IP&T 745 - Stats 2: Multiple Regression
Winter 2018 Section 001: 105 KMBL on M from 1:00 pm - 3:50 pm

Instructor/TA Info

Instructor Information

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Course Information

Description

IP&T/CPSE/ 745 will provide a thorough exposure and application of multiple regression analysis which is the foundation for a wide variety of subsequent statistical procedures including path analysis, factor analysis, structural equation modeling, and hierarchical linear modeling.

Prerequisites

IP&T 651/CPSE 651 or equivalent.

Materials

MULTIPLE REGRESSION AND BEYOND
2E *Required*
by KEITH, T

Learning Outcomes

Conceptual understanding and practice application of statistics
Focusing more on concepts than computation will allow us to cover more ground with more practice of each concept. By integrating the course with training in SPSS, students will be prepared to select and execute appropriate analytical strategies in their applied research and practice.

Demonstrate fluency
- All students will demonstrate fluency in SPSS commands and functions.
- All students will demonstrate fluency in interpreting SPSS output files.
- All students will demonstrate fluency in selecting the appropriate statistical analysis based on the research questions and the nature of the data.
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Demonstrate fluency
All Students will demonstrate the ability to analyze, understand, and critique multiple regression in a journal article.

Grading Scale

Grades	Percent
A	93%
A-	90%
B+	87%
B	83%
B-	80%
C+	77%

C	73%
C-	70%
D+	67%
D	63%
D-	60%
E	0%
T	0%

Assignments

Assignment Descriptions

Day 1 - Homework

Jan
22

Due: Monday, Jan 22 at 1:00 pm

Day 1 - Homework

Day 2 - Quiz

Jan
22

Due: Monday, Jan 22 at 2:10 pm

Quiz #1

Data Gathering Assignment

Jan
22

Due: Monday, Jan 22 at 4:00 pm

Report back whether you have a dataset (including a continuous dependent variable, and at least two independent variables) through either (a) any NCES dataset (e.g., ECLS-K, NELS), (b) data you have gathered yourself, or (c) data you have access to.

Reading Accountability Quiz 1

Jan
22

Due: Monday, Jan 22 at 4:00 pm

This Quiz will assess your readings up to this point. You should have read the following before today: Keith Preface; Keith Appendix B; Keith 6; Keith 1-3; and Keith 9

Sample Standard Deviation Quiz 1

Jan
22

Due: Monday, Jan 22 at 11:59 pm

1) Memorize and prepare to write down in Class the Sample Standard Deviation.

2) Prepare to do a sample standard deviation on a very small dataset by hand.

P-value quiz 1

Jan
22

Due: Monday, Jan 22 at 11:59 pm

1) Memorize and prepare to write down in class the definition of a p-value.

One Minute Paper 1

Jan
22

Due: Monday, Jan 22 at 11:59 pm

Write one thing you learned from class today.
Write one thing you are still confused from class today.
Your writing will be shared with all at the beginning of the next class period.

One Minute Paper 2

Jan
23

Due: Tuesday, Jan 23 at 11:59 pm

Write one thing you learned from class today.
Write one thing you are still confused from class today.
Your writing will be shared with all at the beginning of the next class period.

Day 2 - In-class Practice

Jan
29

Due: Monday, Jan 29 at 1:00 pm

Day 2 - In-class Practice

Reading Accountability Quiz 2

Jan
29

Due: Monday, Jan 29 at 3:00 pm

This Quiz will assess your readings up to this point. You should have read the following at least once before today: Keith Preface; Keith Appendix B; Keith 6; Keith 1-3; Keith 9; Keith 6; and Keith 4.

Formative Quiz 1 (Regression, Linearity)

Jan

29

Due: Monday, Jan 29 at 3:59 pm

This quiz will discuss centering variables and the linearity assumption.

One Minute Paper 3

Jan

30

Due: Tuesday, Jan 30 at 11:59 pm

Write one thing you learned from class today.

Write one thing you are still confused from class today.

Your writing will be shared with all at the beginning of the next class period.

Formative Quiz 2 (CLT, Equality of Variance, Multicollinearity)

Feb

10

Due: Saturday, Feb 10 at 6:45 pm

Helps you synthesize your learning

One Minute Paper 4

Feb

10

Due: Saturday, Feb 10 at 11:59 pm

Write one thing you learned from class today.
Write one thing you are still confused from class today.
Your writing will be shared with all at the beginning of the next class period.

Day 4 - Quiz

Feb

12

Due: Monday, Feb 12 at 1:00 pm

Day 4 - Quiz

Reading Accountability Quiz 3

Feb
12

Due: Monday, Feb 12 at 7:00 pm

Have you read Keith 5 before today?

Formative Quiz 3 (three types of regression)

Feb
12

Due: Monday, Feb 12 at 9:00 pm

To help you in understanding the three types of regression

Day 3 - In-Class Practice

Feb
14

Due: Wednesday, Feb 14 at 1:00 pm

Day 3 - In-Class Practice

Day 4 - Inclass practice

Feb
14

Due: Wednesday, Feb 14 at 3:50 pm

Day 4 - Inclass practice

One Minute Paper 5

Feb
17

Due: Saturday, Feb 17 at 11:59 pm

Write one thing you learned from class today.
Write one thing you are still confused from class today.
Your writing will be shared with all at the beginning of the next class period.

Day 5 - Quiz

Feb
20

Due: Tuesday, Feb 20 at 1:00 pm

Day 5 - Quiz

Formative Quiz 4 (Interactions)

Feb
20

Due: Tuesday, Feb 20 at 1:59 pm

This will help your understanding of interaction effects.

Day 5 - Inclass practice

Feb
20

Due: Tuesday, Feb 20 at 4:00 pm

Day 5 - Inclass practice

Day 5 - Homework

Feb
26

Due: Monday, Feb 26 at 1:00 pm

Day 5 - Homework

P-value Quiz 2

Feb
26

Due: Monday, Feb 26 at 11:59 pm

Standard Deviation Quiz 2

Feb
26

Due: Monday, Feb 26 at 11:59 pm

One Minute Paper 6

Feb
26

Due: Monday, Feb 26 at 11:59 pm

Write one thing you learned from class today.
Write one thing you are still confused from class today.
Your writing will be shared with all at the beginning of the next class period.

Beta Quiz

Feb
26

Due: Monday, Feb 26 at 11:59 pm

Day 3 - Quiz

Feb
28

Due: Wednesday, Feb 28 at 12:50 pm

Quiz #3

Day 3 - Homework

Feb
28

Due: Wednesday, Feb 28 at 1:00 pm

Day 3 - Homework

Day 2 - Homework

Feb
28

Due: Wednesday, Feb 28 at 1:00 pm

Day 2 – Homework

Day 4 - Homework

Feb
28

Due: Wednesday, Feb 28 at 1:00 pm

Day 4 - Inclass practice

MiniProject

Mar
05

Due: Monday, Mar 05 at 12:59 pm

A scientist needs a prediction model for happiness. He is interested in the simplest model that can predict happiness the best, of the following variables. Comparative wealth, Education, male, FamilySize. Remember he is only interested in prediction. Give him the simplest model the best predicts happiness (don't forget to check your assumptions.)
Submit a 5 slide powerpoint with your conclusions. Make sure to include your justifications for this conclusion.
MiniProjectData.csv Download

Day 7 - Quiz

Mar
05

Due: Monday, Mar 05 at 12:59 pm

Day 7 - Quiz

Day 6 - Inclass practice

Mar
05

Due: Monday, Mar 05 at 1:00 pm

Day 6 - Inclass practice

Day 6 - Homework

Mar
05

Due: Monday, Mar 05 at 1:00 pm

Day 6 - Homework

Day 7 - Homework

Due: Monday, Mar 05 at 1:00 pm

Day 6 - Homework part 2

Day 7 - In-class

Due: Monday, Mar 05 at 1:00 pm

Day 6 - In-class part 2

Day 6 - Quiz

Due: Monday, Mar 05 at 4:30 pm

Day 5 - Quiz

Individual Project

Due: Monday, Mar 05 at 11:59 pm

Find a secondary dataset (preferably in your field)
Analyze your dataset using SPSS or program of your choice.
Include a continuous outcome.
Include at least two Independent Variables.
Include at least One Interaction
Create a Powerpoint in APA style that includes up to 20 slides. You will present these results in class and answer questions during your presentation.
Below is a suggested slide composition:
Slide 1: Title page, include your name and the name of your project
Slide 2: Briefly describe the theoretical backdrop of your problem (why is your problem interesting?)
Slides 3-5: Show Raw Descriptives (Mean, Minimum, Maximum, Standard Deviation) of all your variables (excluding the interaction), a Histogram of your outcome variable and a bivariate correlation table of your variables after you have prepared the data (including the interaction)
Slides 6-9: Assumptions: Show your Residual plot, histogram of your residuals, Variance Inflation Factors, and discuss any potential outliers. (this may take more slides than 1).
Slide 10: Show a table of your output including, R-squared, Betas, Standardized Betas, Standard errors and p-values. Interpret your output in context.
Slide 11: Have a graph of your interaction whether it is significant or not. Be prepared to discuss.
Slide 12: Brief discussion on the significant of your results.

Submit to Learning Suite:
Your Slides
Your Data
Your Syntax
Your Output.

Article Review

Due: Monday, Mar 05 at 11:59 pm

Find an article in your field that uses Multiple Regression.
Prepare 5 Powerpoint slides in APA that you will present to class.
Slide 1: Title page with your name, and the reference to the article
Slide 2: Brief description of the theory of the article (why is the article interesting)
Slide 3: Discuss the assumptions of multiple regression and whether they are met in the article.
Slide 4: Show the table the authors provided that show the Multiple Regression results. Be prepared to interpret the results in context.
Slide 5: A brief discussion on the practical significance of the article and whether you are confident in the authors inferences. State the strengths and weaknesses of the article and give your best assessment of the level of evidence (low, moderate, strong) for the article according to the WWC handout.

One Minute Paper 7

Due: Monday, Mar 05 at 11:59 pm

Write one thing you learned from class today.
Write one thing you are still confused from class today.
Your writing will be shared with all at the beginning of the next class period.

Mini Project 2

Due: Monday, Mar 12 at 1:00 pm

Dr. Larsen is interested in discovering what makes people happy. He has a data set with many variables, however he is only interested in investigating whether or not the following affect happiness:
• Imagination
• Intelligence
• HrsSleep
• Openness to Experience
• Neuroticism

- Depression
- Agreeableness
- Conscientiousness
- Extraversion

Remember he is only interested in prediction. Give him the simplest model that best predicts happiness (don't forget to check your assumptions.)
Submit a 5 slide powerpoint with your conclusions. Make sure to include your justifications for this conclusion.
MiniProject2.xlsx [Download](#)

Day 8 - Quiz

Mar
12

Due: Monday, Mar 12 at 4:00 pm

Outlier - Quiz

One Minute Paper 8

Mar
12

Due: Monday, Mar 12 at 11:59 pm

Write one thing you learned from class today.
Write one thing you are still confused from class today.
Your writing will be shared with all at the beginning of the next class period.

Happiness Regression

Mar
25

Due: Sunday, Mar 25 at 2:00 pm

You need to create your own model for happiness and then share it with a friend. Using regression techniques, try to recover your friend's model. Report here when finished.

Formative Quiz 5 (Logistic Regression)

Apr
12

Due: Thursday, Apr 12 at 9:00 am

Where we go over the concepts of logistic regression. When it is used, how to interpret the results.

Formative Quiz 6 (Multilevel Model)

Apr
17

Due: Tuesday, Apr 17 at 9:59 am

Testing the concepts in the book on Multilvel modeling (228-140)

Final Exam III

Apr
17

Due: Tuesday, Apr 17 at 11:45 pm

The final exam will consist of three parts: (a) Procedural Fill in the blank (b) Mini-Project #3 (c) Conceptual opened questions This is an open book, closed neighbor exam.

Final Exam Part I

Apr
17

Due: Tuesday, Apr 17 at 11:59 pm

The final exam part one. This part of the final covers the procedural tasks you should have learned in the class.

Point Breakdown

Categories	Percent of Grade
In Class Practice	10%
Homework	20%
Analysis Quizzes	10%
Conceptual Quizzes	5%
Projects	25%
Article Review	10%
Final Exam	20%

University Policies

Honor Code

In keeping with the principles of the BYU Honor Code, students are expected to be honest in all of their academic work. Academic honesty means, most fundamentally, that any work you present as your own must in fact be your own work and not that of another. Violations of this principle may result in a failing grade in the course and additional disciplinary action by the university. Students are also expected to adhere to the Dress and Grooming Standards. Adherence demonstrates respect for yourself and others and ensures an effective learning and working environment. It is the university's expectation, and every instructor's expectation in class, that each student will abide by all Honor Code standards. Please call the Honor Code Office at 422-2847 if you have questions about those standards.

Preventing Sexual Misconduct

In accordance with Title IX of the Education Amendments of 1972, Brigham Young University prohibits unlawful sex discrimination against any participant in its education programs or activities. The university also prohibits sexual harassment-including sexual violence-committed by or against students, university employees, and visitors to campus. As outlined in university policy, sexual harassment, dating violence, domestic violence, sexual assault, and stalking are considered forms of "Sexual Misconduct" prohibited by the university.

University policy requires all university employees in a teaching, managerial, or supervisory role to report all incidents of Sexual Misconduct that come to their attention in any way, including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Incidents of Sexual Misconduct should be reported to the Title IX Coordinator at t9coordinator@byu.edu or (801) 422-8692. Reports may also be submitted through EthicsPoint at https://titleix.byu.edu/report or 1-888-238-1062 (24-hours a day).

BYU offers confidential resources for those affected by Sexual Misconduct, including the university's Victim Advocate, as well as a number of non-confidential resources and services that may be helpful. Additional information about Title IX, the university's Sexual Misconduct Policy, reporting requirements, and resources can be found at http://titleix.byu.edu or by contacting the university's Title IX Coordinator.

Student Disability

Brigham Young University is committed to providing a working and learning atmosphere that reasonably accommodates qualified persons with disabilities. If you have any disability which may impair your ability to complete this course successfully, please contact the University Accessibility Center (UAC), 2170 WSC or 422-2767. Reasonable academic accommodations are reviewed for all students who have qualified, documented disabilities. The UAC can also assess students for learning, attention, and emotional concerns. Services are coordinated with the student and instructor by the UAC. If you need assistance or if you feel you have been unlawfully discriminated against on the basis of disability, you may seek resolution through established grievance policy and procedures by contacting the Equal Employment Office at 422-5895, D-285 ASB.

Schedule

Date	Information	Readings and Devotionals	In Class Exercises	Out of Class Exercises
Week 1				
M Jan 08 Monday	**Introduction** Devotional **Class Overview** **Slides** **Remote Access SPSS** Instructions on how to access SPSS through the remote server.docx Download **Decision Based Learning (DBL) diagram** DBL Diagram and Links Final.pdf Download **Conceptual:** • Definition of p-value.pdf Download • Sample Standard Deviation **Procedural:** • How to Dummy Code a categorical variable **Conditional:** Refer to Learning Suite Content-Problem-Day 1 In Class **Get an individual Dataset assignment:** • Distant Learning Dataset Training (DLDT) • Education Data Analysis Tool (EDAT) • EDAT User's Guide	Keith Preface; Keith Appendix B; Keith 6 Devotional -- Ross Larsen		**Day 1 - Homework Opens**
Week 2				

M Jan 15 Monday	**Martin Luther King Jr Day**			
Week 3				

M Jan 22 Monday	**Day 2 - Quiz** **DBL diagram updated** DBL Diagram and Links.pdf Download
	
	One minute paper #1 https://docs.google.com/document/d/1smqgHP35TKlpK_ie9IpQyOFg7fzwzr85XmQsCjRY7So/edit?usp=sharing
	
	Type 1 and Type 2 Error Definitions.docx Download
	
	Dummy Variables (why).docx Download
	
	How to interpret your Dummy Variable Coefficients in Multiple Regression.
	
	Regression Assumptions.docx Download
	
	Procedural:
	• Center the Continuous IVs
	• Create Interaction Terms
	• Linearity Assumption
	  ○ Squared term
	  ○ Transformation
	
	Other place to get data:
	
	https://www.data.gov/
	
	Datasets for class n=1000,stud & par_3.sav Download
		How can remembering bring us closer to the Spirit? -- Judy
		
		Keith 1-3; Keith 9
			One Minute Paper 1 **P-value quiz 1** **Day 2 - In-class Practice Opens Sample Standard Deviation Quiz 1**	**Day 2 - Homework Opens Reading Accountability Quiz 1** **Day 1 - Homework Closes Data Gathering Assignment**

T Jan 23 Tuesday		**Forum: Sister Sharon Eubank**	**One Minute Paper 2**	
Week 4				
M Jan 29 Monday	**Day 3 - Quiz Opens** One minute paper 2.docx Download Center and Dummy Variables (why).docx Download My favorite Transformation handout Curve Estimation Video Curvilinear dataset of Grade Anxiety and Hours of Homework.sav Download Life of Light Bulbs.sav Download **Procedural:** • Assumption: Independence • Assumption: Normality o Normality: Transformation **Conceptual:** • **Central Limit Theorem** CLT Example.sav Download CLT Simulation Simple Code.sps Download Google Sheets Simulation Study	How can remembering bring us closer to the Spirit? -- Shiloh Keith 4; Keith 9	**Day 2 - In-class Practice Closes Day 3 - In-Class Practice Opens Formative Quiz 1 (Regression, Linearity)**	**Day 3 - Homework Opens Reading Accountability Quiz 2**

T Jan 30 Tuesday		**Devotional: Ben Ogles, Family, Home, and Social Sciences**	**One Minute Paper 3**	
F Feb 02 Friday				
Week 5				

M Feb 05 Monday	New DBL! 2_6_2017_DBL.pdf [Download](#)
	
	 [Silly gimmick](#)
	
	 [Geometric means](#)
	
	 [Independence Assumption](#)
	
	 Procedural:
	 • [Assumption: Equality of Variance](#)
	  ○ [Log transformation example to solve equality of variance](#) Good Example
	  ○ [Official Video](#)
	 • [Assumption: Lack of Multicollinearity](#)
	 Day 4 - Quiz Opens
		Keith 5
		
		 How can remembering bring us closer to the Spirit? -- Kerong
			Formative Quiz 2 (CLT, Equality of Variance, Multicollinearity) Opens Day 4 - Inclass practice Opens	**Day 4 - Homework Opens Reading Accountability Quiz 3 Opens**

Sa Feb 10 Saturday			**One Minute Paper 4 Formative Quiz 2 (CLT, Equality of Variance, Multicollinearity) Closes**	
Week 6				
M Feb 12 Monday	**Day 4 - Quiz Closes** New Video with Equality of Variance	How can remembering bring	**Day 5 - Inclass practice Opens**	**Day 5 - Homework Opens**

	https://youtu.be/yl9ojoBI8lQ **Procedural:** • Simultaneous • Sequential Hierarchical, • Combination of Sequential Hierarchical and Model Selection • Model Selection Techniques • Outliers • Reporting Whether the F-test is significant • Reporting whether the intercept is significant/practically or not • Report whether the slopes are significant/practically significant or not • Collate the Results **Day 5 - Quiz Opens**	us closer to the Spirit? -- Scott Keith 5 Keith (p.195-200);	**Formative Quiz 3 (three types of regression)**	**Reading Accountability Quiz 3 Closes**
W Feb 14 Wednesday			**Day 3 - In-Class Practice Closes Day 4 - Inclass practice Closes**	
Sa Feb 17 Saturday			**One Minute Paper 5**	
Week 7				
M Feb 19 Monday	**Presidents Day Day 6 - Quiz Opens**			

T Feb 20 Tuesday	**Monday Instruction** **Day 5 - Quiz Closes** Updated Variance Video https://youtu.be/rxztCJJrxpA Interactions with Categorical Variables **Interactions** • Nominal*Nominal • Nominal*Continuous • Continuous*Continuous • Graphing Interactions	How can remembering bring us closer to the Spirit? -- Rachel Keith 7	**Day 6 - Inclass practice Opens Day 5 - Inclass practice Closes Formative Quiz 4 (Interactions)**	**Day 6 - Homework Opens**
Week 8				
M Feb 26 Monday	**Day 7 - Quiz Opens** Interaction Kade dataset.sav Download **Procedure:** **Interactions** • Nominal*Nominal • Nominal*Continuous • Continuous*Continuous • Graphing Interactions	How can remembering bring us closer to the Spirit? -- Lisa Keith 7; Keith 8	**P-value Quiz 2 One Minute Paper 6 Day 7 - In-class Opens Standard Deviation Quiz 2 Beta Quiz**	**Day 5 - Homework Closes Day 7 - Homework Opens**

W Feb 28 Wednesday	Aktekin_et_al-2001-Medical_Education.pdf [Download](#) WWC_FAQ.pdf [Download](#) 2017_03_01_Ross Larsen example article.pptx [Download](#) Ross Example Project Dataset.sav [Download](#) 2017_03_01 Example Project first couple slides.pptx [Download](#) 2017_03_01 Example Project Complete.pptx [Download](#) Example Syntax.sps [Download](#) Example Output.spv [Download](#) **Concepts:** • Example of Individual Article Presentation • Example of Individual Final Project Presentation **Day 3 - Quiz Closes**			**Day 3 - Homework Closes** **Day 2 - Homework Closes** **Day 4 - Homework Closes**
Week 9				
M Mar 05 Monday	**Day 6 - Quiz Closes** **Day 8 - Quiz Opens** **Day 7 - Quiz Closes** https://docs.google.com/forms/d/e/1FAIpQLSfz9-2hfTUFrFp81aKsUiAh7DvhajqX-PO1diC3jcve18zP8A/viewform?usp=sf_link	How can remembering bring us closer to the Spirit? -- Chunyue	**Day 6 - Inclass practice Closes** **One Minute Paper 7 Article Review** **Day 7 - In-class Closes**	**Day 7 - Homework Closes** **Day 6 - Homework Closes** **Individual Project MiniProject**
T Mar 06 Tuesday		**Devotional: Julie Crockett, Engineering and Technology**		
Week 10				

			One Minute Paper 8	Mini Project 2
M Mar 12 Monday	Student Article Presentations **Day 8 - Quiz Closes**	How can remembering bring us closer to the Spirit? -- Jon		
Week 11				
M Mar 19 Monday	Student Article Presentations Student Final Project Presentations	MiniProjectData.xlsm Download How can remembering bring us closer to the Spirit? -- Elisse		
T Mar 20 Tuesday		**Devotional: Elder Kim B. Clark**		
Th Mar 22 Thursday				**Happiness Regression Opens**
Su Mar 25 Sunday				**Happiness Regression Closes**
Week 12				
M Mar 26 Monday	Student Article Presentations Student Final Project Presentations	How can remembering bring us closer to the Spirit? -- Clint		
T Mar 27 Tuesday		**Forum: Amy Cuddy, social psychologist, author and lecturer**		
Week 13				
M Apr 02 Monday	Student Article Presentations	How can remembering bring		

	Student Article Presentations Student Final Project Presentations	us closer to the Spirit? -- Adam		
Week 14				
M Apr 09 Monday	logistic mlm chap 10.pptx Download **Procedure: Introduction to Logistic Regression and Multilevel Modeling**	How can remembering bring us closer to the Spirit? -- David Keith 10	**Formative Quiz 5 (Logistic Regression) Opens**	
Th Apr 12 Thursday			**Formative Quiz 5 (Logistic Regression) Closes**	
Week 15				
M Apr 16 Monday	Final Exam **Multilevel Modeling**	How can remembering bring us closer to the Spirit? -- Taylor Keith 10	**Formative Quiz 6 (Multilevel Model) Opens**	
T Apr 17 Tuesday		**Unforum**	**Final Exam III Final Exam Part I Formative Quiz 6 (Multilevel Model) Closes**	
W Apr 18 Wednesday	No Class (Stay Home and Study)			
Week 16				
M Apr 23 Monday				