

Statistics 250 Syllabus Fall 2016

Statistics are ubiquitous in life, and so should be statistical reasoning.

Alan Blinder, former Federal Reserve vice chairman and Princeton academic. [Inside the List](#), NYTimes.

Think analytically, rigorously, and systematically about a problem and come up with a solution that leverages the available data.

Michael O'Connell, Sr. Director of Analytics, TIBCO, [What Is a Data Scientist?: Michael O'Connell of TIBCO Spotfire](#), Forbes

Welcome ~ Course Info will be available through Canvas

<https://umich.instructure.com/courses/101220>

Instructors

Dr. Brenda Gunderson

Lecture Section 001: TTH 11:30 AM – 1 PM, MLB AUD 3

Lecture Section 006: TTH 8:30 – 10 AM, MLB AUD 4

Office: 445A West Hall

Office Phone: 734-615-2830

Email: bkg@umich.edu

Dr. Alicia Romero

Lecture Section 002: MWF 10 – 11 AM, MLB AUD 3

Lecture Section 005: TTH 2:30 – 4 PM, MLB AUD 4

Office: 443 West Hall

Office Phone: 734-764-8551

Email: alromero@umich.edu

Dr. Jackie Miller

Lecture Section 003: MWF 12 – 1 PM, MLB AUD 3

Office: 427 West Hall

Office Phone: 734-931-0411

Email: jabmille@umich.edu

Dr. Nadiya Fink

Lecture Section 004: MWF 1 – 2 PM, MLB AUD 3

Office: 443 West Hall

Office Phone: 734-764-8551

Email: nafink@umich.edu

Lectures, Labs, Graduate Student Instructors (GSIs), and Office Hours

- Students enroll in exactly one of the 6 lecture sections and in exactly one of the 63 lab sections.
- During **lectures**, the instructors present the main bulk of the material.
- During **labs**, GSIs discuss examples, answer questions, and guide in-lab projects. Students will work with statistical software (R and R Commander) to perform statistical data analyses. **Why R?** The ability to use R is a valuable skill recognized by employers. R is a free, open source software that can be downloaded onto student machines for access to it any time. It is also available at all campus computing sites (so having your own device is not required). Other Statistics courses use R and this will make for an easier transition into these next courses.
- Most **labs** meet in computer lab classrooms, most are held in G444-B or C Mason Hall in the Angell Hall Computer Courtyard; a few are held in B760 East Hall, B254 East Hall, B743 East Hall, and 2302 SEB. If your lab meets in 2244 USB it is a *BYOL (bring your own laptop) lab*, and you are required to bring your own laptop to lab each week with R and R Commander installed.
- **The first labs will meet the week of SEPTEMBER 12.** Attendance in labs is **required**, and you must attend the lab for which you are enrolled. Be sure you review the lab policies when you receive your Lab Syllabus in your first lab.
- **Be respectful** in your use of technology during lecture and lab so as not to disrupt the learning process for yourself and those around you.
- All Stats 250 Instructors and GSIs will have **office hours**. A full schedule will be available by September 11. **GSI hours will be in the Science Learning Center (SLC) 1720 Chem.** All office hours are open for any Stats 250 student to attend, that is, you do not have to go to just your own instructor/GSI hours.
- **Email** correspondence: including “Stats 250” in the subject line helps us find your messages readily. But do check the Canvas course site first as you might find your answer there! If you do not receive a response within 48 hours, please send a gentle reminder to the person you emailed.

Course Materials

Required 1. Stats 250 Fall 2016 Lecture Notes and Lab Workbook Course Pack: Required and available in few ways: (1) Dollar Bill Copying <https://www.dollarbillcopying.com/STAT-250-P2064.aspx> located at 611 Church St, A2 (665-9200), Bin #6002-F16, ~\$18 OR (2) print yourself (in full or by section) from your Canvas course site. **Note: Must be the F16 version (earlier version will not work with the change to using R open source software and updates from previous terms).**

Required 2. Course.Work Online Homework tool (\$35): Through this tool you will receive required and recommended HW, answer questions, and receive graded HW with feedback. Purchase at <https://www.course.work> (not bookstores).

Required 3. Statistical Software ~ R and R Commander (\$0 free): The ability to use R is a valuable skill recognized by employers. R is a free, open source software that can be downloaded to your personal machine for access to it any time. **Check out Canvas for R Info and times of drop in help sessions.** R is also available on all campus computing machines.

Required 4. i>clicker: The i>clicker Response System will be used regularly in *most* lecture sections and all lab sections. For student i>clicker information see <https://lrc.iss.lsa.umich.edu/iclicker/student-qa/>. You may purchase a clicker at the Computer Showcase (Union or Pierpont) (Note: students in Lecture 003 MWF 12-1 will use an alternate response system during lecture and the i>clicker during labs. More information coming from Dr. Miller soon.)

Required 5. Calculators: Used for homework and exams. Any basic scientific (can raise to a power, take a square root) is fine (graphing calculator is allowed). No cell phone (or devices with communication functions) allowed during exams.

Highly Recommended. E²Coach for Stats 250 (\$0 free): Large lecture classes are different from other classes you may have taken, and achieving the final grade you want may be challenging. E²Coach is designed using advice from previous students, education research, and tips from your stats professors to “coach” you through the class - and it works! Watch for an email and course announcement about signing up!

Recommended, but not required. Mind on Statistics 5th Edition Text (MOS by Utts/Heckard, Cengage, 2015). A UM version (ISBN 9781337396608) bundled with our 250 formula card. Any copy of 5th edition is fine. *Not required*, but some students prefer another resource to read and review. Formula card will be provided for exams for all students.

Homework

- There will be **weekly online HW** available through Course.Work, submitted automatically at due date/time.
- When a HW assignment is posted, you will have seen *most* corresponding material. Start HW early when it opens. Past students have found out too late that starting HW the day it is due means too little time to think about the exercises, review material, do computer analysis questions, or ask questions. So do not wait until the night before.
- **HW assignments must reflect your own work**—you can talk to others, but calculations and final answers must be your own, explanations must be in your own words. Copying HW from past solutions or submitting work identical to others is considered a violation of academic integrity (**read the Academic Integrity statement in this syllabus**).
- You can revisit your HW unlimited times and edit it up until the due date/time. All saved work will be submitted for you at the due date/time. So **you are encouraged to save after you answer each question and to print the questions with your answers (save as pdf) after each main work session as back up.**
- **Do not** open two versions of Course.Work as it will cause one to overwrite the other. ONLY have ONE browser open to your HW at any time. Log out if your connection will change, if your work session is done, or on a public machine.
- **Do not** share your login information for Course.Work with anyone else in the course. Doing so might open yourself up to academic misconduct on the part of another student
- As you work with this system, if any technical issues please contact support@course.work and **CC your GSI** so they are aware of any issues. The **first practice online HW** will be available by **Mon, Sept 12 and due Thu, Sept 22, 5 PM.**
- Once the HW due date/time has passed, the solutions will become available through the online HW tool. Your HW will be graded online, with scores and some personalized feedback available the following week.
- Although **no late HW** will be accepted (solutions are provided immediately), we do know things can come up. Your **one lowest HW score will be dropped** before computing the HW part of your lab grade (see lab syllabus details).
- Some **HW problems are to be done using a computer package** (R and R Commander). Be sure you include/upload only the relevant parts. Any graphs **must include an appropriate descriptive title AND your name.**
- In addition, **recommended problems** will be made available. These problems are optional but are *highly* recommended. Statistics is learned by doing. Solutions to these problems will be available to check your work.

Exam Schedule

There are two semester exams and a cumulative final exam.

Exam 1: Thursday, October 20, 6:00 – 7:30 PM

Exam 2: Thursday, November 17, 6:00 – 7:30 PM

Final Exam: Thursday, December 15, 7:30 – 9:30 PM

Exam Policy: All exams are closed book but students are provided with a Stats 250 *blue* formula card with tables. There will be **no make-ups for the exams, so check your calendars now**. You must take the final exam to pass this course.

Students with exam conflicts or needing special (documented) accommodations for testing must email stats250altexam@umich.edu and include details (name, time, and instructor for class that conflicts) and turn in any documentation to your instructor or lab GSI by **Wednesday, September 28**.

Full Credit Policy: Full credit for problems (on HW, lab work, and exams) can only be earned through showing justification. *Answers that require work but have none will not receive full credit.* With all assignments in Stats 250, *show any work beyond trivial calculations*, and, if needed, *round answers to 4 decimal places*. Also make sure to *include units* and to *make statements and conclusions in the context of the problem*, where appropriate.

Grading Policy

Performance on exams will account for 80% of your final grade; the remaining 20% will come from lab (in-lab projects, HW, lab attendance, participation, i>Clicker participation). There are two methods for computing your final class grade:

Method 1 (using scores from all exams):

HW and Lab: 20% Exam 1: 20% Exam 2: 20% Final Exam: 40%

Method 2 (higher weighting of final exam score):

HW and Lab: 20% Exam 1: 10% Exam 2: 10% Final Exam: 60%

For each student, **the method that produces the higher grade will be used. You must take the final to pass this course.** Your final course grade will be assigned by taking your percentage of points received to the following scale:

96 and up = A+	[84, 88] = B+	[72, 76] = C+	[59, 63] = D+	Below 50 = E
[92, 96] = A	[80, 84] = B	[68, 72] = C	[55, 59] = D	
[88, 92] = A-	[76, 80] = B-	[63, 68] = C-	[50, 55] = D-	

- An example of how the grading scale works: if your final percentage is 87.8%, then your final grade is B+.
- **Lab attendance is required and each missed lab will reduce your final grade percentage by 1%** (see lab syllabus).

Student Responsibilities

It is your responsibility as a student to be aware of course policies as laid out in this syllabus and presented on the course site, to check the announcements, email messages *sent to your UM email*, and various resources on the course site regularly, and to communicate with your instructor and GSI in a timely manner regarding any conflicts or issues.

You are responsible for your own learning; this includes:

- attending class and, if you should miss a class, getting assignments and notes from others;
- asking questions when you have them;
- doing the assigned homework and labwork on time and participating in the class; and
- contacting your instructor and/or GSI if you are having difficulties (earlier, rather than too late).

Student Mental Health and Wellbeing

University of Michigan is committed to advancing the mental health and wellbeing of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, contact **Counseling and Psychological Services (CAPS)** at (734) 764-8312 and <https://caps.umich.edu/> during and after hours, on weekends and holidays, or through its counselors physically located in schools on both North and Central Campus. You may also consult **University Health Service (UHS)** at (734) 764-8320 and <https://www.uhs.umich.edu/mentalhealthsvcs>, or for alcohol or drug concerns, see www.uhs.umich.edu/aodresources. For a listing of other mental health resources available on and off campus, visit: <http://umich.edu/~mhealth/>.

Our Stats 250 Canvas site has a link on the homepage called “Student Support Services at Michigan.” You will find info for several offices on campus that are classified as Academic Support and Tutoring, Counseling and Health and Wellness, Services for Students with Disabilities, and Support for a Diverse Community. It is important to us that you know the resources available to you as a student, so we wanted to make sure that you have quick links to these resources.

Academic Integrity

“The LSA undergraduate academic community, like all communities, functions best when its members treat one another with honesty, fairness, respect, and trust. The College holds all members of its community to high standards of scholarship and integrity. To accomplish its mission of providing an optimal educational environment and developing leaders of society, the College promotes the assumption of personal responsibility and integrity and prohibits all forms of academic dishonesty and misconduct. Academic dishonesty may be understood as any action or attempted action that may result in creating an unfair academic advantage for oneself or an unfair academic advantage or disadvantage for any other member or members of the academic community. Conduct, without regard to motive, that violates the academic integrity and ethical standards of the College community cannot be tolerated. The College seeks vigorously to achieve compliance with its community standards of academic integrity. Violations of the standards will not be tolerated and will result in serious consequences and disciplinary action.” www.lsa.umich.edu/academicintegrity/.

So do not cheat. The penalties for cheating are very steep, and the potential rewards are very minor. For example, prior cheating in the course has included similar phrasing to other students on homework assignments. In cases like this, it is better to not turn in your homework and to take a zero for that assignment than to use another student's homework. And, while we encourage you to work together on homework, remember that your answers must always be in your own words. For potential academic misconduct examples see www.lsa.umich.edu/academicintegrity/examples.html. If we suspect academic misconduct on any graded elements of the course, you will receive an email from Dr. Miller that indicates the suspected academic misconduct and how the case will be handled. University policy dictates that we must report every instance of suspected academic dishonesty to the Assistant Dean for Undergraduate Education, **no matter how small**. If you have a question or concern about what may be considered academic misconduct in Stats 250 and/or if you have any questions regarding the Stats 250 academic integrity policy, please contact Dr. Miller (jabmille@umich.edu).

Stats 250 Research – Fall 2016: Research is being conducted to improve student learning in Stats 250.

1) “Math: EAGER: Researching the **HyFlex+ Instructional Model of Blended Learning**” is an NSF funded project that seeks to offer students choices about how to attend lecture by using a hybrid-flexible (HyFlex) model of teaching. Details about this model will be provided to students in Lecture 003 and available to all students in Stats 250. All students in Stats 250 will benefit from this research. All students in the course will be asked to complete two surveys at the beginning and end of the term: 1) CAOS (Comprehensive Assessment of Outcomes in a First Statistics Course); 2) SATS (Student Attitudes Towards Statistics). Completion of these two surveys is not mandatory, but extra credit on homework will be offered for their completion. More details will come the first week of the class. Dr. Miller may also ask students to complete another survey during the term as well. In any presentation of results of these studies, *we will not include your name or any identifying details about you*. If we plan to quote extensively (e.g., more than one sentence, an image of your work), we will follow up with an email to check that this is acceptable to you.

2) In addition, **M-Write**, a project that aims to increase students’ conceptual understanding through the use of Writing to Learn assignments (WTL) will be running in this course. M-Write isn’t about improving the quality of writing; it is about using writing to deepen understanding of key ideas in statistics. Students who opt into this project will receive an Honors designation for Stats 250, irrespective of being part of the Honors Program. Participation in the project involves completing 1) three WTL assignments consisting of an initial draft, peer review of fellow students’ writing, and a revised draft of your work, 2) taking a short survey covering attitudes towards writing, and 3) answering short response assessment questions following submission of the revised drafts. Students who participate in M-Write will receive support from Sweetland Writing Fellows who have taken the course previously and been trained by the Sweetland Center for Writing. All student work will be de-identified and treated confidentially.

General Advice

1. **Perseverance pays.** Most students need to go over an idea more than once (sometimes many times) to properly understand it.
2. **Stay awake** and try to learn as much as possible during class time. Don't waste your time by not learning in class.
3. **Be respectful** of your peers and instructors in class. Talking during lecture and/or lab is distracting to the students around you and may negatively impact their learning experiences.
4. When you don't understand something do not be afraid to **ask** for clarification.
It's very likely that other students have the same questions that you do.
5. **Do the homework problems** – start them early, first on your own, then come in with questions.
Do the recommended problems. By far the best way to learn statistics is to do problems.
6. **Don't get left behind.** Statistical knowledge is cumulative. New skills generally depend on ones you learned earlier.
7. **Sign up for E²Coach** to receive a few key messages, tailored advice, a grade calculation tool, and extra review tools.

Stats 250 Lecture Outline – Fall 2016

As you complete the lecture notes over the term in class, they will be a great source for review.

If you decide to use the recommended textbook, a list of text chapters (and sections) expected to be covered each week is included.

Week	Chapter (Section)	Topic(s)
1 (Sept 6-9)	1 and 2	Introduction, Summarizing Data, Labs do not meet this week (Tue/Wed)
2 (Sept 12-16)	2, 5, 6, and 7	Summarizing Data, Sampling and Gathering Useful Data, and Probability
3 (Sept 19-23)	7, 8	Probability, Random Variables
4 (Sept 26-30)	8, 9 (1-4); 10 (1-2)	Random Variables, Learning about a Population Proportion (SD)
5 (Oct 3-7)	10 (1-2); 12 (1-2,4)	Learning about a Population Proportion (CI and HT)
6 (Oct 10-14)	9 (5); 10 (3); 12 (3) 9 (6,9,10)	Learning about the Difference in Population Proportions (SD, CI, HT) Learning about a Population Mean (SD)
7 Mon/Tue Oct 17/18	<i>Fall Break</i>	No Lectures Monday/Tuesday, No Labs Monday through Wednesday
Tue Oct 18	<i>Tentative Review for EXAM 1 – time/location TBD, will be captured & posted</i>	
7 (Oct 19-21)		Some Lecture Review Wed/Thu, no lectures on Fri, Oct 21
Thu Oct 20	<i>EXAM 1 ~ 6:00 – 7:30 pm (locations TBD)</i>	
8 (Oct 24-28)	11 (1,2); 13 (1,2,5)	Learning about a Population Mean (CI, HT)
9 (Oct 31-Nov 4)	9 (7); 11 (3); 13 (3) 9 (8)	Learning about a Population Mean Difference (SD, CI, HT) Learning about the Difference in Population Means (SD)
10 (Nov 7-11)	11 (4); 13 (4)	Learning about the Difference in Population Means (CI, HT)
Sun Nov 13	<i>Tentative Review for EXAM 2 – time/location TBD, will be captured & posted</i>	
11 (Nov 14-18)	16	Analysis of Variance (ANOVA)
Thu Nov 17	<i>EXAM 2 ~ 6:00 – 7:30 pm (locations TBD)</i>	
12 (Nov 21-23)	3, 14	Relationships between Quantitative Variables (Regression)
Nov 24-25		Thanksgiving Break: No Classes Thursday/Friday
13 (Nov 28-Dec 2)	3, 14	Relationships between Quantitative Variables (Regression)
14 (Dec 5-9)	4, 15	Relationships between Categorical Variables (Chi-Square Tests)
15 (Dec 12-13)		Lecture Wrap Up; Labs do NOT meet this last short week.
Wed Dec 14	<i>Tentative Review for FINAL EXAM – time/location TBD, will be captured & posted</i>	
Thu Dec 15	<i>FINAL EXAM* 7:30 – 9:30 PM (locations tbd) *All students expected to take Thu, Dec 15, 7:30 PM final exam. If you have a final that conflicts directly with this time; the alternate exam (Fri, Dec 16, 8 AM) is for such students with prior permission.</i>	

Stats 250 Review Questions ~ Try it!

Here is a set of optional questions that demonstrate the level of math/algebra skills used in Stats 250. Why not try them out for some review. As with all assignments in Stats 250, to receive credit you must show all work and where appropriate, carry out work to (at least) 4 decimal places. You may use (and likely need) a calculator for some computations. Solutions will be available on your Canvas Site (under Files -> Review Info). Feel free to bring any questions to any GSI or instructor.

1. What is the value of $(4 + 3) \times 7$?
2. What is the value of $\sqrt{\frac{1}{10} + \frac{1}{20}}$?
3. Solve for the value of x where $2x + 17 = 23$.
4. Solve for the value of n where $0.03 = \frac{1}{\sqrt{n}}$.
For this example, round up your answer to the next integer value.
5. Suppose $x_1 = 3, x_2 = 6, x_3 = -2$, and $x_4 = 8$. Then find the value of $\sum_{i=1}^4 x_i$.
Note the symbol \sum just means to add them all up, and in this case start with $i = 1$ and go up to $i = 4$.
6. Suppose we have five probabilities that must sum up to 1 (for 100%) and we know $p_1 = 0.3, p_2 = 0.1, p_3 = 0.3$, with p_4 and p_5 unknown.
If we know that p_4 is twice the value of p_5 , what must be the values of p_4 and p_5 ?
7. Fractions and Decimals: Is $\frac{2}{7} < 0.27$?
8. What is the mean (or average) of these responses: 3, 8, 6, -4?
9. Provide the range of values represented by 0.72 ± 0.04 .
10. Plot the following line, including axes labels and at least 3 values on each axes.
 $y = 2x - 1$

