

**Inferential Statistics**  
**Psychology 6000 Spring 2019**  
 4:30 – 5:45 pm Tuesday & Thursday  
 LD 131

**Instructor:** Wei Wu PhD  
**Email:** wwul@iu.edu (best method)  
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**Office:** LD 120C  
**Office Hrs:** By appointment

**Required Text:**

Howell, D. C. (2017). *Fundamental Statistics for the Behavioral Sciences* (9<sup>th</sup> Ed.), Wadsworth, Cengage Learning. ISBN-13: **978-130565297**.

[https://www.amazon.com/Fundamental-Statistics-Behavioral-Sciences-Howell/dp/1305652975/ref=sr\\_1\\_2?ie=UTF8&qid=1543336646&sr=8-2&keywords=Fundamental+Statistics+for+the+Behavioral+Sciences](https://www.amazon.com/Fundamental-Statistics-Behavioral-Sciences-Howell/dp/1305652975/ref=sr_1_2?ie=UTF8&qid=1543336646&sr=8-2&keywords=Fundamental+Statistics+for+the+Behavioral+Sciences)

You can find the supporting materials for the book such as datasets used in the book and student manuals and some very useful online statistics resources at <http://www.uvm.edu/~dhowell/fundamentals9/>

**Recommended text:**

Discovering Statistics Using R. Andy Field, Jeremy Miles, and Zoe Field. Sage

**Course Description**

This course is intended to be an introduction to the statistical methods for graduate psychology students. However, I have adopted this class to be generalizable to most grad programs. There are two main sections to the course: (1) discussion of the conceptual and theoretical foundations of inferential statistics and (2) survey and practical application of several statistical analyses based on inferential statistics and the general linear model. We will begin with a brief review of basic statistical concepts in order to set the stage for discussing inferential statistics. Then, we will discuss the foundations for inferential statistics, including probability theory. Finally, we will cover several statistical procedures pertaining to inferences about mean differences (e.g., t-tests, ANOVA) and strengths of relationships (e.g., correlation). My goal is to provide you with a basic theoretical understanding of inferential statistics and practical tools for understanding and conducting research.

**Instructional Format**

This course will combine traditional lectures with in-class computer lab exercises. Because we will be in the computer lab (LD 131) for all of our scheduled meetings, the lectures and computer exercises will be interwoven throughout the semester.

I have provided a *very tentative* course schedule in this syllabus (see last page). Because of the small class size, I encourage you to actively participate in the class discussions. Additionally, I expect there to be some revision to the course schedule based on your feedback. Each of you has a different level of familiarity with statistics; hence, we may need to spend more or less time on a particular topic depending on the needs of the class. Please do not be shy about asking for help and/or clarification about any of the topics that we cover. It's an old but true adage: if you don't understand something, odds are somebody else doesn't either.

The best strategy is to read the assignment before we discuss it in class. Even if you do not completely understand the concepts, reading ahead of time will better prepare you to absorb the material in class and prepare you for potentially unannounced quizzes (they *can* happen). This also will help to minimize the inevitable feeling of being overwhelmed at the end of the semester when all of your other obligations come due...*consistency is key*.

### **Lectures and Readings**

There will be substantial overlap between the readings and the lectures. The lectures will be more focused and in-depth in nature. However, there will be some topics in the readings that are not covered in the lectures, and vice versa. You are responsible for knowing *all* of the information in the readings *and* the lectures.

### **R**

Throughout the semester we will be using the program “R” (<http://www.r-project.org/>). This program is open source, free, and offers some very powerful capabilities that some proprietary programs do not. As a scientist, this can be a very powerful tool for you to carry forward into your career. The Field text will be your primary resource for learning R. Specifically, we’ll be using Rstudio (<https://www.rstudio.com/home/>) to interface with R.

### **Evaluation**

There will be two exams each counting 40% toward your final grade. There will be homework/quiz assignments that will count a total of 15% toward your final grade. The remaining 5% of your final grade will be based on class attendance and general positive affect. I will review the focus and structure of each test before it is given. The general goal of this course is the conceptual understanding and effective application of inferential statistics principles. Each exam is comprised 50% of an in class written portion and 50% of a project where you will apply learned statistical concepts - typically in R. You will then be asked to present the results in a written format that loosely resembles those you would present in a scientific text.

### **Grades**

Final grades will be based on the following scale:

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

Grades will be posted on Canvas. If you need to withdraw from the course, please pay attention to the university guidelines.

**Homework/Pop quizzes**

Homework assignments will be handed out in class. You may work with your classmates to complete these assignments (I encourage this). However, the final product should be your own and not just a transcription. I will grade the homework assignments based on the following scale:

- 0 = did not do it
- 1 = poor/incomplete
- 2 = satisfactory

The number of homework assignments is to be determined. We will assign homework when it becomes apparent extra practice is required to master a concept. These assignments are intended to give you feedback about what you understand and what you need to work on. Statistics is a subject that truly is cumulative (i.e., each new topic builds on the previous ones). Hence, it is in your best interest to understand a particular subject area before moving on. If you are having trouble understanding a particular assignment, please let me know.

Class participation is paramount in this class. In order to fully participate in class performing the assigned readings prior to class is necessary. At every lecture there is the possibility that a quiz could be given which covers the assigned readings for that class. If a quiz is given, it will factor into your homework or attendance grade. If you are absent for a quiz, a homework set will be assigned as a make-up. Quizzes will be graded as follows:

- 0 = poor/no acquisition of content
- 1 = very little acquisition of content
- 2 = satisfactory acquisition of content

**Special Accommodations**

If you have a physical or psychological issue that makes it difficult for you to perform on exams, I will be happy to arrange special help and examinations. If there is something I need to know about you to help you in this regard, please, let me know as early as possible.

**Canvas**

For communication and management of the course, I will make use of Canvas. I will post grades, additional readings, the syllabus, etc. on our course website. The address is: [here](#). You will need an online ID to access the site. See me if you have any questions.

**Communication**

Communication is also paramount in this course. This may prove to be a difficult course for some of you, and I need to know early on in the semester if you feel like you need additional help. In addition, I fully intend to be flexible enough to alter the course to meet the class needs. Hence, if we discover that there are areas we need to cover more in depth, then I will alter the plan accordingly. Of course, I can only become aware of this if we have open channels of communication. Feel free to contact me by phone, email, or in person. Also, please email me directly rather than through Canvas.

I will use an email mailing list to communicate to the class. If you send me an email pertaining to the course that I feel is particularly important, I may send my response to the entire class. If you wish not to have a communication shared with the rest of the class, please let me know. If you must call my office and leave a message that requires a prompt response, please follow-up with an email.

### Civility

Statistics provides a vehicle to communicate and share your ideas. In this class we'll be learning how to communicate ideas that are often complex. Therefore, having a safe space where we can make mistakes in front of one another, and learn from them, is extremely important. A civil classroom is key to open communication. A civility statement is designed to promote the free exchange of ideas by making participants feel safe to express themselves and explore issues in a spirit of inquiry. In order to promote civility, you are expected to:

- Treat each other and your instructor with respect
- Appreciate that everyone has something to contribute
- Avoid offensive language and gestures
- Refrain from side conversations when others are speaking
- Allow others to speak without interruption
- Demonstrate care and concern for others
- Keep an open mind
- Use cell phones or other devices only for class work
- Use respectful language in your online communications
- Maintain self-control
- Appreciate differences
- Be inclusive

**\*\*\*Finally, if you have any questions or concerns (academic, personal, or otherwise), please come see me. I am here to help you. I look forward to working with you this semester.**

**Tentative Course Schedule**

<b>Week</b>	<b>Date</b>	<b>Topic</b>	<b>Reading</b>	
Jan	8	Course Overview & Introduction	Ch. 1	
	10	Basic concepts --- R intro	Ch. 2	
	15	Displaying data	Ch. 3	
	17	Central Tendency/Variability	Ch. 4, 5	
	22	Normal Curve/Standard Scores	Ch. 6	
	24	TBD		
	29	Probability	Ch. 7	
	31	Hypothesis Testing	Ch. 8	
	Feb	5	Correlation	Ch. 9
		7	<b>No class</b>	Ch. 8
12		Regression	Ch. 10	
14		Regression	Ch. 10	
19		Hypothesis testing applied to mean: one sample	Ch. 12	
21		Hypothesis testing: two related samples	Ch. 13	
26		Hypothesis testing: two independent samples	Ch. 14	
28		TBD		
Mar	5	Review for Midterm		
	7	Midterm Exam		
	12	<b>No class- Spring Break</b>		
	14	<b>No class- Spring Break</b>		
	19	Power	Ch. 15	
	21	One-Way Analysis of Variance	Ch. 16	
	26	Factorial Analysis of Variance	Ch. 17	
April	28	Factorial Analysis of Variance	Ch. 17	
	2	Repeated Measures ANOVA	Ch. 18	
	4	TBD		
	9	ANCOVA		
	11	ANCOVA		
	16	Chi-square	Ch. 19	
	18	Nonparametric	Ch. 20	
	23	R applications for Nonparametric	Ch. 20	
	25	Review for Final		
	30	<b>Final exam (3:30 – 5:30pm)</b>		

**\*\* Syllabus is approximate and subject to change \*\***