

EDP 371: Introduction to Statistics Spring 2018 – Tuesdays/Thursdays

Instructor

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Office Hours

Tuesdays/Thursdays: 1:50pm – 2:45pm & by appointment

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Course Description:

This course is designed to help students learn:

- Introductory descriptive and inferential statistical procedures that are used in educational, behavioral and social science research studies.
- Assumptions and concepts underlying, the hypotheses being tested by, and the inferences that can be made with the use of the relevant statistics and procedures.
- How to conduct your own such statistical analyses and to evaluate critically others' uses of statistics.

Pre-requisites

Mathematical skills: While this course is not completely mathematical, it is founded upon the use of mathematical tools. Thus some fundamental mathematical skills are essential for successful mastery of the material. Students are expected to have basic algebra skills including the ability to solve single variable equations. Students should have a basic understanding of exponents and square roots, as well as the order of operations, proportions, fractions, decimals, percentage, and negative numbers. Appendix A of the textbook contains a review of the basic math skills needed for this course. Please be sure to review and check with the instructor or teaching assistants if you have any concerns.

Calculator: Students are required to bring a scientific calculator to class that can be used to sum, multiply, square and take the square root of numbers. Calculators are recommended for use during class time, homework assignments, and exams. Please do not forget your calculator for the exam. Use of cell phones is completely forbidden during the exam.

Computer software: The material covered in this course does not require the use of statistical software. Instead, students are expected to calculate the relevant statistics using the formulas provided by hand/calculator. The formulas are simple enough that their use should reinforce students' understanding of the relevant concepts. Jumping straight to using statistical software instead of working on problems by hand tends to reduce the depth of students' understanding. In higher level statistics courses, use of Excel, SPSS, SAS, R, etc. is introduced but it is not deemed necessary for this basic material.

Course Materials and Resources

- *Statistics for the Behavioral Sciences, 10th Edition* by F. J. Gravetter and L. B. Wallnau. This textbook is available at the Co-op. It also provides a good resource in that it presents the material in a slightly different way than the instructor presents the material during class time. You are welcome to use an earlier edition (9th edition) but then you are responsible for making sure that you read corresponding material (as page numbers likely differ), figuring out errors that might have been fixed in the later edition and aligning problems. You are only responsible for the material in the textbook covered during class.
- Class handouts matching the overheads used by the instructor will be available on **CANVAS** (<http://canvas.utexas.edu>) under **Introduction to Statistics**. Reading the handouts does not provide the student with the learning experiences nor the complete material equivalent to that obtained by attending class. The handouts provide a skeleton of what is being covered each day and will thus be an incomplete version of the material actually covered. They contain spaces for the student to fill in the additional material and practice provided in class. Notes will be posted the day before to the day on which the notes are discussed in class. I recommend printing out the notes and bringing them to class to write in any additional notes and calculations discussed in class.

Assignments - UNGRADED

Homework

Reading about statistics does not ensure mastery. As with many other skills, the best way to master statistics is through practice. There will be homework problems associated with each class topic (see List of Topics). Once a topic has been covered in class, the homework should be completed. The homework problems will be posted online also for students who do not have the 10th edition.

The majority of the homework assignments are even-numbered problems from the textbook. Because answers to odd-numbered problems are available at the back of the text, students are also strongly encouraged to try odd-numbered problems on their own. The more practice, the better!

The answers to each assigned even-numbered homework problem will be made available in the Homework Answers folder on Canvas. It is the student's responsibility to check their work and ensure their mastery of the relevant material. Do come to office hours with the teaching assistants and the instructor if you have any questions.

Assignments - GRADED

Exams

Exams tend to "motivate" students to thoroughly review course material and provide students with additional practice. The three in-class exams (***February 15th***, ***March 29th*** and ***May 3rd***) will consist of conceptual, computational and application questions. The exams will focus on the material covered during the most recent class segment. More detail will be provided about the material assessed by each exam closer in time to the actual exams. It should be noted that most of the statistical skills acquired during this class are constantly building upon earlier learning. This means that even though each exam will focus on the preceding section of the course, students might need to recall skills learned in earlier sections!

To relieve test anxiety and approximate a more authentic environment in which researchers have access to reference materials, students will be given a formula sheet for use during exams. And the format of the formula sheet will be shared the week before each exam. The exams are not open-book because summary of learning should be accomplished before, not during, the exam. The dates of

these exams will not change. Time permitting, Exam Review sessions will be offered during the immediately preceding class period.

Format: Exams will consist of true-false, multiple-choice and short-answer questions including both conceptual and computational problems. Partial credit is awarded where relevant. Students will be given the entire class time to complete each exam.

Materials: Students will be given a formula sheet and necessary tables for each exam. Students MUST bring a calculator. Cell phones must be hidden away and turned off during exams.

Proportion of final grade: Exams are worth a total of **75%**. The first two exams are worth 25% each and the last exam is worth 25% of the final grade.

Online Quizzes

This assignment is designed to encourage students to keep up with material covered in class while offering them the opportunity to test their mastery of concepts and to try out additional computational exercises. It also exposes students to various kinds of questions they should be considering when reviewing material. Quizzes will be posted on Canvas and need to be completed every two weeks by Friday at 5pm of that week, unless otherwise stated. Announcements will be sent out when a quiz is posted. The quiz will be closed after the due date and time. It is your responsibility to ensure that you complete the quizzes on time.

Proportion of final grade: Quizzes are worth **25%** of the final grade.

Makeup assignments

Only in exceptional circumstances (which does **NOT** include family vacations/ weddings, routine doctor's appointments, job interviews, etc.) and only with **prior** permission from the instructor, or with a verifiable medical excuse, will students be able to take a makeup exam. The student must provide medical proof of illness. The student is responsible for notifying the teaching assistants and the instructor by the day of the exam that they cannot attend the exam.

As a student will be given ample time to complete a quiz, it is the responsibility of the student to ensure the quiz is completed by the due date. It is important to complete the quizzes **before** the day that they are due to avoid forgetting or working around other issues that may come up.

Grading system

| <i>Assessment</i> | <i>Weight</i> |
|---------------------|---------------|
| Online Quizzes | 25% |
| In-class Exams | 75% |
| Homework (Ungraded) | -- |

Grades are assigned based on the percentage of accumulated points as follows:

A : 93-100; **B+**: 87-89; **C+**: 77-79; **D+**: 67-69; **F**: 0-<60
A-: 90-92; **B** : 83-86; **C** : 73-76; **D** : 63-66;
 B-: 80-82; **C-**: 70-72; **D-**: 60-62;

Attendance policy

Students are responsible for all material presented in lectures. (This material includes course material and due dates for online quizzes). It is expected that students will attend lectures although attendance will not be taken. The class is designed this way because it is felt that the guided practice

obtained during class time provides one of the best opportunities for learning. While exam dates will not change, due dates for online quizzes are assigned during class time because they will be based on when the coverage of the relevant material is complete.

Exams are held during class time and can only be re-scheduled for individual students under exceptional circumstances. (see Makeup Assignments section)

Students are expected to arrive **on time** for the beginning of class. Cell phones and pagers **must** have the sound turned off when in the classroom and are not allowed to be visible or on students' desks during exams.

Religious Holy Days

Religious holy days sometimes conflict with class and examination schedules. Section 51.911 of the *Texas Education Code* addresses absences by students for observance of religious holy days. The policy states that a student shall be excused from attending classes or other required activities, including examinations, for the observance of a religious holy day, including travel for that purpose. A student whose absence is excused under this subsection may not be penalized for that absence and shall be allowed to take an examination or complete an assignment from which the student is excused within a reasonable time after the absence. University policy requires students to **notify** each of their instructors as far in advance of the absence as possible so that arrangements can be made.

If you must miss a class, an examination, or an online assignment in order to observe a religious holy day, you will be given an opportunity to complete the missed work within a reasonable time after the absence but you must have arranged the new deadline with me (the instructor) in advance. The same applies for online assignments. If you will have to miss the deadline for submission of an online assignment, due to the observance of a religious holy day, then it is your responsibility to schedule a time with me in advance of the deadline for the assignment.

Scholastic dishonesty policy

The University defines academic dishonesty as cheating, plagiarism, unauthorized collaboration, falsifying academic records, and any act designed to avoid participating honestly in the learning process. Scholastic dishonesty also includes, but is not limited to, providing false or misleading information to receive a postponement or an extension on a test or other class assignment, and submission of essentially the same written assignment for two courses without the prior permission of faculty members. (Please refer to the University of Texas' Honor Code that can be found at the following website: <http://catalog.utexas.edu/general-information/the-university/#universitycodeofconduct>)

By accepting this syllabus and participating in this course, you have agreed to these guidelines and **must** adhere to them. This means (specifically for this class) that any work that you hand in for a grade **MUST** be your own work. This also means that you may **NOT** use or review the assignments or exams of students of this class from previous semesters.

Violation of this agreement and of any of the University rules on scholastic dishonesty will result in the student being awarded an ***F for the final course grade***, being referred to the appropriate university officials, and may result in suspension or expulsion from the University.

Disability Accommodation

Students with disabilities who require special accommodations need to get an accommodation letter that documents the disability from the Services for Students with Disabilities (471-6259 voice or 471-4641 TTY for users who are deaf or hard of hearing). This letter should be presented to the

instructor in each course at the beginning of the semester and accommodations needed should be discussed at that time. Five business days before an exam, the student should remind the instructor of any testing accommodations that will be needed. See the following website for more information: <http://diversity.utexas.edu/disability/>.

Communication

You will also be responsible for checking the Canvas course site regularly for announcements and copies of my overheads. As with all computer systems, there are occasional scheduled downtimes as well as unanticipated disruptions, so plan accordingly.



In this course *e-mail* will be used as a means of communication between instructor, teaching assistants and students. When emailing questions, please be specific and give adequate time for response.

EDP Research Participation Requirement

All students registered for this course must complete a research participation requirement through the Educational Psychology Department subject pool. To do so, you must either complete 5 credits worth of EDP subject pool studies or write the 5-page alternate assignment (a research paper about a roughly 20-page article). The deadlines will be posted on Canvas. If you still have questions, please email the Subject Pool Coordinator, Hien Nguyen, at edpSubjectPool@austin.utexas.edu. Or visit: http://www.edb.utexas.edu/education/departments/edp/subject_pool/students/

EDP 371: Introduction to Statistics, Spring 2018
Tentative Schedule of Topics

| Date: | Topic | Reading | Homework - 10th edition |
|-------------------------|--|---|---|
| 1/16 Tues | Syllabus, course requirements, course content, etc. | | |
| 1/18 Thurs | <i>Introduction:</i> <ul style="list-style-type: none"> Vocabulary 4 scales of measurement Statistical notation | Chapter 1 | <u>Chapter 1</u> 8, 12, 20, 22 |
| 1/23 Tues | <i>Frequency distributions of scores:</i> <ul style="list-style-type: none"> Tables Graphs Shape Percentiles | Chapter 2 | <u>Chapter 2</u> 4, 6, 10, 22 |
| 1/25 Thurs | <i>Measures of central tendency</i> <ul style="list-style-type: none"> Mean Median Mode Characteristics of Mean | Chapter 3 | <u>Chapter 3</u> 4, 6, 10, 22, 24 |
| 1/30 Tues | <i>Measures of variability:</i> <ul style="list-style-type: none"> Range IQ & SIQ Range Variance & standard deviation | Chapter 4 | <u>Chapter 4</u> 2, 4, 7, 8, 14, 15, 18, 22, 24 |
| 2/1&2/6 Thurs/Tues | <i>Z-scores:</i> <ul style="list-style-type: none"> Raw scores⇒Z-scores Z-scores⇒Raw scores Transforming scales Normal distribution | Chapter 5 Chapter 6: p.159-178, p.184-on | <u>Chapter 5</u> 1, 6, 22, 24, 25 <u>Chapter 6</u> 6, 10, 18, 20 |
| 2/8 Thurs | <i>Sampling distributions of sample means:</i> <ul style="list-style-type: none"> Shape Mean Variability | Chapter 7 | <u>Chapter 7</u> 1, 4, 8, 10, 13, 16, 20 |
| 2/13 Tues | <i>Continue previous topic & REVIEW</i> | | |
| 2/15 Thurs | <i>EXAM I</i> | | |
| 2/20&2/22 Tues/Thurs | <i>One-sample Hypothesis Testing</i> <ul style="list-style-type: none"> Assumptions The Four Steps and the “logic” of Hypothesis testing Type I & Type II error / Power | Chapter 8 | <u>Chapter 8</u> 4, 6, 8, 16, 22, 23 |

| Date: | Topic | Reading | Homework – 10th edition |
|--|--|---------------------------------------|--|
| 2/27 Tues | <i>The one-sample t-statistic</i> | Chapter 9 | <u>Chapter 9</u> 1, 2, 5, 6, 8, 12, 18, 22, 23 |
| 3/1 Thurs | <i>Confidence intervals</i> | Chapter 9 | 13, 14c), 15b), 17b) |
| 3/6 Tues | <i>Independent samples Hyp. Testing</i> <ul style="list-style-type: none"> Sampling dist'n of differences between sample means F-Max statistic | Chapter 10 | <u>Chapter 10</u> 3, 4, 6, 10, 14, 18, 19, 22 |
| 3/8 Thur | <i>Related samples</i> <ul style="list-style-type: none"> Sampling dist'n of mean differences | Chapter 11 | <u>Chapter 11</u> 1, 2, 10, 20, 22 |
| <div style="text-align: center;">  March 12th to March 16th  SPRING BREAK – NO CLASS </div> | | | |
| 3/20&3/22 Tues/Thurs | <i>Analysis of Variance (ANOVA)</i> | Chapter 12 | <u>Chapter 12</u> 1, 3, 4, 9, 10, 12, 20, 21 |
| 3/27 Tues | <i>Continue previous topic & REVIEW</i> | | |
| 3/29 Thurs | <u>EXAM 2</u> | | |
| 4/3&4/5 Tues/Thurs | <i>Multiple comparisons (cont'd)</i> <ul style="list-style-type: none"> Tukey's HSD Scheffé's | Chapter 12 p.393-on | <u>Chapter 12</u> HW will be provided |
| 4/10&4/12 Tues/Thurs | <i>Correlation</i> <ul style="list-style-type: none"> Hypothesis testing | Chapter 15 p.485-509 | <u>Chapter 15</u> 1, 2, 5, 8, 10, 12, 14 |
| 4/17 Tues | <i>Simple Regression</i> | Chapter 16 p.529-537 | <u>Chapter 16</u> 2, 4, 6, 8, 10, 14 and calculate standard error of estimate for 10 and 14 |
| 4/19 Thurs | <i>Chi-squared test of</i> <ul style="list-style-type: none"> Goodness of Fit | Chapter 17 p.559-573 | <u>Chapter 17</u> 2, 4, 8, 10 |
| 4/24&4/26 Tues/Thurs | χ^2 test of <ul style="list-style-type: none"> Independence | Chapter 17 p.573-582, p.586-587 | <u>Chapter 17</u> 11, 16, 21 |
| 5/1 Tues | <i>Continue previous topic & REVIEW</i> | | |
| 5/3 Thurs | <u>EXAM 3</u> | | |

Hints for success

Practice: Practice will facilitate successful mastery of the skills to be learned from this class. During class periods, guided practice will be offered in the form of sample problems. The ungraded homework and online quizzes will also provide opportunities for practice. It is hoped that studying for and completion of exams will provide additional such opportunities!

Practice II: Watching the instructor work through examples might (hopefully) make it appear simple. However, I will not be at your side when you are working problems out in the real world (or, say) on exams. I strongly recommend that you practice what you see me doing.

Practice III: You know the topic you are covering when doing a homework or online quizzes or listening to my working through an example in class. In the real world (or, in, say, an exam), you will not have these contextual clues (such as chapter headings!). Make sure you understand **when** to use the statistics we cover, not just how to do so. (The portfolio entries are designed to help you think about when to use the statistics as well as how to do so).

Homework I: The homework problems provide you with mostly computational practice. However, I expect you to grasp more than just the steps required to solve problems. I would strongly recommend that you also focus on **mastering the concepts** covered during class time. Their mastery will provide you with a strong foundation for understanding the statistics covered in this and later statistics courses.

Homework II: By the same token, while some of the homework problems appear to entail purely computational practice, some of them are trying to demonstrate statistical concepts (such as comparing factors that might impact statistical conclusions) using numbers. Instead of whipping through the computations, do try to take some time to think through why the questions might ask you to compare outcomes. What factor is being manipulated and what is the impact of the manipulation?

Textbook: You are responsible for whatever topics are covered in class. We do not necessarily cover all the material in the textbook. The terminology in the textbook sometimes differs from what we use in class. Use the terminology and symbols that I use in class. For class assignments, you must use the terminology and symbols that I use in class. However, it is helpful to realize that there are multiple ways that disciplines present statistical concepts and for you to be flexible for scenarios outside of this class.

Study groups: It is highly recommended that you form study groups to master the material in this class. If you understand a concept, teaching it to your fellow students will help you solidify that learning. If you do not understand a concept, it might help to have it presented to you by someone who has more recently mastered it rather than by the TA or instructor. It can help to have a concept presented by several people in different ways. BUT any of the work handed in for assessment (assignments and exams) **must be** the work of the individual student. If it is not, you will receive an **F** for the course.

Office hours: Use them – our job is to help you learn! If you cannot make our office hours due to scheduling conflicts with work or courses, ask me or the teaching assistants via email to schedule another time to meet.

Email I: Check your email messages from me and the TAs.

Email II: Use email to schedule appointments **NOT** to ask conceptual or computational questions. We will not answer those questions online because hand-feeding you the answer(s) does not help your learning as much as our prompting **you** (face-to-face) to come up with the answer.

Email III: (and most important) If you email one of us (professor or teaching assistants), please give us adequate time to respond and **copy all of us on the email**. That ensures a speedier response.

Class notes: If a student misses class, it is his/her responsibility to obtain any missed information from a classmate – ***not*** from the instructor, ***nor*** from the teaching assistants.

Keep up: The skills to be mastered for statistical analyses keep building upon themselves. If you fall behind, it will not only affect the topic in which you are behind but will affect your learning of a later topic.

**FOR THOSE OF YOU WHO HAVE THE 9th EDITION,
PLEASE USE THE FOLLOWING PAGE NUMBERS**
9th EDITION PAGE NUMBERS

| Date: | Topic | Reading | Homework – 9th Edition |
|-------------------------|--|---|--|
| 8/31 Thurs | Syllabus, course requirements, course content, etc. | | LOOK ON CANVAS FOR HOMEWORK SETS |
| 9/5 Tues | <i>Introduction:</i> <ul style="list-style-type: none"> ▪ Vocabulary ▪ 4 scales of measurement ▪ Statistical notation | Chapter 1 | |
| 9/7 Thurs | <i>Frequency distributions of scores:</i> <ul style="list-style-type: none"> ▪ Tables ▪ Graphs ▪ Shape ▪ Percentiles | Chapter 2 | |
| 9/12 Tues | <i>Measures of central tendency</i> <ul style="list-style-type: none"> ▪ Mean ▪ Median ▪ Mode ▪ Characteristics of Mean | Chapter 3 | |
| 9/14 Thurs | <i>Measures of variability:</i> <ul style="list-style-type: none"> ▪ Range ▪ IQ & SIQ Range ▪ Variance & standard deviation | Chapter 4 | |
| 9/19 Tues | <i>Z-scores:</i> <ul style="list-style-type: none"> ▪ Raw scores⇒Z-scores ▪ Z-scores⇒Raw scores ▪ Transforming scales ▪ Normal distribution | Chapter 5 Chapter 6: p.163-184, p.189-on | |
| 9/21 Thurs | <i>Sampling distributions of sample means:</i> <ul style="list-style-type: none"> ▪ Shape ▪ Mean ▪ Variability | Chapter 7 | |
| 9/26 Tues | <i>REVIEW</i> | | |
| 9/28 Thurs | <i>EXAM 1</i> | | |
| 10/3-10/5 Tues/Thurs | <i>One-sample Hypothesis Testing</i> <ul style="list-style-type: none"> ▪ Assumptions ▪ The Four Steps and the “logic” of Hypothesis testing ▪ Type I & Type II error / Power | Chapter 8 | |

| Date: | Topic | Reading | Homework |
|-------------------------------|--|---|-----------------|
| 10/10 Tues | <i>The one-sample t-statistic</i> | Chapter 9 | |
| 10/12 Thurs | <i>Confidence intervals</i> | Chapter 9 | |
| 10/17 Tues | <i>Independent samples Hyp. Testing</i> <ul style="list-style-type: none"> ▪ Sampling dist'n of differences between sample means ▪ F-Max statistic | Chapter 10 | |
| 10/19 Thurs | <i>Related samples</i> <ul style="list-style-type: none"> ▪ Sampling dist'n of mean differences | Chapter 11 | |
| 10/24- 10/26 Tues/Thurs | <i>Analysis of Variance (ANOVA)</i> | Chapter 12 | |
| 10/31 Tues | REVIEW | | |
| 11/2 Thurs | <u>EXAM 2</u> | | |
| 11/7-11/9 Tues/Thurs | <i>Multiple comparisons (cont'd)</i> <ul style="list-style-type: none"> ▪ Tukey's HSD ▪ Scheffé's | Chapter 12 p.415-on | |
| 11/14- 11/16 Tues/Thurs | <i>Correlation</i> <ul style="list-style-type: none"> ▪ Hypothesis testing | Chapter 15 p.509-530 | |
| 11/21 Tues | <i>Simple Regression</i> | Chapter 16 p.557-569 | |
| 11/23 Thurs | <i>Thanksgiving – no class</i> | | |
| 11/28 Tues | <i>Chi-squared test of</i> <ul style="list-style-type: none"> ▪ Goodness of Fit | Chapter 17 p.591-603 | |
| 11/30 Thurs | χ^2 test of <ul style="list-style-type: none"> ▪ Independence | Chapter 17 p.604-613, p.615-616, p. 620-on | |
| 12/5 Tues | REVIEW | | |
| 12/7 Thurs | <u>EXAM 3</u> | | |