EDP 380C 4-Correlation and Regression Methods
Spring 2017 – Unique #: 10856   TTH 12:30 – 2:00pm   SZB 240

Instructor   **Office Hours**
Dr. Anita Israni   Tuesdays: 2:00 – 3:30pm & by appointment
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Course Description

This course is designed for students to master correlation and regression techniques. This class will focus on helping students learn how to:

1) Identify when to use correlation and regression techniques,
2) Understand associated assumptions and how to test them,
3) Make the appropriate inferences,
4) Describe and discuss correlation and regression and associated inferences.

Pre-requisites

*Mathematical/Statistical skills***:** This course requires the use of several intermediate level mathematical/statistical skills and understanding. Students are <u>required</u> to have successfully completed a *Fundamentals of Statistics* graduate course (including ANOVA and associated topics: not a research design course but a statistics-based course). Equivalent graduate level courses can be approved by the instructor.

*Computer programs***:** Some examples of the use of SPSS will be given during class time but students will also be expected to calculate many of the statistics by hand (or calculator) and thus to master use (and interpretation) of the relevant formulas. Note that there are many different versions of SPSS available and they might look somewhat different (from my version and thus differ somewhat from the screenshots in the course overheads and from each other's versions). However, as these versions change, you will have to be flexible about figuring out where to find the relevant SPSS functions. However, students are not required to use SPSS. If a student uses another statistical software program (R, SAS, Stata, etc.), then they are responsible for ensuring the correspondence between procedures and estimation techniques that are used.

Calculator: Students <u>must</u> have access to a calculator that can be used to perform the relevant mathematical functions (such as taking the natural log, the exponent, square root, etc.). Students will need to use the <u>calculator during class time</u> – both during lectures and for in-class exams.

Class-time distractions: Do **not** text, surf the internet, check Facebook, email, etc. during class time as this distracts both you and students seated around you. Please turn off the volume on your <u>cell phones</u> when in class unless you have a reason that you might need to keep the volume on (child- or elder-care emergencies, etc.).

Required Course Materials

- Warner, R. M. (2013). *Applied statistics: From bivariate through multivariate techniques* (2nd ed.). Los Angeles, CA: Sage. One copy of the book is available on PCL Reserves. References to pages in the texts that correspond to topics covered in class are provided in the schedule below. The texts provide some information not covered in class and similarly some material is covered in class that might not be mentioned in the texts. <u>The student is responsible for</u>

material covered in class. Students may choose to read the sections either <u>before or after</u> the class sessions, whichever better helps them solidify their learning.

- Class notes will be available on our Canvas website. Class notes will be posted by 10pm prior to the day on which the notes are discussed in class and may be retrieved on Canvas: <u>canvas.utexas.edu</u>. I update overheads to match class progress and thus cannot offer them any earlier. Please do not ask to post them earlier.

Course Assessment

1. Portfolio of Correlation and Regression Research Questions: As consumers of this course, each student inevitably brings their own unique applied, substantive area of interest. Application of the techniques mastered in this class to students' specific substantive research area should prove useful to students' understanding of the relevance and importance of these techniques and should help students master the material far more than watching the instructor's demonstrations using possibly irrelevant examples. For almost every statistic covered in this course, students will construct a portfolio entry. For each portfolio entry, a rubric detailing what is required and a worked example will be provided. Basically, for each concept, the assignment will involve students constructing research questions in their own area of research interest that can be "answered" using the statistical concept of interest. Students will name and briefly describe the variables of interest, detail the relevant relationship of interest, the statistical analysis to be conducted, make up (or use actual) data, calculate statistics that would result and interpret the resulting values. Portfolio entry assignments and due dates ***will be posted on Canvas and discussed during class***. Dates for the entries are selected based on class progress.

2. Exams: Exams tend to "motivate" students to thoroughly review course material and provide students with additional practice. The three equally weighted (i.e., each will be 30% of the final grade) in-class exams (on **2/16**, **3/30, 5/4**) will consist of conceptual, computational and application questions. Students must bring a <u>calculator</u> to the exams. 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 (students will likely be much better prepared if they don't need to rely on it). 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, <u>Exam Review</u> sessions will be offered during the immediately preceding class period. Each exam will cover material from the lessons since the last exam (unless otherwise specified). <u>Missed exams may not be made up unless arrangements have been made prior to class.</u>

3. Quizzes and Homework (Ungraded): Watching the instructor perform calculations can result in the <u>illusion of understanding</u>. Only by answering questions themselves can students ensure their mastery of the material. Short quizzes and longer homework (both ungraded) will be posted on Canvas periodically and announced to all students when available.

Course Grades

Your exams (percentage correct on each exam) will be weighted equally. Grades will be posted to our Canvas website – please periodically check for any keypunch errors. Final grades will then be assigned based on the scale below.

Assessment	*Weight*
Portfolio of Correlation and Regression Research Questions	10%
In-class Exams	90%
Online Quizzes (Ungraded)	--

Overall Course Percent	Grade
93% - 100%	A
90% - 92%	A-
87% - 89%	B+
83% - 86%	B
80% - 82%	B-
77% - 79%	C+
73% - 76%	C
70% - 72%	C-
below 70%	F

Unless a computational error has been made, grades will not be changed after the end of the semester.
No Extra Credit: Your course grades are based only on the above information. There will be no extra-credit opportunities.
Grades of "Incomplete:" Unless the student can demonstrate that near catastrophic events have led to a case of extreme hardship, grades of "Incomplete" will not be given.

Attendance:

Students are responsible for all material presented in lectures. It is expected that students will attend lectures, however, attendance will not be taken. If a student misses a class, then regardless of the reason for class being missed the **student is responsible** for obtaining both the course material that was missed as well as any class announcements from his/her classmates.

Students are expected to arrive **on time** for the beginning of class. Assignments are due at the beginning of class on the due date specified with the assignment. If a student cannot attend on the days when an in-class assignment is due, then the student is responsible for notifying the instructor **in advance** and arranging timely delivery of the assignment or completion of an alternative assignment.

We **do not accept emailed** assignments.

Religious holy days sometimes conflict with class and examination schedules. It is the policy of The University of Texas at Austin that you must give your instructors sufficient notification prior to the classes scheduled on dates you will be absent to observe a religious holy day. If a student has to miss an assignment due to a religious holy day, it is the student's responsibility to consult the instructor to re-schedule another deadline for the assignment.

Please note the dates of the exams. Classes will not be held during Spring Break.

Access to IBM SPSS

- IBM SPSS is available in the following campus labs: MEZ 2.104 (5 copies).
- UT Campus Computer Store - 1 year license GradPack (PC or Mac)
- Software Distribution & Sales - 1 year annual license (PC or Mac)
- e-academy lease licenses - 6 month or 12 month student license
- A FREE option is to run SPSS by logging into a virtual environment from anywhere with a network connection to use the software. Instructions can be found by going to desktop.edb.utexas.edu and clicking the "Click Here" link under "Message Center."
  Be sure to also read this page:
  http://www.edb.utexas.edu/education/ito/tutorials/connect/coe_desktop_resources/coe-stats-vdi/

Training for IBM SPSS

The Department of Statistics and Data Sciences offers Software Tutorials for SPSS and other statistical software. Please see: https://stat.utexas.edu/training/

Correlation and Regression Methods
Spring 2017 Tentative Schedule, Topics, and Reading Assignments

Date	Topic	Warner
1/17 & 1/19	Course Introduction & Review of Important Statistical Concepts • Scales of Measure • Mean • Measures of variability • Z-scores • Sampling distributions, standard errors • Logic of hypothesis testing, p-values, power, Types I and II error, test statistics • Confidence intervals	Ch. 1-3
1/24 & 1/26	Pearson's Correlation, r • Covariance • Correlation – assumptions, formula, SPSS • Scatterplots • Restriction of range • Unit of analysis • Outliers	Ch. 7 (pp. 261-290; 297)
1/31 & 2/2 & 2/7	Statistical significance of r • H_0: $\rho = 0$, practical significance • Confidence interval for ρ • H_0: $\rho = c$, using Z_r • H_0: $\rho_1 - \rho_2 = 0$, for independent ρ_1 and ρ_2 • H_0: $\rho_1 - \rho_2 = 0$, for dependent ρ_1 and ρ_2 • Statistical significance of elements of matrix of rs	Ch. 7 (pp. 261-290; 297)
2/9	Other Measures of Association and tests of their statistical significance • Spearman • Phi coefficient • Point-biserial • Biserial	Ch. 8
2/14	Follow up with Measures of Association and Exam Review	
2/16	**EXAM 1**	
2/21	Testing Univariate Assumptions	Ch. 4
2/23	Introduction to Simple Linear Regression • Relation to bivariate correlation • Basic model and parameters	Ch. 9 (pp. 344-352)
2/28	Simple Linear Regression • Tests of significance • Standard Error of Estimate • Confidence intervals	Ch. 9 (pp. 352-362)

3/2 & 3/7	Correlations between more than two variables • Multiple correlation • Partial correlation • Semi-partial correlation	Ch. 10 (pp. 384-407) Ch. 11 (pp. 429-438)
3/9	Multiple Regression • Model, • Test of model parameters • Beta weights • Adjusted R^2 / shrinkage • Cross-validation	Ch. 11 (pp. 407-426; 438-462)
☺ SPRING BREAK (3/13-3/17) ☺		
3/21 & 3/23	Multiple Regression (cont'd) • Multicollinearity • Suppression	Ch. 10 (pp. 407-426)
3/28	Follow up with Multiple Regression and Exam Review	
3/30	**EXAM 2**	
4/4	Categorical independent variables (continued) • Dummy coding & Effects coding	Ch. 12
4/6	Interactions/Moderation • Categorical variables	Ch. 15
4/11	Interactions/Moderation (continued) • Continuous variables • Continuous and categorical variables	
4/13	Interactions/Moderation (continued) • Describing interactions	
4/18	Introduction to Mediation	Ch. 16 (pp. 645-666)
4/20	More Mediation • Testing mediation	
4/25	Model selection techniques and Cross-validation	Ch. 14
4/27	Regression Model Assumptions / Power	Ch. 4
5/2	Follow up with topics and Exam Review	
5/4	**EXAM 3**	

Other Suggested References

Berry, W. D. (1993). *Understanding regression assumptions.* Sage University Paper Series on
    Quantitative applications in the Social Sciences, 07-092. Newbury Park, CA: Sage Publications, Inc.
Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied Multiple Regression/Correlation
    Analysis for the Behavioral Sciences.* (3rd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.
Edwards, A. L. (1984). *An introduction to linear regression and correlation.* New York, NY:
    Freeman.
Glantz, S. A., & Slinker, B. K. (1990). *Primer of applied regression and analysis of variance.* New
    York, NY: McGraw-Hill, Inc.
Hamilton, L. C. (1992). *Regression with graphics.* Belmont, CA: Wadsworth, Inc.
Hardy, M. A. (1993). *Regression with dummy variables.* Sage University Paper Series on
    Quantitative applications in the Social Sciences, 07-093. Newbury Park, CA: Sage Publications, Inc.
Lewis-Beck, M. S. (1980). *Applied regression: An introduction.* Sage University Paper Series on
    Quantitative applications in the Social Sciences, 07-022. Newbury Park, CA: Sage Publications, Inc.
Liebetrau, A. M. (1983). *Measures of association.* Sage University Paper Series on
    Quantitative applications in the Social Sciences, 07-032. Newbury Park, CA: Sage Publications, Inc.

Makeup Assignments

Only in exceptional circumstances (including a verifiable medical excuse) and only with ***prior*** permission from the instructor will students be able to hand in an assignment late. Without this permission, the student will be penalized for late work. For each 24-hour period that the assignment is delayed, 10% will be deducted from the assignment's score. Because assignments are due at the beginning of class, each 24 hour period will start coincident with the class's beginning. Thus if an assignment is due, for example, at 11am on Tue, 9/6 but is handed in at 10:59am on Thu, 9/8, then 20% will automatically be deducted from the student's score on the assignment. There will be no exceptions to this penalty.

If a student becomes ill on the day that a portfolio assignment is due, it is the student's responsibility to contact the instructor and to arrange delivery of the assignment by the time it is due. In this case, if the assignment is not complete, then the student will receive credit only for what was attempted. It is important to complete assignments **before** the day on which they are due. If the student becomes ill on the day of an exam, then it is the student's responsibility to ensure the instructor is contacted to notify them, provide them with a doctor's note and to re-schedule the exam.

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.

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.

By accepting this syllabus and participating in this course, you have agreed to these guidelines and *must* adhere to them. Students who violate University rules on scholastic dishonesty will receive an F for the course grade, be referred to the appropriate university officials, and may receive a maximum penalty of suspension or even expulsion from the University. To find a copy of the UT Honor Code (or statement of ethics) and an explanation or example of what constitutes plagiarism go to the following link: http://www.lib.utexas.edu/services/instruction/learningmodules/plagiarism/

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/.