Statistics 250 Syllabus Fall 2015

The quiet statisticians have changed our world - not by discovering new facts or technical developments but by changing the ways we reason, experiment and form our opinions about it.

Ian Hacking (1936 -)

Canadian philosopher, specializing in the philosophy of science

Welcome ~ Course Info will be available through Canvas

https://umich.instructure.com/courses/23386

Instructors

Dr. Brenda Gunderson
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Dr. Tom Venable
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Dr. Jackie Miller
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Lectures, Labs, Graduate Student Instructors (GSIs), Office Hours, and E^{2}Coach

- Students enroll in exactly one of the 6 lecture sections and in exactly one of the 62 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, so students can have access to it any time on their personal devices and won't have to use Virtual Sites. Other Statistics courses use R and this will make for an easier transition into these next courses.
- Most **labs** meet in computer lab classrooms, many are held in G444-B or C Mason Hall in the Angell Hall Computer Courtyard; a few are held in B760 and B254 East Hall. 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.
- **The first labs will meet the week of September 14.** 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 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 13. **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!

E^{2}Coach for Stats 250 ~ Large lecture classes (like statistics) are very different from other classes you may have taken, and achieving the final grade you want may be challenging. E^{2}Coach is designed using advice from previous students, education research, and tips from your stats professors to "coach" you through the class - and it works!

Think of E^{2}Coach as your own personal coach: one with years of experience, aware of what all the best professors and students who've taken Stats 250 would advise. Through this system, you will receive advice from peers who have previously completed the course, as well as reminders about requirements and expectations throughout the term. Watch for an email and course announcement about signing up!

Course Materials

Required 1. Stats 250 Fall 2015 Lecture Notes and Lab Workbook Course Pack: Required and available in a few ways: (1) Dollar Bill Copying at 611 Church St, Ann Arbor, MI 48104 (665-9200), Bin #6015 OR (2) print yourself (in full or by section) from your Canvas course site or from Open Michigan site (link provided early September). **Note: Must be the Fall 2015 version (earlier version will not work with the change to using R open source software).**

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

Required 3. i>clicker: The i>clicker Audience Response System (clickers) will be used regularly in most lecture sections and all lab sections). You may purchase a clicker device or a web-clicker subscription. See http://bit.ly/studentclickers for student i>clicker information (including cost, app info, registration, etc.). Also available at Computer Showcase in Union, Pierpont Commons. (Note: students in Lecture 003 MWF 12-1 will use an alternate response system during lecture and the i>clicker during labs, with more information coming from your instructor soon.)

Required 4. Calculators: A calculator may be used for homework and exams. Any basic scientific (that can raise to a power, take a square root) is fine (and a graphing calculator is allowed). No cell phone (or other electronic devices with calculator functions) will be allowed during exams.

Recommended, but not required. **Mind on Statistics 4th Edition Textbook** (MOS by Utts/Heckard, Duxbury, 2012). There a nice cheaper loose-leaf three-hole punch UM version (ISBN 9781305752252) bundled with formula card. Any electronic or hard copy of the 4th edition is fine. Not required, but some students do prefer to have 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 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 night before it is due means too little time to think about the exercises, review material, do computer analysis related questions, or ask questions. So do not wait until the night before.
- HW assignments should reflect your own work—you can talk to others, but calculations and final answers must be your own and 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 (see the Academic Integrity statement in this syllabus).
- You can revisit your HW unlimited times and edit it up until the due date/time. The system is set to auto-save, but you are encouraged to save from time to time and to **print the questions with your answers (save as pdf) 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.
- As you work with this system, if any technical issues please contact **support at Course.Work** and **CC your GSI** so they are aware of any issues. The **first *practice* online HW** will be available by **Mon, Sept 14 and due Thu, Sept 24, 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 (since 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 *with 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 22, 6:00 – 7:30 pm
Exam 2: Thursday, November 19, 6:00 – 7:30 pm
Final Exam: Thursday, December 17, 7:30 – 9:30 pm

Exam Policy: All exams are closed book but students are provided with a Stats 250 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 30.**

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 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-	

Notes: 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%. Please review your lab syllabus for more details.

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 have having difficulties (earlier, rather than too late).

Academic Integrity

The undergraduate academic community, like all communities, functions best when its members **treat one another with honesty, fairness, respect, and trust**. Your instructors and GSIs expect students to work and study together to foster learning and understanding of the material. However, direct copying of homework, copying of homework from existing solutions, cheating on an exam, and other conduct that violates the academic integrity and ethical standards of the College community cannot be tolerated and will result in serious consequences and disciplinary action.

So do not cheat. If we suspect you have cheated (including plagiarism), at the very least you will receive a zero on the assignment. University policy dictates that we must report every instance of academic dishonesty, no matter how small. For examples see http://www.lsa.umich.edu/academicintegrity/index.html. Suspected academic misconduct will be handled by the lecturer/GSI involved as well as Dr. Miller.

General Advice

1. **Perseverance pays.** Most students will 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 E^{2}Coach** to receive a few key messages, tailored advice, a grade calculation tool, and extra review tools.

Stats 250 Tentative Lecture Outline – Fall 2015

As you complete the lecture notes over the term in class, they will be a great source for review.
If you decide to also use the recommended textbook, we are providing
a list of the text chapters (and sections) that are expected be covered each week.

Week	Chapter (Section)	Topic(s)
1 (Sept 8-11)	1 and 2	Statistical Stories, Turning Data into Information Labs do not meet this week (Tuesday/Wednesday)
2 (Sept 14-18)	2, 5, 6, and 7	Data into Information, Sampling and Gathering Useful Data, and Probability
3 (Sept 21-25)	7, 8	Probability, Random Variables
4 (Sept 28-Oct 2)	8, 9 (1-4); 10 (1–3)	Random Variables, Learning about a Population Proportion (SD and CI)
5 (Oct 5-9)	10 (1–3); 12 (1-3,5) 9 (5); 10 (4); 12 (4)	Learning about a Population Proportion (CI and HT) Learning about the Difference in Population Proportions (SD, CI, HT)
6 (Oct 12-16)	9 (6,9,10); 11 (1,2)	Learning about a Population Mean (SD, CI)
7 Mon/Tue Oct 19/20	*Fall Break*	No Lectures Monday/Tuesday, No Labs Monday through Wednesday
Tue Oct 20	***Review for EXAM 1* – time/location TBD, will be captured & posted**	
7 (Oct 21-23)		Some Lecture Review, no classes on Friday, October 23
Thu Oct 22	***EXAM 1* ~ 6:00 – 7:30 pm (locations TBD)**	
8 (Oct 26-30)	13 (1,2,5) 9 (7); 11 (3); 13 (3)	Learning about a Population Mean (HT) Learning about a Population Mean Difference (SD, CI, HT)
9 (Nov 2-6)	9 (8); 11 (4); 13 (4)	Learning about the Difference in Population Means (SD, CI, HT)
Sun Nov 15	***Review for EXAM 2* – time/location TBD, will be captured & posted**	
10 (Nov 16-20)	16	Analysis of Variance
Thu Nov 19	***EXAM 2* ~ 6:00 – 7:30 pm (locations TBD)**	
11 (Nov 23-25)	3, 14	Relationships between Quantitative Variables (Regression)
Nov 26-27		Thanksgiving Break: No Classes Thursday/Friday
12 (Nov 30-Dec 4)	3, 14	Relationships between Quantitative Variables (Regression)
13 (Dec 7-11)	15, 17	Relationships between Categorical Variables (Chi-Square Tests) Turning Data into Wisdom, Wrap Up
14 (Dec 14)	17	Turning Data into Wisdom, Wrap Up; Labs do NOT meet this last short week.
Tue Dec 15	***Review for FINAL EXAM* – time/location TBD, will be captured & posted**	
Thu Dec 17	***FINAL EXAM** 7:30 – 9:30 pm (locations TBD)**	

* All students are expected to take the Thursday, Dec 17, 7:30 pm final exam.
As there may be a few other classes with a final exam also on this Thursday evening that conflicts directly with our exam time; the alternate exam (Friday, Dec 18, 8 am) is set up for such students and only available by prior permission.

Stats 250 Math Review

Here is a set of optional questions that demonstrate the level of math skills needed for Stats 250. Try them out for some review. As with all assignments in Stats 250, show all work and if needed, round your answer to 4 decimal places. You may use (and likely need) a calculator for some computations. Solutions will be available on your Canvas Site (under files). Feel free to bring any questions to your GSI or instructor.

1a) What is the value of $(4+3) \times 7$?

1b) What is the value of $\sqrt{\frac{1}{10}+\frac{1}{20}}$?

2a) Solve for x: $2 \times x + 17 = 23$.

2b) Solve for n: $400 = \left(\frac{n}{10}\right)^2$.

3a) Find $\sum_{i=1}^{3} x_i$, where $x_1 = 3, x_2 = 6, x_3 = -2$ and $x_4 = 8$.

3b) Let $p_1 = .3, p_2 = .1$, and $p_3 = .3$, with p_4 and p_5 unknown. If we know that p_4 has twice the value of p_5, and that $\sum_{i=1}^{5} p_i = 1$, what are p_4 and p_5?

4a) True or False: $\frac{2}{7} < .27$.

4b) True or False: $\frac{11}{15} > 73\%$.

5) What is the mean (average) of 3, 8, 6, -4 ?

6) Plot the following line, including axes labels and at least 3 values on each axis: $y = 2x - 1$.