

Psychology 6307
Fall 2016

Correlation and Regression

Instructor: Osvaldo F. Morera, PhD
Office: Room 212
Phone 747-5417
Office hours: Thursdays from 10:00 am – 11:50 am and by appointment
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TA:
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Lectures: 3:00 pm – 4:20 pm; TR, WORR 205

Textbooks: *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences (3^d Edition*. Cohen, J., Cohen, P., West, SG., & Aiken, L. Lawrence Erlbaum Associates, 2003.

Course Objective:

After this course, you should have a solid foundation in correlation and regression. You should also be able to effectively use multiple regression and other correlational techniques for your research. You will also know about the 'state of the art' procedures when it comes to assessing mediation, moderation and moderated mediation. You will also know that analysis of variance is a special case of regression and that regression is a general data analytic system.

Course Prerequisites:

It is expected that you will have had the equivalent of Psychology 4317: Advanced Statistics. If you have not had this class, please consult your advisor about taking this course.

Evaluation:

Course grades will be based on points earned from the following sources:

Homework assignments	22%
Midterm Exam 1	26%
Midterm Exam 2	26%
Cumulative Final Exam	26%

Homework:

Homework problem sets will usually be passed out during class and due 1 to 2 weeks later (depending on the length of the assignment). Late homework assignments **will not be accepted**. If computer output is required for the homework, include only the part which is necessary for the solution and edit out any irrelevant output. Computer packages that will be used is SPSS. You can access SPSS in the Vinson Laboratory, located in the Psychology Building. You should also ask your mentor to install the PROCESS macro on the computers in your labs, as later homework assignments will require the use of PROCESS (see more later).

Evaluation

Scores between an 85.0% and 100% guarantees an A. Scores between a 70.0% and an 84.99% will guarantee a B. Scores between 60.0% and 69.99% will guarantee a C. Scores between 50.0% and 59.99% will guarantee a D. Scores below a 50% will guarantee a F.

I may also incorporate a curve to evaluate you. My curving is based on how you perform relative to everyone else in the class. I specifically look for gaps in the distribution of scores to distinguish "A" students, "B" students and, if necessary, "C", "D" and "F" students. I will try to look for gaps in such a way such that the person earning the highest B is closer to the person earning the second-highest B than the person earning the lowest A. A similar strategy is adopted to distinguish between students earning a B and C and so on.

There will no opportunity to improve your grade in the class after you have taken the final examination, so please refrain from asking to do additional assignments after you have completed the course.

Policy on Auditors

Student and faculty auditors are welcome in the class, as long as they complete the required university audit form. However, my first priority is to the students who are registered for the class. Students in the class get first dibs on seats in the class. I also ask that auditors not submit any homework assignments or take any exams, as it is extra work on my part and the TA's part. If your attendance becomes sporadic, I expect that you will not slow down the class with questions that were covered in prior lectures.

In short, your completion of the university audit form allows you the privilege of listening to the course material (and that is all). If your attendance requires additional time of my TA, additional time of myself or takes away from the learning experience from the registered students in the class, you should not audit this class.

Course structure and requirements:

1. Students will be responsible for all material covered in lectures, class handouts and assigned readings. With regard to lectures, there is no such thing a stupid question. If you have a question, someone else probably has that same question. Feel free to ask any questions.

2. Make-up exams will be given only under extraordinary circumstances, such as documented sickness, hospitalization or death of a family member (funeral card required). In some other cases, exceptions will be made if **advance notice of absence** is provided.
3. There will be two mid-term exams and a final exam. The midterm exams will cover material in the assigned readings, lectures and handouts. Although the midterm exams may have a different number of points on the exam, they will be equally weighted. The final examination will be comprehensive. The examinations will be closed-book and closed-notes. You will be able to bring in **2 pages** of “crib sheets” to each midterm exam and 6 pages of “crib sheets” to the final exam.
4. A calculator is highly recommended. It should perform all basic mathematical operations and should have several memories.
5. There will be between 7 and 10 homework sets. Many of the homework assignments will require running statistical software. We will use SPSS in this class, which can be used on the machines in Room 212 of the Psychology Building. In addition, we will use the PROCESS macro from Dr. Andrew Hayes’ website (www.afhayes.com). PROCESS can also be found at www.processmacro.org. We will also be using some online tools that can be found at www.quantpsy.org.

I would strongly recommend bookmarking these links to your computer. Please ask your mentors to install PROCESS in your lab, as I am no longer checking the computers in the Vinson Lab to see if they have PROCESS or not. Please do this now rather than later. Finally, I may also use *MPlus* in some examples in class. The computers that have *MPlus* on them in the Vinson Lab have a “LISREL” tag on them and those computers are: dbvlab18 (utep tag #132801), dbvlab20 (utep tag #132803), dbvlab21 (utep tag #132796), and dbvlab23 (utep tag #132798).

6. **Please turn off all pagers, beepers and other electronic devices before entering class.** They are a distraction to other students in the class and to the professor.
7. **Office Hours and Appointments:** If you have questions concerning the topics of this course, you can stop by to see me during my office hours or you can make an appointment to see me. If you stop by my office and you do not have an appointment to see me, I will ask you to schedule an appointment to see me and I will answer your question during that appointed time. This policy also applies to students who come to my office door with “questions that will only take a minute to answer.” This same standard will also apply for your interactions with the teaching assistant.
8. **Conduct of Graduate Students:** Students enrolled in this course are graduate students and I have certain expectations of graduate students. As you are pursuing an advanced professional degree, I expect that you will act in a professional manner. Asking for extensions on assignments because you are busy with other courses/projects/papers/conference presentations is not professional. In addition, I also expect that you will show respect for everyone in the class.

9. **Academic Misconduct:** The University has a responsibility to promote academic honesty and integrity and to develop procedures to deal effectively with instances of academic dishonesty. Students are responsible for the honest completion of their own work, for the appropriate citation of sources, and for respect of others' academic endeavors.

In other words, plagiarism, cheating and academic dishonesty will not be tolerated in this class. Plagiarism consists of using another person's ideas, words, or assistance, while failing to acknowledge this person. If you must submit someone else's work as if it were your own, you must acknowledge the original author/original source. As you may be asked to write sections of homework problems in a way that would be communicated in a professional journal (i.e, summarize your results for a Results section in a paper submitted to the Journal of Behavioral Decision Making), it is your responsibility to know what constitutes plagiarism.

Information on plagiarism and academic dishonesty can be found at <http://www.utep.edu/dos/acadintg.htm> If I suspect any incidence of academic dishonesty on the homeworks or the exams, I will be more than happy to forward any suspected material to Dean of Students Office.

10. If you have an identified disability that may affect your performance in this class, please see the instructor (no later than the second class) or contact the Center for Accommodations and Student Services (CASS) in Room 106 of the Student Union (phone 747-5148) such that provisions can be made to ensure that you have an equal opportunity to meet all the requirements of this course.
11. I have also assigned supplemental readings. You are responsible for reading these papers, as I may ask questions concerning these readings on homework assignments and/or examinations. These readings can be found in the Main Office of the Psychology Building or they may be emailed to you. Additional readings may be added to the list during the semester.

Tentative Class Schedule

The following chapters from the Cohen et al., (2003) will be covered in the following order.

Chapter 1:	Overview/Review
Chapter 2:	Simple Linear Regression
Appendix 1 & 2:	Matrix Notation and Finding Determinants of Matrices
Chapter 3:	Multiple Linear Regression
Chapter 4 & 10:	Regression Diagnostics
Chapter 5:	Multiple Regression with Sets of Independent Variables
Chapter 7 and 12:	Interactions Among Continuous Variables and Mediation
Chapter 8:	Categorical Independent Variables and Multiple Regression
Chapter 6:	Nonlinear Regression
Chapter 13:	Logistic Regression

Tentative Course Schedule

Date	Topic	OFM Handout Number
8/23, 8/25	Review, Pearson Correlation, Types of Correlations	Lectures 0 - 2
8/30, 9/1	Simple Linear Regression, Regression to the Mean	Lectures 3 + 4
9/6, 9/8	Strength of association, Inferential Testing Null Hypothesis Significance Testing, Power	Lectures 4 - 5
9/13, 9/15	Influences on Correlation, Matrix Algebra	Lectures 5 - 6
9/20, 9/22	Gauss-Markov, Multiple Linear Regression (MLR)	Lectures 7-8
9/22	MIDTERM 1	
9/27	Semi-partial and Partial Correlations	Lecture 9
10/4 - 10/6	MLR with k IV's, Extra SS principle Inferential testing, multicollinearity	Lect. 10 - 13
10/11- 10/13	Power, cross-validation, Model assumptions	Lect. 13 - 16
10/18 - 10/20	Variable selection methods, hierarchical linear reg.	Lect. 17 - 18
10/25	MIDTERM 2	
10/27	Sets of IV's, Interactions among continuous IVs	Lect. 19 - 20
11/1 - 11/3	Centering and probing of interactions, Mediation and moderation	Lect. 21 - 22
11/8 – 11/15	Coding of Categorical IVs, ANOVA and regression	Lect. 23 - 25
11/17 - 11/22	Interactions among categorical IV's, ANCOVA More regression diagnostics	Lect. 26 – 28
11/24	Thanksgiving Day: No class	
11/29- 12/1	Multicollinearity, Nonlinear regression, logistic regression	Lect. 28 - 30
FINAL EXAMINATION THURSDAY DECEMBER 8, 4:00 PM - 6:45 PM		

Course Readings Outside of the Text:

Review and Matrix Algebra (file names denoted NWK1 and NWK6)

Neter, J., Wasserman, W., & Kutner, MH (1985). *Applied Linear Statistical Models*. Irwin. (2nd edition) Selected chapters

Problems with Null Hypothesis Significance Testing

Carver, RP (1978). The Case Against Statistical Significance Testing. *Harvard Educational Review*, 48, 378-399.

Fan, X. (2001). Statistical Significance and Effect Size in Education Research: Two Sides of a Coin. *Journal of Educational Research*, 94, 275-282.

Feinstein (1996). P-Values and Confidence Intervals: Two Sides of the Same Unsatisfactory Coin. *Journal of Clinical Epidemiology*, 51, 355-360.

Greenwald, AG, Gonzalez, R., Harris, RJ & Guthrie, D. (1996). Effect sizes and p values: What should be reported and what should be replicated. *Psychophysiology*, 33, 175-183.

Kirk RE (1996). Practical Significance: A Concept Whose Time Has Come. *Educational and Psychological Measurement*, 56, 746-759.

Walker, ME (1999). Commentary on Greenwald et al. (1996) Effect sizes and p-values: What should be reported and what should be replicated. Unpublished commentary

Dichotomizing and Discretizing Continuous Independent Variables

Cohen, J. (1983). The Cost of Dichotomization. *Applied Psychological Measurement*, 7, 249-253.

Dawson, N. V., & Weiss, R. (2012). Dichotomizing continuous variables in statistical analysis: A practice to avoid. *Medical Decision Making*, 32, 225.

Fitzsimons, G. J. (2008). Editorial: Death to dichotomizing. *Journal of Consumer Research*, 35, 5–8.

Iacobucci, D, Posavac, SS, Kardes, FR, Schneider, MJ, Popovich, DL (2015). Toward a more nuanced understanding of a median split. *Journal of Consumer Psychology*, 25, 652-665.

Iacobucci, D, Posavac, SS, Kardes, FR, Schneider, MJ, Popovich, DL (2015). The Median Split: Robust, Refined and Revived. *Journal of Consumer Psychology*, 25, 690-704.

Lynch, JG, McClelland, G, Irwin, JR, Spiller, SA. & Fitzsimons, GJ (2015, September) Tis Not, Tis Not – Tis So, Tis So: Rebuttal of Rebuttal by Iacobucci, Posavac, Kardes, Schneider, and

Popovich (2015) on the Appropriateness of Median Splits (September 25, 2015). Available at SSRN: <http://ssrn.com/abstract=2665437> or <http://dx.doi.org/10.2139/ssrn.2665437>

MacCallum, RC, Zhang, S., Preacher, KJ & Rucker, DD (2002). On the Practice of Dichotomization on Continuous Independent Variables. *Psychological Methods*, 7, 19-40.

McClelland, G, Lynch, JG, Irwin, J, Spiller, SA & Fitzsimons, GJ (2015). Median splits, Type II errors and false-positive consumer psychology: Don't fight the power. *Journal of Consumer Psychology*, 25, 679-689.

Preacher, KJ, Rucker, DD, MacCallum, RC & Nicewander, WA (2005). Use of the Extreme Groups Approach: A Critical Examination and New Recommendations. *Psychological Methods*, 10, 178-192.

Royston, P, Altman, DG, Sauerbrer, W (2006). Dichotomizing continuous predictors in multiple regression: A bad idea. *Statistics in Medicine*, 25, 127-141.

Rucker, DD, McShane, BB & Preacher, KJ (2015). A researcher's guide to regression, discretization and median splits of continuous variables. *Journal of Consumer Psychology*, 25, 666-678.

Streiner, D. L. (2002). Breaking up is hard to do: The heartbreak of dichotomizing continuous data. *Canadian Journal of Psychiatry*, 47, 262–266.

Power and Sample Size in Multiple Regression

Maxwell, SG (2000). Sample Size and Multiple Regression Analysis. *Psychological Methods*, 5, 434-458.

Kelly, K. & Maxwell, SE (2003). Sample Size for Multiple Regression: Obtaining Regression Coefficients That Are Accurate, Not Simply Significant. *Psychological Methods*, 8, 305-321.

Mediation Papers

Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs*, 76, 408–420.

Morera, O.F. & Castro, F.G. (in press). Important Considerations in Conducting Statistical Mediation Analyses. *American Journal of Public Health*.

Important Dates to Remember

Wednesday, September 7

Thursday, September 22

Tuesday, October 25

Friday, October 28

Thursday, December 1

Thursday, December 8

Wednesday, December 14

Census Day; Last day to drop course without "W" appearing on transcript

Midterm 1

Midterm 2 (this exam may be pushed back 1 week)

Course drop deadline

Last Day of our class

Cumulative Final Exam (4:00 pm - 6:45 pm)

Grades due to Records Office