

Course: STA2220 Introduction to Statistical Concepts and Reasoning

Semester: Winter 2018 **Sections:** 10172 and 14155

Faculty	Office	Phone	Class Time	Room
Bill Hamilton	361 SEB	370-4033	MWF 8am - 9:07am	165 SFH
			MWF 10:40am - 11:47am	165 SFH

Office Hours: Before and after class and by appointment.
(except quiz/exam days- no office hours on these days)

Attendance at every class is expected.

Prerequisites: A 2.0 or better in MTH012 or equivalent course at another school or placement "R". Students are sometimes unaware, until after they have taken a college mathematics or statistics course, how much more emphasis is placed in college courses on understanding and applying concepts, as opposed to learning to perform routine computations. Indeed, understanding of concepts and their applications are the central issues of college-level work. Students who have not been in such courses often underestimate the amount of time and hard work needed to succeed.

Text: The Basic Practice of Statistics, 7th Ed., by Moore, D.S., Notz, W.I., and Fligner, M.A., published by W.H. Freeman. The sections covered are listed on the detailed tentative schedule included in this syllabus.

Calculator Policy: For this course you will need a calculator with basic statistical operations like mean and standard deviation. You may use the calculator on all tests, quizzes, and homework assignments, and it is important to learn to use it effectively. In particular, you should know how to do complex calculations without writing down intermediate answers, and be aware of how many digits of accuracy you can expect an answer to have. To receive full credit on tests, be sure to show all the statistical work necessary for setting up a calculation before using the calculator.

Tests and Quizzes: There will be 600 points possible, coming from quizzes, exams and the final. See the tentative schedule for the details of the point distributions. The tests and quizzes are closed book, closed note.

Final Examination: THE FINAL EXAM IS COMPREHENSIVE. It will be given on Friday, Apr. 20, 8am - 10:45am, and counts 200 points. The room for the final exam will be announced prior to the exam.

Emergency Closing: If OU is closed at the time of a scheduled test or quiz the test or quiz will be given during the next class period when OU reopens. The emergency closing number is 248-370-2000.

Electronic Devices: It is expected that students will refrain from texting, taking/making phone calls, using computers, etc, during class. Such activities are disruptive to the learning process, both to the student doing the activity and to those around them. Therefore, these activities are banned. PLEASE ADHERE TO THIS POLICY.

Grading Policy: Your course grade will be based upon the percentage of points you have earned out of total points in the course. There is no fixed grading scale for this course; a conversion formula from your percentage score to OU grades will be determined at the end of the course. A "worst case" grading scale follows: the lowest possible grade that a given percentage will earn (your grade may be higher than this): 95% - 4.0 , 80% - 3.0 , 65% - 2.0 , 50% - 1.0 After each test, an indication of class performance on that test will be given. Extra credit may be offered and will be announced.

Make-up Policy: No make-up tests or quizzes will be given. If you miss a test or quiz and have a valid reason, timely submitted, your grade will be determined by giving more weight to the final.

Academic Honesty: Cheating is a serious academic crime. Oakland University policy requires that all suspected instances of cheating be reported to the Academic Conduct Committee for adjudication. Anyone found guilty of cheating in this course will receive a course grade of 0.0, in addition to any penalty assigned by the Academic Conduct Committee. Working with others on a homework assignment does not constitute cheating; handing in an assignment that has essentially been copied from someone else does. Receiving help from someone else or from unauthorized written material during a test, quiz, or final exam is cheating, as is using a calculator as an electronic "crib sheet".

Study Habits: Cultivating good work and study habits is necessary for doing well in mathematical sciences courses. You should keep on top of the subject by doing large amounts of homework (frequently working problems not assigned), regularly reviewing earlier material, asking questions in class, and making good use of your instructor, Supplemental Instruction and Tutoring Center (100 NFH). If you are having difficulty with some concept or mathematical procedure, you should get it clarified as soon as possible. If you make mistakes on exams or quizzes, rework these problems with the idea that you will not make similar mistakes later. Regular reviewing of older material in the course will put you in good stead when it comes to final exam time. This will help you to avoid the usual non-retention problems students encounter at the end of the course. You should expect that doing all of these things will take at least two hours outside of class for each hour in class. Many students find it helpful to spend some of this time working with others in study groups.

Dropping the Course: The Department of Mathematics and Statistics is committed to achieving the goal of an academically sound freshman and sophomore mathematical sciences curriculum in which most conscientious OU students can expect to be successful. If you are considering dropping the course and wish to discuss the matter further, you are encouraged to contact your instructor. The last day to drop this Winter 2018 course is Wednesday, Mar. 14, 2018. The Registrar's Office strictly adheres to this date. Be sure to consult with an advisor to assure that you fully comprehend the consequences of your actions (staying in or dropping).

Course Objectives: The primary goal of this course is to introduce the concept of statistical theories, and the usage of statistical methods to students with minimal mathematical sophistication. The successful student will develop an appreciation and understanding of (1) purposes and methods of exploratory data analysis, (2) probability theory and its role in our daily lives, (3) basic statistical inference including sampling techniques, sampling distribution, estimation, and testing, and (4) statistical problem solving such as correlation study and analysis of qualitative data.

Topics List :

- Chapter 0 : Getting Started (Statistical ideas, what lies ahead)
- Chapter 1 : Picturing Distributions (Bar Graphs and Pie Charts, Histograms, Stemplots, Time Plots)
- Chapter 2 : Describing Distributions with Numbers (Measures of Center and Spread, 5-Number Summary and Boxplots)
- Chapter 3 : The Normal Distributions
- Chapter 4 : Scatterplots and Correlation
- Chapter 5 : Regression (Least-Squares Regression)
- Chapter 6 : Two-way Tables (Describing relationships with categorical variables , Simpson's paradox)
- Chapter 8 : Producing Data : Sampling (Simple Random Samples, Other Sample Designs, Multistage Samples)
- Chapter 9 : Producing Data : Experiments (Comparative Experiments, Randomized Comparative Designs, Completely Randomized Designs, Matched-pair and Block Designs)
- Chapter 10: Data Ethics
- Chapter 12 : Introducing Probability Distributions (The Idea of Probability , Probability Rules, Normal Probability Distributions)
Central Limit Theorem)
- Chapter 13: General Rules of Probability (Independence and the Multiplication Rule, the General Addition Rule, Conditional Probability)
- Chapter 14: The Binomial Distributions (Binomial Distribution, Normal Approximation to the Binomial)
- Chapter 15: Sampling Distributions (Parameters and Statistics , Statistical Estimation, Sampling Distributions, The
- Chapter 16: Confidence Intervals: The Basics (Confidence intervals for a population mean μ when σ is known)
- Chapter 17: Tests of Significance: The Basics (Test for a population mean μ , p-values, Statistical Significance)
- Chapter 18: Inference in Practice (Conditions and cautions for confidence intervals and hypothesis tests, sample size determination, power of a hypothesis test)
- Chapter 20: Inference About a Population Mean (The t Distributions, One-sample t Confidence Intervals and Tests, Matched Pairs t procedures, Robustness of t procedures)
- Chapter 22: Inference for Proportions (Large Sample Confidence Intervals and Hypothesis Tests for p, Sample Size Determination, Accurate CIs for proportions)

Note: Ch 7, 11 and 19 contain review problems for previous material

General Education Learning Outcomes :

This course addresses the following general education learning outcomes:

- 1) The student will demonstrate knowledge of one or more formal reasoning systems such as computer programming, mathematics, statistics, linguistics or logic.

Particularly, successful students in this course will demonstrate knowledge of statistical thinking, and be able to apply it in order to read, understand, model, and solve problems across a variety of applications. Every section of the text includes examples and exercises that involve applying statistical reasoning in order to reach conclusions based on data.

- 2) The student will demonstrate application of formal reasoning to read, understand, model, and solve problems across a wide variety of applications.

The course contributes to the Natural Science and Technology objective demonstrating the ability to develop and test hypotheses, draw conclusions, and report findings. Statistical reasoning is one of the foundations of the scientific method.

This course also addresses the following general education "Cross-Cutting Capacities":

- 1) Critical thinking. Solving statistics problems involves the following skills identified as part of the capacity for critical thinking: (a) ability to clearly formulate questions and problems, (b) ability to gather and assess relevant information using abstractions to interpret it effectively, (c) ability to come to well-reasoned conclusions and solutions and test them against relevant criteria, (d) ability to recognize and assess the assumptions, implications, and consequences of alternative theories.

- 2) Social awareness. Many examples in the course illustrate the application of statistical methods in order to better understand important social issues. ("Statistical thinking will one day be as necessary for effective citizenship as the ability to read and write" H.G. Wells, 1904)

Class Policy Concerning Use of Electronic Devices

In recent years, there has been an explosion in the use of electronic devices for communicating, game playing, web surfing and other similar activities. The prevalence of these devices has had, in this instructor's humble opinion, a negative impact within the classroom. The distractions that these devices create, both for the user of the device and those around them, significantly impede the ability of students to master the material of a course. It is not uncommon to have a student, maybe even sitting in the front row, staring at their lap, both hands beneath the table, totally absorbed in a conversation that in all likelihood has nothing at all to do with the course lecture going on. How can this possibly be beneficial to the learning process?

Some students will say that they can do both (simultaneously communicate with others and pay attention in class). Common sense, and many studies, suggest otherwise. I have had numerous instances where some simple statement was made, but because so many students were not paying attention due to use of these devices (or just talking with other students), the statement had to be repeated again, and again, and again. When absorbed in these other activities, a student cannot also maintain focus on the class material. They may hear the words, but the meaning does not sink in or is not retained. Sometimes when looking at the notes students have taken, it is clear that there are times when whole segments of the lecture were not recorded.

As the instructor of the class, it is my responsibility to assure a good environment for students to learn the material. This can only occur if everyone in the room is focused on the task at hand. When I was a student at OU (back before most of you were born), when I was on campus my focus was entirely on school. I was away from family, almost all of my friends, and just about anything else that might distract me from my studies. There were virtually no other campus activities to draw attention from my studies. Maybe a pay phone or two on campus. These were the good old days for education! We can recapture some of our focus by turning off potential distractions.

I know it can be difficult, being out of touch with the world, but it is only for a little over an hour, and this is a reasonable requirement. All parties involved will benefit, and you might find that the lectures are not as "rambling" or "boring" as students are so fond of referring to them as. At the very least, you will learn more than you would if you were to allow yourself to be distracted.

So the bottom line: turn off cell phones, do not text in class, use a computer (if you must) only to take notes. Use these technological wonders outside of class to facilitate learning (researching topics, etc). Please help to make for a good learning environment in the classroom for all of us. This is not too much to ask.

Tentative Schedule - Winter 2018

Jan.			Mar.	7	Ch.12/13
	3	Intro, Ch.0		7	Ch.12/13,Ch.14
(2)	5	Ch.1	(25)	9	Ch.14
	8	Ch.1,Ch.2		12	Ch.15
	10	Ch.2		14	Ch.16-18
(5)	12	Ch.2	(28)	16	Quiz III (Ch.12-15)
	15	MLK Day - No Class		19	Ch.16-18
	17	Ch.3		21	Ch.16-18
(7)	19	Quiz I (Ch.1,2)	(31)	23	Ch.16-18,Ch.20
	22	Ch.3		26	Exam III (Ch.10-18)
	24	Ch.4/5		28	Ch.20
(10)	26	Ch.4/5	(34)	30	Ch.20
	29	Exam I (Ch.1-3)	Apr.	2	Ch.20,Ch.22
	31	Ch.4/5		4	Ch.22
Feb.	2	Ch.4/5,Ch.8	(37)	6	Quiz IV (Ch.20)
(13)	5	Ch.8		9	Ch.22
	7	Quiz II (Ch.4/5)		11	Ch.6
(16)	9	Ch.9/10	(40)	13	Review
	12	Ch.9/10	(41)	16	Review
	14	Ch.9/10	Exams are 100 points, quizzes 25 points, the final 200 points. No scores dropped.		
(19)	16	Ch.9/10,Ch.12	(Classes end 10pm, Tuesday, Apr. 17)		
	19	Winter Recess	**** Final Exam: Fri, Apr.22 ****		
	21	Winter Recess	8am - 10:45am		
	23	Winter Recess	*Room to be announced later in the semester - be sure to know where*		
	26	Ch.12/13	Note: This will be the same time as other lower-level math finals.		
	28	Exam II (Ch.4,5,8,9,10)	Notify your instructors!		
Mar.	2	Ch.12/13			
(22)					

Important Dates : Jan. 17 - Last day for 100% tuition refund
 17 - Last day "no grade" drop
 17 - Last day to add a class
 Mar. 14 - Last day for official withdrawal
 Apr. 17 - Classes end at 10 pm

 * April 20 - Day math class finals 8am - 10:45am *

NOTE: Many day math finals are given at a special time and place. If you have another math class, special arrangements may be needed to take both finals. For Winter semester, expect to take the STA2220 final with your class.