Stat 216: Introduction to Statistics  
Spring 2019 Syllabus

Statistical thinking will one day be as necessary for efficient citizenship as the ability to read and write. – H. G. Wells, 1903

Your Instructor: See D2L announcement for instructor contact information.

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Course Description: Stat 216 is designed to engage you in the statistical investigation process from developing a research question and data collection methods to analyzing and communicating results. This course introduces basic descriptive and inferential statistics using both traditional (normal and t-distribution) and simulation approaches including confidence intervals and hypothesis testing on means (one-sample, two-sample, paired), proportions (one-sample, two-sample), regression and correlation. You will be exposed to numerous examples of real-world applications of statistics that are designed to help you develop a conceptual understanding of statistics. After taking this course, you should be able to:

- Understand and appreciate how statistics affects your daily life and the fundamental role of statistics in all disciplines;
- Evaluate statistics and statistical studies you encounter in your other courses;
- Critically read news stories based on statistical studies as an informed consumer of data;
- Assess the role of randomness and variability in different contexts;
- Use basic methods to conduct and analyze statistical studies;
- Evaluate and communicate answers to the four pillars of statistical inference: How strong is the evidence of an effect? What is the size of the effect? How broadly do the conclusions apply? Can we say what caused the observed difference?

MUS Stat 216 Learning Outcomes:

1. Understand how to describe the characteristics of a distribution.
2. Understand how data can be collected, and how data collection dictates the choice of statistical method and appropriate statistical inference.
3. Interpret and communicate the outcomes of estimation and hypothesis tests in the context of a problem.
4. To understand the scope of inference for a given dataset.

CORE 2.0: This course fulfills the Quantitative Reasoning (Q) CORE 2.0 requirement because learning probability and statistics allows us to disentangle what's really happening in nature from “noise” inherent in data collection. It allows us to evaluate claims from advertisements and results of polls and builds critical thinking skills which form the basis of statistical inference. Students completing a Core 2.0 Quantitative Reasoning (Q) course should demonstrate an ability to:

- Interpret and draw inferences from mathematical models such as formulas, graphs, diagrams or tables.
- Represent mathematical information numerically, symbolically and visually.
- Employ quantitative methods in symbolic systems such as, arithmetic, algebra, or geometry to solve problems.
Prerequisites: You should have completed a 100-level math course (or equivalent) with a grade of C- or better (Alternatives: a good score on Math portion of SAT or ACT, or a 30 (3) on the MPLEX exam). You should have familiarity with computers and technology (e.g., Internet browsing, word processing, opening/saving files, converting files to PDF format, sending and receiving e-mail, etc.).

Course Website and D2L:
• There is a course webpage http://www.math.montana.edu/courses/s216/ which contains this syllabus; a course calendar of topics, assigned readings, and due dates; web links for in-class activities; supplemental readings; data sets used in the course, plus additional resources.
• Your specific section will make use of your D2L class page https://ecat.montana.edu/d2l/home for announcements, additional content, discussion boards, posted assignments, quizzes, and grades. Important: Make sure you are receiving email notifications for any D2L activity. In D2L, click on your name, then Notifications. Check that the D2L is using an email address that you regularly check; you have the option of registering a mobile number. Check the boxes to get notifications for announcements, assignments, content, discussions, grades, and quizzes.
• If you have a question about the course material, computing, or logistics, please post your question to your D2L discussion board instead of emailing your instructor or TA. Then all students can benefit from the responses. Other students are encouraged to respond.

Course Materials and Required Textbook:
The required textbook for the course is Introduction to Statistical Investigations by Tintle, Chance, Cobb, Rossman, Roy, Swanson, and VanderStoep (Wiley, 2016). MSU negotiated a reduced price for the textbook available only through the MSU bookstore (ISBN -9781119385943), and offers a custom e-textbook that includes videos for each section (videos are not required for the course). You may purchase the e-book alone from the MSU bookstore or from https://www.vitalsource.com/custom/9781119384212.
You may purchase either the print textbook (used or new) or an e-textbook, but you must have access to the textbook during each class period. Other materials, such as readings and assignments, will be downloaded from D2L.

Technology: This course utilizes technology extensively. You will need one laptop within your group each day.
• For most of the statistical analyses, we will be utilizing the web applets at http://www.rossmanchance.com/ISIapplets.html.
• For data visualizations, we will use Tableau. Tableau Desktop is free for students, or you may use the online Tableau Public. Visit https://www.tableau.com/academic/students to download the free software.

Course Format: Stat 216 is taught using a partially flipped classroom model. In a traditional lecture course, students passively consume information during class and actively work through problems outside of class. However, most of the difficulties and questions come up while working through problems outside of class, when the instructor is not available. In this course you are responsible for reading/watching the material before class, and then class time can be used more effectively to fine-tune concepts, work through explorations and problems, and get hands-on experience with the instructor. It is well-established in educational research that active learning greatly increases student achievement and engagement, especially in the STEM disciplines (see, for example, the 2014 Freeman et al. paper in PNAS). You will need to prepare for class every day by completing reading assignments, videos, and a short online assessment.

Group Expectations: We have all been in groups which did not function well. Hopefully we've also all had good experiences with working in groups. Our use of groups in this course is based on educational research which provides strong evidence that working in groups is effective and helps us learn. Additionally, you will build team skills that employers look for when hiring. By expressing your opinions and catching each other’s mistakes, you will learn to communicate statistical concepts. These are partly “common sense” ideas (for instance, gathering more data provides a better foundation for decision making), but they are often phrased in odd ways. We find it really helps to talk about them with others.
Classroom Etiquette and Mutual Respect:

- Your instructor and TAs make every effort to start and end on time. Please respect the 150 minutes of weekly class time; do not pack up early. If you know you have to leave early, please let your instructor know.
- **Turn OFF your cell phones and put them away.** The ability to multi-task is a myth! Cell phones are distracting both to the instructor and to those students around you.
- Laptops and tablets should only be used to follow along with the web applets and course activities. Do not watch movies, listen to music, browse the web, text your friends, etc. during class.
- Be considerate of your fellow students, your instructor, and your education!

Additional Resources:

- Your instructor holds at least three office hours per week to assist students with understanding course material. Please come prepared with written questions. Check D2L announcement for your instructor’s office hour schedule.
- Your course fees pay for your use of the Math Learning Center in 1-112 Wilson Hall. Check the course specific tutoring schedule at [http://www.math.montana.edu/undergrad/mlc/](http://www.math.montana.edu/undergrad/mlc/) and try to attend when a current Stat 216 instructor is available. The MLC is open **9:00am-7:00pm Mon-Thurs** and **9:00am-5:00pm Friday**.
- Prior to each exam, several review sessions will be available. These will be posted on D2L.
- SmartyCats ([http://www.montana.edu/aycss/success/smartycats/](http://www.montana.edu/aycss/success/smartycats/)) offers statistics tutoring and will hold tutoring sessions specific to Stat 216 prior to each exam.

Assessment: Grades will be posted in D2L as they become available. The Math Sciences office cannot accept assignments and cannot provide information about grades (you can check on D2L -- they can’t). Your grade in this course will be based on the following:

<table>
<thead>
<tr>
<th>Component</th>
<th>% of Course Grade</th>
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<tbody>
<tr>
<td>Online Readiness Assessment Tests (RATs)</td>
<td>5%</td>
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<tr>
<td>Explorations</td>
<td>10%</td>
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<tr>
<td>Weekly Assignments/Quizzes</td>
<td>15%</td>
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<tr>
<td>Course Project</td>
<td>15%</td>
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<tr>
<td>Common Hour Midterm Exam 1: <strong>Tuesday, February 12, 6:10-8:00 pm</strong></td>
<td>17%</td>
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<tr>
<td>Common Hour Midterm Exam 2: <strong>Thursday, March 14, 6:10-8:00 pm</strong></td>
<td>17%</td>
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<tr>
<td>Final Exam: <strong>Monday, April 29, 10:00-11:50 am</strong></td>
<td>21%</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100%</strong></td>
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**RATs:**
Readiness Assessment Tests are short 5 point D2L quizzes on the required reading and videos for each class period or review material. RATs help prepare you for class as well as provide your instructor with a guide for what topics require more attention in class. RATs will be due two times per week with the due dates set by your instructor. You will earn full credit on a RAT as long as you get at least 50% of the questions correct. The lowest RAT grade will be dropped.

**Explorations and attendance:**
Much of class time will be spent working on explorations from the textbook. Your instructor will ask you to turn in parts of these explorations at the beginning of each class period, graded based on completion. This portion of your grade also serves to assess attendance. The lowest two (if TR) or three (if MWF) exploration grades will be dropped.

**Assignments and Quizzes:**
Each week, you will be assigned either a D2L online quiz or a written assignment (posted in D2L) as your weekly assignment. You will be allowed to work on a portion of the assignment/quiz with others, and the remaining portion must be completed individually. MLC tutors will not help you on the individual portion. The lowest assignment/quiz grade will be dropped.
Project:
A group data analysis project consisting of a final report and presentation will be completed throughout the course with the following components (due dates and details posted on the course website):

• CITI human subjects research training (1%)
• Project proposal (5%)
• Excel data set (4%)
• Draft of methods and results sections of report (4%)
• Draft of abstract, background and significance, and discussions and conclusions sections of report (4%)
• In-class project presentations (30%)
• Final project report (50%)
• Group member evaluation (2%)

Exams:
Taken individually, not in groups. You may bring one two-sided 8.5”x11” page of handwritten notes and a calculator to each midterm exam; you may use two pages of notes for the final exam.

Final Exam Replacement: If you complete both midterm 1 and midterm 2, then you have the opportunity for your final exam grade to replace the lowest of your midterm exam scores. If you do not take one of the midterm exams, final exam replacement does not apply.

Letter grades will be assigned as approximately (cutoffs may be slightly lowered at the end of the semester): 93-100 = A; 90-92 = A-; 88-90 = B+; 83-87 = B; 80-82 = B-; 78-80 = C+; 70-77 = C; 60-69 = D; below 60 = F

Attendance Policy: If you cannot be in class, it is your responsibility to notify the instructor and your group members with as much advance warning as possible. You may miss up to two (if TR) or three (if MWF) class periods without affecting your grade.

Late Work Policy:
• Late work (RATs/explorations/assignments/quizzes) in this course is not accepted. Portions of each component of the grade are dropped to allow for unexpected absences or emergencies.
• Make-up exams are not available for this course. In the case of a personal emergency, we will allow the final exam replacement to apply to the missed midterm exam.
• Exceptions to this policy may be granted in only extreme cases at the discretion of the instructor (daily work) or Student Success Coordinator (exams). You must speak to your instructor or Student Success Coordinator on or before the due date or exam date and provide documentation explaining your absence for the instructor or Student Success Coordinator to determine whether an exception should be granted.

Common Hour Exam Policy: By registering for this course, you agree to the University common hour exam policy http://www.montana.edu/policy/exams/. In particular, a version of the exam may only be taken at a different time if you have regularly scheduled class or lab, have another common hour exam, are engaged in an official University activity or event, sustain a personal emergency that prevented participation in the scheduled exam. Students are responsible for identifying conflicts and must speak with the Student Success Coordinator no later than ten days prior to the scheduled exam. Conflicts brought to our attention within ten days of the exam may not be able to be accommodated. The avenue for a student to appeal this policy is first through the Student Success Coordinator, then the Mathematical Sciences Department Head (Beth Burroughs), then the CLS Associate Dean (David Cherry).

We will not allow students to take the common hour final exam early. Make your spring break and summer break travel plans accordingly!

Academic Integrity Policy: Students are allowed to responsibly collaborate on group portions of in-class explorations, assignments, and quizzes. However, copying another student’s solutions is not collaboration; it is cheating. The first instance of cheating on an assignment or quiz will result in a zero grade for that assignment/quiz for all parties involved. The second instance will also result in a zero grade, and will be reported to your student record. Any instance of cheating on an exam will result in a zero grade for the exam and will be
reported to your student record. Egregious instances of academic dishonesty may be subject to more severe sanctions.

**Grading Disputes:** If you find that a calculation error was made in grading an assignment, quiz, or exam, notify your instructor as soon as possible so we can correct it. If you feel you deserved a better grade than that which was awarded, ask your instructor to go over how the question was graded so you understand what you missed. *Asking your instructor to reconsider your grade at the end of the semester is inappropriate and will not be considered.*

**Comments and Concerns:**
We are always looking for ways to improve this class and we want students to be successful. The first step is to discuss your comments or concerns with your instructor. If they are not resolved, contact the Student Success Coordinator or Course Supervisor.

**Plan ahead:** In our experience, it takes 6 to 9 hours per week outside of class to achieve a good grade in Stat 216. By “good” we mean at least a C because a grade of C- or below does not count toward fulfilling degree requirements. Many of you set your goals higher than just getting a C, and we fully support that. You need roughly nine hours per week to review past activities, read feedback on previous assignments, complete current assignments, and prepare for the next day's class. A typical week in the life of a Stat 216 student looks like (for TH classes):

**Mon:**
- Complete assigned reading/videos, taking notes and writing down questions as you read/watch. Complete the online RAT based on this reading. (1 hr)
- Finish (if not finished in class) and review the previous class period’s in-class exploration. Write down any questions you would like to ask your instructor; have this ready to show your instructor at the beginning of the next class period. (1 hr)

**Tue:**
- Attend class; take detailed and complete notes as you work through the exploration so that you can use these notes to study from in the future; put away your cell phones and engage with your group members. (75 min)
- Take a few minutes after class to review the key learning outcomes from the class period; write a summary of the important points. (15 min)
- Start working on this week’s assignment/quiz. (30 min)

**Wed:**
- Complete assigned reading/videos, taking notes and writing down questions as you read/watch. Complete the online RAT based on this reading. (1 hr)
- Finish (if not finished in class) and review the previous class period’s in-class exploration. Write down any questions you would like to ask your instructor; have this ready to show your instructor at the beginning of the next class period. (1 hr)
- Continue working on the week’s assignment/quiz. (30 min)

**Thur:**
- Attend class; take detailed and complete notes as you work through the exploration so that you can use these notes to study from in the future; put away your cell phones and engage with your group members. (75 min)
- Take a few minutes after class to review the key learning outcomes from the class period; write a summary of the important points. (15 min)
- Continue working on the week’s assignment/quiz. (1 hr)

**Fri-Sun:**
- Review your notes/reading/videos/explorations from the previous week. (30 min)
- Finish this week’s assignment/quiz. (1 hr)
- Review feedback from last week’s assignment/quiz. (30 min)
- Start on assigned reading/videos for Tuesday. (30 min)
- Set up this week’s meetings with your project members (later in the semester).
University Policies and Procedures

Behavioral Expectations: Montana State University expects all students to conduct themselves as honest, responsible and law-abiding members of the academic community and to respect the rights of other students, members of the faculty and staff and the public to use, enjoy and participate in the University programs and facilities. For additional information reference see MSU’s Student Conduct Code at: http://www2.montana.edu/policy/student_conduct/cg600.html. Behavioral expectations and student rights are further discussed at: http://www.montana.edu/wwwds/studentrights.html.

Collaboration: Discussing assignments with others (in your group for example) is a good way to learn. Giving others answers is not doing them a favor, because then they aren't learning the material. Copying from others is cheating, and will not be tolerated. University policy states that, unless otherwise specified, students may not collaborate on graded material. Any exceptions to this policy will be stated explicitly for individual assignments. If you have any questions about the limits of collaboration, you are expected to ask your instructor for clarification.

Plagiarism: Paraphrasing or quoting another’s work without citing the source is a form of academic misconduct. Even inadvertent or unintentional misuse or appropriation of another’s work (such as relying heavily on source material that is not expressly acknowledged) is considered plagiarism. If you have any questions about using and citing sources, you are expected to ask for clarification.

Academic Misconduct: Section 420 of the Student Conduct Code describes academic misconduct as including but not limited to plagiarism, cheating, multiple submissions, or facilitating other’s misconduct. Possible sanctions for academic misconduct range from an oral reprimand to expulsion from the university.

Section 430 of the Student Code allows the instructor to impose the following sanctions for academic misconduct: oral reprimand; written reprimand; an assignment to repeat the work or an alternate assignment; a lower or failing grade on the particular assignment or test; or a lower grade or failing grade in the course. See the Stat 216 Academic Integrity Policy as described above.

Academic Expectations: Section 310.00 in the MSU Conduct Guidelines states that students

A. be prompt and regular in attending classes;
B. be well prepared for classes;
C. submit required assignments in a timely manner;
D. take exams when scheduled;
E. act in a respectful manner toward other students and the instructor and in a way that does not detract from the learning experience; and
F. make and keep appointments when necessary to meet with the instructor.

In addition to the above items, students are expected to meet any additional course and behavioral standards as defined by the instructor.

Withdrawal Deadlines:
Wednesday January 30 is the last day to withdraw without a “W” grade. The last day to withdraw with a “W” grade is Thursday, April 11. University policy is explicit that the adviser and instructor must approve requests to withdraw from a course with a grade of “W”. Students who stop attending and stop doing the work are not automatically dropped. Taking a “W” does not hurt your GPA but it is a sign that you are not making progress toward your degree, and could affect your financial aid or student loans.