# Instructor/TA Info

# Instructor Information

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# **TA Information**

Name: Shiloh Howland Email: shiloh.howland@gmail.com

# **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

No materials

# 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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All Students will demonstrate the ability to analyze, understand, and critique multiple regression in a journal article.

# **Grading Scale**

Grades	Percent
А	93%
A-	90%
B+	87%
В	83%
B-	80%
C+	77%
С	73%
C-	70%
D+	67%
D	63%
D-	60%
Е	0%
Т	0%

# Assignments

# **Assignment Descriptions**

## Week 1 in-class practice

**Jan Due:** Monday, Jan 07 at 11:59 pm

Dummy coding practice

## Week 1 - Homework

Jan	
14	Due: Monday, Jan 14 at 12:59 pm

Week 1 - Homework

# Week 2 Quiz

Jan 14

Due: Monday, Jan 14 at 2:30 pm

This will be held in class. There is a 30 minute time limit.

# Sample Standard Deviation Quiz 1

Jan 14 <sup>Due: Monday,</sup> Jan 14 at 11:59 pm

# P-value Quiz 1



Due: Monday, Jan 14 at 11:59 pm

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

## Week 2 in-class practice A

Jan 14 Due: Monday, Jan 14 at 11:59 pm

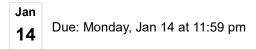
Centering of continuous variables

## Week 2 in-class practice B

Jan 14 Due: Monday, Jan 14 at 11:59 pm

Interaction terms with centered continuous variables and dummy variables

## **One Minute Paper 1**



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 15 Due: Tuesday, Jan 15 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.

# Week 2 - Homework

Jan	
28	Due: Monday, Jan 28 at 12:59 pm

Week 2 - Homework

## Week 3 Quiz

Jan 28 Due: Monday, Jan 28 at 3:30 pm

This will be held in class. There is a 30 minute time limit.

## **Reading Accountability Quiz 1**

Preface; Keith Appendix B; Keith 6; Keith 1-3; and Keith 5

#### Week 3 in-class practice

Jan **28** 

Due: Monday, Jan 28 at 11:59 pm

#### One Minute Paper 3

Jan 29 Due: Tuesday, Jan 29 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.

### Data Gathering Assignment



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.

#### Week 3 - Homework

Feb04Due: Monday, Feb 04 at 12:59 pm

Week 3 - Homework

#### Week 4 Quiz

Feb04Due: Monday, Feb 04 at 3:00 pm

This quiz will be take in-class. You will have 30 minutes to complete it.

#### Reading Accountability Quiz 2

 Feb
 Due: Monday, Feb 04 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 (three types of regression)

Feb04Due: Monday, Feb 04 at 4:00 pm

To help you in understanding the three types of regression

Feb	
04	D

ue: Monday, Feb 04 at 11:59 pm

## One Minute Paper 4

Feb05Due: Tuesday, Feb 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.

## Week 4 - Homework

Feb	
11	Due: Monday, Feb 11 at 12:59 pm

Week 4 - Homework

#### Week 5 Quiz

Feb	
11	Due: Monday, Feb 11 at 2:30 pm

Day 5 - Quiz

## **Reading Accountability Quiz 3**

Feb11Due: Monday, Feb 11 at 7:00 pm

Have you read Keith 5 before today?

## Week 5 in class practice

 Feb
 Due: Monday, Feb 11 at 11:59 pm

#### One Minute Paper 5

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Feb12Due: Tuesday, Feb 12 at 11:59 pm
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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.

#### Week 5 - Homework

Feb19Due: Tuesday, Feb 19 at 1:00 pm

Day 5 - Homework

# 19

Day 6 - Quiz

Week 6b in class practice

Feb 19

Due: Tuesday, Feb 19 at 11:59 pm

# Week 6 in class practice

Feb 19 Due: Tuesday, Feb 19 at 11:59 pm

# One Minute Paper 6

Feb20Due: Wednesday, Feb 20 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.

# Week 6 - Homework

Feb25Due: Monday, Feb 25 at 1:00 pm

Even if you don't see violations of equality of variance in the scatterplots, practice doing the Keith method (https://docs.google.com/document/d/1MD10E70MVFneVLkauKfJaSwXgo8Z4kfy8r8z\_IE4sL0 /edit?usp=sharing) so that you can do it during the quiz next week. It's time-consuming so practicing it over and over will help the quiz go better next week.

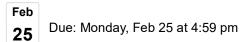
# Week 7 Quiz



Due: Monday, Feb 25 at 2:30 pm

Day 7 - Quiz

# Reading Accountability Quiz 4



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; and Keith 7 & 8.

# Beta Quiz

Feb	
25	Due: Monday, Feb 25 at 11:59 pm

# 25

## Sample Standard Deviation Quiz 2

**25** Due: Monday, Feb 25 at 11:59 pm

## Week 7 in class practice

Feb 25

Due: Monday, Feb 25 at 11:59 pm

Graphing nominal by continuous interactions

# One Minute Paper 7

Feb26Due: Tuesday, 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.

## Week 7 - Homework

Mar 04 Due: Monday, Mar 04 at 1:00 pm

Graphing interactions: nominal by continuous

## Week 8 Quiz

Mar 04 Due: Monday, Mar 04 at 2:15 pm

This quiz will be taken in-class on Monday, March 4.

For this quiz, you will submit your Excel spreadsheet to Learning Suite.

Using this <u>dataset (https://www.dropbox.com/s/7ktk1hfmit97x7p/ATLsubset.sav?dl=0)</u>, you want to explain teacher perceptions of a student's approach to learning in 4th grade (T4LEARN) using:

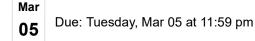
- 1. Male
- 2. Parent perceptions of a student's approach to learning in 2nd grade (P2LEARN)
- 3. An interaction term created between Male and Parent perceptions of a student's approach to learning in 2nd grade (insert this term in a second block)

Center any independent, continuous variables.

Run the regression with the three variables and **graph** the interaction in Excel. Upload the Excel file to Learning Suite. Include the Coefficients table and your graph of the interaction.

## Week 8 in class practice





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.

### Week 8 - Homework

Mar 11 Due: Monday, Mar 11 at 1:00 pm

Graphing interactions: continuous by continuous and nominal by nominal

#### Week 9 Quiz

Mar11Due: Monday, Mar 11 at 2:30 pm

This quiz will be taken in-class on Monday, March 11.

For this quiz, you will submit your Excel spreadsheets. You can upload separate spreadsheets for each problem OR submit them in the same spreadsheet. This assignment will accept multiple file uploads.

#### Problem #1

Using this <u>dataset (https://www.dropbox.com/s/8ii8mz8727q8kuz/Wk9fesjQ1.sav?dl=0)</u>, you want to explain scores on the FESJ assessment using:

- 1. Male
- 2. International status
- 3. An interaction term created between Male and International status (insert this term in a second block)

Center any independent, continuous variables.

Run the regression with the three variables and graph the interaction in Excel. Upload the Excel file with the Coefficients table and your interaction graph.

## Problem #2

Using this <u>dataset (https://www.dropbox.com/s/hzqysh6ccbilhli/Wk9q2.sav?dl=0)</u>, you want to explain scores on the MD assessment using:

- 1. Scores on the MA assessment
- 2. Scores on the FESJ assessment
- 3. An interaction term created between the MA score and the FESJ score (insert this term in a second block)

Center any independent, continuous variables.

Run the regression with the three variables and graph the interaction in Excel. Upload the Excel file with the Coefficients table and your interaction graph.

#### Article Review

Mar 11 <sup>Due: I</sup>

Due: Monday, Mar 11 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: Priof description of the theory of the article (why is the article interacting). 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.

#### **Individual Project**

Apr **01** 

Due: Monday, Apr 01 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.

#### Final Exam Part I

Apr 24 Due: Wednesday, Apr 24 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.

#### Final Exam Part II Ends

Apr 24 Due: Wednesday, Apr 24 at 11:59 pm

Dr. Tolman has been studying factors related to happiness and has requested you run the analysis.

There are six variables that he has gathered data on for each participant: Wealth, Religiosity, Openness to Experience, Gender, Age, and Family Size.

He has reason to believe that there is a potential interaction between Family size and wealth, religiosity and family size, religiosity and openness to experience, Openness to experience and Gender, Gender and Age, and

You are to turn in either a paper report or a slide show presentation that summarizes and justifies your conclusions, and shows clearly your work and thought process.

You will be graded primarily on the quality and clarity of your thought process, but the accuracy of your answer will also be taken into account.

https://docs.google.com/spreadsheets/d/1hYCGcrh-htm31l5wPDEqzylkfNqrtOGS6NmF75mcdfY /edit?usp=sharing

# Final Exam Part III

Apr 24 Due: Wednesday, Apr 24 at 11:59 pm

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

#### Point Breakdown

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

# **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 guestions 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 <u>t9coordinator@byu.edu</u> or (801) 422-8692 Reports may also be submitted through EthicsPoint at <u>https://titleiv.byu.edu/report</u>

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 <a href="http://titleix.byu.edu">http://titleix.byu.edu</a> 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	Topic and additional help	In-class activities	Outside-of- class activities
Week 1			

M Jan 07 Monday	Introduction	Devotional Shiloh	Keith Preface;
	Devotional	Shilon Howland	Keith Appendix B; Keith 6
	Class Overview	Week 1 in- class	Week 1 - Homework
	Slides	practice	Opens
	Remote Access SPSS		
	Instructions on how to access SPSS through the remote server.docx <u>Download</u>		
	Decision Based Learning (DBL) diagram		
	DBL Diagram and Links Final.pdf Download		
	Conceptual:		
	<ul> <li>Definition of p-value.pdf <u>Download</u></li> <li><u>Sample Standard Deviation</u></li> </ul>		
	Procedural:		
	<ul> <li>How to Dummy Code a categorical variable</li> </ul>		
	Center and Dummy Variables (why).docx <u>Download</u>		
	Conditional:		
	<ul> <li>Use DBL for in-class practice assignment #1</li> </ul>		
	Get an individual dataset assignment:		
	Distant Learning Dataset Training (DLDT)		
	<ul> <li><u>Education Data Analysis Tool (EDAT)</u></li> <li><u>EDAT User's Guide</u></li> </ul>		
Week 2			

M Jan 14 Monday	DBL diagram updated         DBL Diagram and Links.pdf Download         One minute paper #1         https://docs.google.com/document         /d/1smqgHP35TKlpK_ie9lpQyOFg7fzwzr85XmQsCjRY7So         /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         • Other place to get data:         https://www.data.gov/         Datasets for class         n=1000,stud & par_3.sav Download	Devotional Ken Plummer Week 2 Quiz P-value Quiz 1 Sample Standard Deviation Quiz 1 Week 2 in- class practice A Week 2 in- class practice B	Keith 1-3; Keith 9 One Minute Paper 1 Week 1 - Homework Closes Week 2 - Homework Opens Data Gathering Assignment Opens
T Jan 15 Tuesday			One Minute Paper 2
Week 3			
M Jan 21 Monday	Martin Luther King Jr Day		
Week 4			
M Jan 28 Monday	One minute paper 2.docx <u>Download</u> Procedural:	Devotional Dr. Larsen Week 3 Quiz	Keith 5 Reading Accountability Quiz 1 Week 2 -
	<ul> <li>Simultaneous</li> <li>Sequential Hierarchical,</li> <li>Combination of Sequential Hierarchical and Model Selection</li> <li>Model Selection Techniques</li> </ul>	Week 3 in- class practice	Week 2 - Homework Closes Week 3 - Homework Opens

T Jan 29 Tuesday			One Minute Paper 3
Th Jan 31 Thursday			Data Gathering Assignment Closes
Week 5			
M Feb 04 Monday	<ul> <li>Silly gimmick</li> <li>Procedural: <ul> <li>Linearity Assumption</li> <li>Squared term</li> <li>Transformation</li> </ul> </li> <li>My favorite Transformation handout</li> <li>Curve Estimation Video</li> </ul> <li>Curvilinear dataset of Grade Anxiety and Hours of Homework.sav Download <ul> <li>Life of Light Bulbs.sav Download</li> </ul> </li>	Devotional Chris Cardenas Formative Quiz (three types of regression) Week 4 Quiz Week 4 in- class practice	Keith 4; Keith 9 Week 3 - Homework Closes Week 4 - Homework Opens Reading Accountability Quiz 2
T Feb 05 Tuesday			Reading Accountability Quiz 3 Opens One Minute Paper 4
Week 6			

M Feb 11 Monday	Procedural:   • Assumption: Independence.   • Assumption: Normality   • Normality: Transformation   • Outliers   • Outliers   Conceptual:   • Central Limit Theorem   CLT Example.sav Download   CLT Simulation Simple Code.sps Download   Google Sheets Simulation Study   Independence Assumption	Devotional Daniel Young Week 5 Quiz Week 5 in class practice	Keith 5 Keith (p.195-200); Week 4 - Homework Closes Week 5 - Homework Opens Reading Accountability Quiz 3 Closes
T Feb 12 Tuesday			One Minute Paper 5
Week 7			
M Feb 18 Monday	Presidents Day		
T Feb 19 Tuesday W Feb 20 Wednesday	Monday Instruction Updated Variance Video https://youtu.be/rxztCJJrxpA Lack of multicollinearity: https://www.youtube.com /watch?v=XRNPJTi3kT0	Devotional Celina Lay Week 6 Quiz Week 6 in class practice Week 6b in class practice	Keith 7 Week 5 - Homework Closes Week 6 - Homework Opens Reading Accountability Quiz 4 Opens
			Paper 6
Week 8			

M Feb 25 Monday	Procedure: Interactions <ul> <li>Nominal*Continuous</li> <li>Graphing Interactions</li> </ul> As requested: <u>Video</u> showing how log transformation can fix a violation of equality of variances.	Devotional Morgan Week 7 Quiz P-value Quiz 2 Sample Standard Deviation Quiz 2 Beta Quiz Week 7 in class practice	Keith 7; Keith 8 Week 6 - Homework Closes Reading Accountability Quiz 4 Closes Week 7 - Homework Opens
T Feb 26 Tuesday			One Minute Paper 7
Week 9			
M Mar 04 Monday	Stats 2 Concept Check: https://docs.google.com/forms /d/e/1FAIpQLSfz9-2hfTUFrFp81aKsUiAh7DvhajqX- PO1diC3jcve18zP8A/viewform?usp=sf_link <b>Procedure:</b> Interactions • <u>Nominal*Nominal</u> • <u>Continuous*Continuous</u> • Graphing Interactions	Devotional Bryn St. Clair Week 8 Quiz Week 8 in class practice	Week 7 - Homework Closes Week 8 - Homework Opens
T Mar 05 Tuesday			One Minute Paper 8
Week 10			

M Mar 11 Monday	Student Article Presentations Aktekin_et_al-2001-Medical_Education.pdf <u>Download</u> WWC_FAQ.pdf <u>Download</u> 2017_03_01_Ross Larsen example article.pptx <u>Download</u>	Devotional Heidi Bussey Article Review Week 9 Quiz	Week 8 - Homework Closes
	Ross Example Project Dataset.sav <u>Download</u> 2017_03_01 Example Project first couple slides.pptx <u>Download</u> 2017_03_01 Example Project Complete.pptx <u>Download</u> Example Syntax.sps <u>Download</u> Example Output.spv <u>Download</u> <b>Concepts:</b> • Example of Individual Article Presentation • Example of Individual Final Project Presentation		
Week 11			
M Mar 18 Monday	Student Article Presentations	Devotional Jonathan Clark	Final Exam Part I Opens Final Exam Part III Opens
Week 12			
M Mar 25 Monday	Student Article Presentations Answers to formative final https://docs.google.com/document /d/1jHMpNMWrgJMCCS4xSfuhDDm8yIGB3VymjjdCftb03aY /edit?usp=sharing	Devotional Rebecca Peterson	
Week 13			
M Apr 01 Monday	Student Final Project Presentations	Devotional Maddy Cope Individual Project	

M Apr 08 Monday	Student Final Project Presentations logistic mlm chap 10.pptx <u>Download</u> Procedure: Introduction to Logistic Regression and Multilevel Modeling	Devotional James Christensen	Keith 10		
Week 15					
M Apr 15 Monday	Final Exam Multilevel Modeling Student Final Project Presentations	Devotional Stacie Mason	Keith 10		
T Apr 16 Tuesday					
W Apr 17 Wednesday					
Week 16	Week 16				
W Apr 24 Wednesday			Final Exam Part II Ends Final Exam Part III Closes Final Exam Part I Closes		