need to miss part or all of a class session, please talk with a classmate and see the course website to get caught-up.

Late Homework. Homework will usually be due the next class, but may be submitted later if you request an extension prior to the deadline. The instructor may enforce strict deadlines on some assignments (e.g., projects) by announcing a "hard deadline." Any partial credit earned for assignments submitted after hard deadlines will be assigned at the instructor's discretion.

Cell Phones/Electronic Devices. Please silence electronic devices during class and step out of class to use them. You may not use any personal electronic device during exams.

Professional Communication. As a class for teachers, communication in this course will be aligned to professional norms. Please type and proof-read your written assignments, use formal "letter style" email correspondence, and express personal views with an emphasis on mutual respect. All class participants (including the instructor) are expected to read emails within 24 hours and respond within 3 business days when appropriate.

Monitoring Grades. Please check your scores on Blackboard regularly and keep returned assignments and tests. If you believe there may be an error or you were graded unfairly, you must bring this to my attention within 3 weeks from the time that the assignment was returned to the class. After this time period, I will not consider requests to review and/or change scores.

Academic integrity. All students are expected to be familiar with and adhere to the policies given in the BSU Student Code of Conduct. In this class, academic misconduct or complicity in an act of academic misconduct will result in a minimum of a 0 on the assignment/test.

Disabilities Accommodations. Students with disabilities needing accommodations to fully participate in this class should contact the Disability Resource Center (DRC). All accommodations MUST be approved through the DRC. Please stop by Administration 114 or call 208-426-1583 to make an appointment with a disability specialist. To learn more about the accommodation process, visit our website at http://drc.boisestate.edu

Changes. The instructor may amend the syllabus at any time prior to the final exam by announcing the changes in class.

IX. TENTATIVE COURSE OUTLINE (subject to change, see course website for updates)

Week	Day	Date	Content	Project Deadlines
1	Tue	1/21	1.2 Observational Studies v. Experiments	
			1.6 The Design of Experiments	
	Thu	1/23	1.1 Introduction to the Practice of Statistics	
			10.1 The Language of Hypothesis Testing	
2	Tue	1/28	2.1 Organizing Qualitative Data	**Reflection #1**
			2.2 Organizing Quantitative Data	
	Thu	1/30	2.3 Additional Displays of Quantitative Data	
			3.5 The Five-Number Summary and Boxplots	
			3.1 Measures of Central Tendency	
3	Tue	2/4	1.3 Simple Random Sampling	
	Thu	2/6	1.4 Other Effective Sampling Methods	
			1.5 Bias in Sampling	
4	Tue	2/11	3.2 Measures of Dispersion	**Status Report #1**
			3.3 Measures of Central Tendency & Dispersion from Grouped Data	
	Thu	2/13	3.4 Measures of Position and Outliers	
			5.1 Probability Rules	
5	Tue	2/18	5.2 The Addition Rule and Complements	
			5.3 Independence and the Multiplication Rule	
			5.4 Conditional Probability & the General Multiplication Rule	
			5.5 Counting Techniques	
	Thu	2/20	Review for Exam 1	
6	Tue	2/25	**Exam 1**	
	Thu	2/27	**Project Work Time**	
7	Tue	3/4	4.1 Scatter Diagrams and Correlation	
			7.0 Continuous Random Variables	
	Thu	3/6	6.1 Discrete Random Variables	**Status Report #2**
			4.4 Contingency Tables and Association	
8	Tue	3/11	7.1 Properties of the Normal Distribution	
			8.1 Distribution of the Sample Mean	
	Thu	3/13	6.2 The Binomial Probability Distribution	
			7.2 The Standard Normal Distribution	
			8.2 Distribution of the Sample Proportion	
9	Tue	3/18	**Project Work Time**	
	Thu	3/20	**Project Work Time**	**Reflection #2**
	Tue	3/25	No Class - Spring Break	

Week	Day	Date	Content	Project Deadlines
	Thu	3/27	No Class - Spring Break	
10	Tue	4/1	**Project Work Time**	
	Thu	4/3	7.5 Normal Approximation to the Binomial Probability Distribution	
11	Tue	4/8	10.2 Hypothesis Tests for a Mean–Standard Deviation Known	
			10.3 Hypothesis Tests for a Mean–Standard Deviation Unknown	
	Thu	4/10	10.4 Hypothesis Tests for a Proportion	
			10.5 Hypothesis Tests for a Standard Deviation	
12	Tue	4/15	Review for Exam 2	
	Thu	4/17	**Exam 2**	
13	Tue	4/22	11.1 Inference about Two Means: Dependent Samples	
			11.2 Inference about Two Means: Independent Samples	
	Thu	4/24	7.3 Applications of the Normal Distribution	
14	Tue	4/29	9.1 Confidence Intervals, Standard Deviation Known	**Statistical Report**
			9.2 Confidence Intervals, Standard Deviation Unknown	
	Thu	5/1	Class Presentations	
15	Tue	5/6	Class Presentations	**Presentation to Community Partner**
	Thu	5/8	Review for Final Exam	
16	TBD	TBD	**Final Exam**	**Reflection #3**