PSYC 209: MEASUREMENT AND STATISTICS

Fall 2018, Alison Hall 132

Section 010: MWF 9:05-9:55
Section 011: MWF 10:10-11:00
Section 012: MWF 11:15-12:05

PROFESSOR

Tamara Medina, Ph.D.
Email: tmedina@psych.udel.edu
Office: Wolf Hall 436

TEACHING ASSISTANTS

Section 010:
MWF 9:05-9:55

Chao Han, Ph.D. candidate
Email: hanchao@udel.edu

Sloan Ferron, B.A. candidate
Email: sferron@udel.edu

Section 011:
MWF 10:10-11:00

Nicholas Collins, Ph.D. candidate
Email: ncollins@psych.udel.edu

Tyler Myrick, B.A. candidate
Email: tymyrick@udel.edu

Section 012:
MWF 11:15-12:05

Denise Barth, Ph.D. candidate
Email: dbarth@psych.udel.edu

Serena Young, B.A. candidate
Email: serenay@udel.edu

DROP IN ASSISTANCE ("OFFICE HOURS")

For assistance outside of class, please stop by any of the following drop-in office hours (no appointment necessary). Do not hesitate to come by to revisit the concepts covered in class or get help with an assignment that is giving you trouble! Please note that you may go to *any* of the drop-in office hours listed below (you are not restricted to your section's TAs). If you are unable to attend any of the following office hours, please contact us to make an individual appointment.

Day	Time	Location	Instructor / TA
Tuesdays	2:00-3:00	Wolf 108	Nick Collins
Wednesdays	2:30-3:30	Wolf 436	Tamara Medina
Thursdays	11:00-12:00	125 E. Main Street, back entrance, room 111 (if not there, look in room 121)	Chao Han
Fridays	1:00-2:00	lobby of Center for Biomedical and Brain Imagining (CBBI)	Denise Barth

COURSE DESCRIPTION

This course provides an introduction to basic concepts of measurement and statistical analysis of psychological data, with an emphasis on the use of statistics in hypothesis testing. In this course we will cover: basic descriptive statistics, sampling and probability, hypothesis testing, t-tests and ANOVA, and the presentation of data in graphs and tables. You will become familiar with data visualization and analysis using Microsoft Excel and JASP.

COURSE PURPOSE AND GOALS

The purpose of this course is to give you a foundation in the measurement of the kinds of variables that are of interest to psychologists, neuroscientists, and cognitive scientists, and to introduce you the use of inferential statistics to test hypotheses and draw conclusions.

By the end of this course, you should:
- understand the logic of inferential statistics in hypothesis testing
- be able to relate different experimental designs to corresponding statistical analyses
- be proficient in using software to run and interpret basic inferential statistical tests

COURSE MATERIALS

TEXTBOOK (REQUIRED)

Statistics for Psychology – Either the 5th or 6th edition is fine. You can find the 6th edition at the campus bookstore (Barnes and Noble) or Lieberman's, or shop around online for the 5th or 6th edition. (Note: you do **not** need to purchase an access code for MyStatLab.)

> Aron, Arthur, Aron, Elaine N., & Coups, Elliot. 2013. *Statistics for Psychology,* 6th Edition. Pearson: Upper Saddle River, NJ. ISBN-10: 0205258158 • ISBN-13: 9780205258154

> Aron, Arthur, Aron, Elaine N., & Coups, Elliot. 2009. *Statistics for Psychology,* 5th Edition. Pearson: Upper Saddle River, NJ. ISBN-10: 0136010571 • ISBN-13: 9780136010579

BINDER (REQUIRED)

You will need a 1- or 2- inch three-ring binder. Throughout the semester, you will be building your own statistical resource binder.

STAPLER (REQUIRED)

The homework you hand in must be stapled.

SOFTWARE (REQUIRED)

You are required to use the following free software in this course. Do not use similar software (such as Google Spreadsheets, Numbers, or Open Office).

Microsoft Office is offered free to students through UDeploy (http://udeploy.udel.edu/).
JASP is a free download (https://jasp-stats.org/download/).
G*Power is a free download (http://www.gpower.hhu.de/en.html - scroll down on the page to "Download").

CANVAS (REQUIRED)

The course syllabus, lecture slides, answer keys, and UD capture recordings will be posted to Canvas throughout the semester. Grades will be maintained in the Gradebook in Canvas, and will be visible to you as the course proceeds.

UD CAPTURE

To catch up after a missed class, please review the UD capture video recording and review any course materials that have been posted to Canvas.

Section 010: MWF 9:05-9:55   https://udcapture.udel.edu/2018f/psyc209-010/
Section 011: MWF 10:10-11:00   https://udcapture.udel.edu/2018f/psyc209-011/
Section 012: MWF 11:15-12:05   https://udcapture.udel.edu/2018f/psyc209-012/

CLASS STRUCTURE

Your learning in this class will come from a combination of what we do in the classroom and what you do on your own outside of class.

Class sessions will consist of instructor-presented material and classroom activities. You are expected to attend all class meetings and to arrive on time; being present in class will be critical to your understanding of the course material.

Outside of class you will be practicing and expanding upon your knowledge via reading and homework.

GRADING

Percent of Final Grade		
Monday Notes	3 %	12 notes, worth 0.25 pts each
Homework	40 %	8 assignments, worth 5 pts each
Exams	45 %	3 exams, worth 15 pts each
Final Paper	5 %	1 paper, worth 5 pts
BYOB	4 %	1 binder, worth 4 pts
Course Reflections	3 %	3 reflections, worth 1 pt each

MONDAY NOTES (3%)

Monday Notes are graded for completion. Each of the 12 Monday Notes is worth 0.5 points toward your final course grade. Assigned pages from the textbook are listed in the Schedule.

To emphasize the importance of your own role in distilling the information you are reading in the textbook, you must take and present your notes on the assigned pages. The format of your notes is up to you - you may wish to create a streamlined outline with definitions, formulas, and list of step-by-step procedures, or you may prefer to produce a more elaborate document with fully worked out examples.

The Monday Notes are due (generally) every Monday at the beginning of class. At the beginning of class on Mondays, the TA will review your notes and give you credit for completion. If you are absent on a Monday, then please bring your notes to the TA by the next class when you return.

HOMEWORK (40%)

Homework assignments are graded for accuracy. Each of the 8 Homework assignments is worth 4 points toward your final course grade. See Schedule for due dates.

The Homework assignments involve practicing the pieces of the statistical concepts and tests that we are covering in class.   *You are encouraged to work together on these assignments!* However, some of the questions require you to put ideas into your own words – each of you should be turning in work that reflects your own ideas in your own wording. Furthermore, you will often be instructed to analyze personalized data sets – you must provide answers that correspond to your *own* dataset, not to another student's data set.

If your answers are deemed by the instructor or the TAs to be nearly identical to any other students' answers, each of you will forfeit the points for those answers. In order to earn back those points, you may write a short essay explaining the concepts in those questions for which you lost points.

You must complete and hand in your stapled work by the beginning of the class period on the day they are due. Emailed assignments will not be accepted without prior permission from the professor or a teaching assistant. **No late or make-up homework is allowed without prior permission from the professor.**

EXAMS (45%)

Exams are graded for accuracy. Each of the 3 Exams is worth 15 points toward your final course grade. See Schedule for dates.

These in-class closed book exams will assess your understanding of best practices in measurement and sampling, the logic of logic of inferential statistics in hypothesis testing and drawing conclusions, and the relationship between experimental designs and the appropriate corresponding statistical analyses. Where appropriate, you will be expected to be able to recognize and carry out the appropriate calculations for a particular statistical test.

To help you focus your studying, you will receive a study guide before each exam.

Your attendance *is required* on the days in which there is an in-class exam. In the event of an emergency or unavoidable conflict, prior to the start of the regularly scheduled exam, you must let your professor know that you will be missing the exam.   If you are eligible to take a make up exam (see below) the TA will schedule and proctor your make up exam ***within one week.*** At the time of your scheduled make-up exam, you must provide written documentation of the reason for your absence.

Eligibility
You are eligible to take a make-up exam within one week of the originally scheduled exam only under the following two circumstances:
- You know ahead of time that you must miss an exam because of a previously scheduled conflict that you are not able to change (e.g., a university-sponsored sports competition that are you participating in, surgery, a religious event), or
- In the case of serious illness or emergency.

FINAL PAPER (5%)

The final paper is graded for accuracy and thoughtful analysis, and is worth 5 points toward your final course grade.

During the last two weeks of class, your group will be designing, carrying out, and analyzing a brief study, which you will each write up individually in the style of a peer-reviewed journal article.

BYOB (BUILD YOUR OWN BINDER) (4%)

The BYOB is graded for completion and is worth 4 points toward your final course grade.

Throughout the semester, you will be building your own statistical resource binder, which will include your notes, the in-class activities, your homework, and your exams. At the end of the course, you will receive 4 points toward your final grade for having maintained a complete binder.

COURSE REFLECTIONS (3%)

Course Reflections are graded for completion. Each of the 3 Course Reflections is worth 1 point toward your final course grade.

At regular intervals during the semester, you will be asked to consider what the course has covered so far with regard to the course goals. You will also be asked to provide feedback and commentary regarding your experience in the course, and to reflect on your own progress in the course.

ATTENDANCE (0%)

Although we will take attendance every day, attending class does not contribute to your final grade.

Attending class is to *your* benefit – it gives you the opportunity to hear the course material explained more fully and with new examples, as compared to the textbook alone. Most importantly, attending class means that you will have the opportunity to try out new course material for yourself on the spot, talk with other students about how to do it, and get help and feedback from the professor and TAs.

Each day, a TA will take your attendance – either by passing a sign in sheet around the classroom, or by visually scanning the room and taking note of who is present. To view your attendance record on Canvas, click on the Attendance link and then view the Roll Call Attendance submission details page. You will need see Attendance via the Grades link because attendance in this class is not being graded and does not contribute to your final grade.

Your attendance *is required* on the days in which there is an in-class exam. See the section above re exams for procedures if you are unable to attend an exam.

GRADE SCALE

		B+	87-89.99	C+	77-79.99	D+	67-69.99
A	93-100	B	83-86.99	C	73-76.99	D	63-66.99
A-	90-92.99	B-	80-82.99	C-	70-72.99	D-	60-62.99
						F	<60

The letter grade you receive is determined by the numerical range that your grade falls into, without additional rounding.

To assist you in calculating your grade, a Grade Calculator is available on Canvas.

SCHEDULE

	Date	Topic	Textbook Pages	Assignment Due
	Part I: Measurement and Visualization of Data			
Week 1	Wed, Aug 29	1: Introduction to the Course		
	Fri, Aug 31	2: Levels of Measurement	3-5	
Week 2	Mon, Sept 3 Labor Day Holiday- University offices closed; classes suspended.	NO CLASS: Labor Day		
	Wed, Sept 5	3: Visualizing Data: Frequency Tables, Histograms, and Distribution Shapes	7-21 [7-21]	Monday Notes Class Survey
	Fri, Sept 7	4: Visualizing Data: Grouping		
Week 3	Mon, Sept 10 Tues, Sept 11: Last day to register or to add courses. After this date, no tuition will be rebated and a $25 processing fee will be charged for change of registration; students withdrawing from courses will receive a grade of 'W' on permanent record. Tues, Sept 11: Deadline for completion of deferred examinations and incomplete work (grade I) from Spring Semester 2018 and 2018 Summer Sessions.	5: Descriptive Statistics	34-51 [33-50]	Monday Notes **Homework 1:** Measurement and Visualization of Data
	Wed, Sept 12	6: Calculating Standard Deviation and Variance (Excel) **BRING YOUR LAPTOP**		
	Fri, Sept 14	7: Creating a DOM		**Homework 2:** Descriptive Statistics
Week 4	Mon, Sept 17	8: Estimating Population Parameters from a Sample	229-230 [225-226]	Monday Notes

	Wed, Sept 19	9: Estimating a DOM from a Sample	140-142, 231 [138-140, 227]	
	Fri, Sept 21	10: Putting It All Together		**Homework 3:** Estimating from a Sample
Week 5	Mon, Sept 24	Exam 1 Prep and Review		Monday Notes
	Wed, Sept 26	**Exam 1**		
Part II: Introduction to Hypothesis Testing				
	Fri, Sept 28	11: The Logic of Hypothesis Testing	108-111, 115-116 [107-110, 114-116]	
Week 6	Mon, Oct 1	12: One Sample t-test: Parameters of the Comparison Distribution of Means	231-238, 255-258 [227-234, 252-253]	Monday Notes
	Wed, Oct 3	One Sample t-test: Finding M in the DOM, Making a Decision, and Reporting the Result		
	Fri, Oct 5	One Sample t-test: Practice		
Week 7	Mon, Oct 8	One Sample t-test: Remaining Questions		Monday Notes
	Wed, Oct 10	13: Type I error, Effect Size	178-179, 181-186 [175-179, 179-184]	**Homework 4:** One Sample T-test
	Fri, Oct 12 Deadline for midterm grades to be posted in UDSIS	Type II error, Power	179-180, 189-192, 207-208, 252-253 [177-178, 187-190, 205-206, 247-249]	
Week 8	Mon, Oct 15	14: Using Software to Run a One Sample t-Test (JASP, G*Power) **BRING YOUR LAPTOP**		Monday Notes
	Wed, Oct 17	15: Interpreting and Reporting the Results of a One-Sample t-test		**Homework 5:** Decision Errors and Power
	Fri, Oct 19	Exam 2 Prep and Review		
Week 9	Mon, Oct 22 Tues, Oct 23: Last day to change registration or to withdraw from courses for Fall 2018.	**Exam 2**		
Part III: Comparisons and Multiple Comparisons				

	Wed, Oct 24	16: Paired Samples t-test (compare to "no difference")	241-248 [237-244]	
	Fri, Oct 26	17: Using Software to Run a Paired Samples t-Test (JASP, G*Power)		
Week 10	Mon, Oct 29	18: Independent Samples t-test (compare to "no difference")	240, 275-289, 293-295 [236, 270-284, 288-289]	Monday Notes
	Wed, Oct 31	19: Using Software to Run an Independent Samples t-Test (JASP, G*Power)		
	Fri, Nov 2	20: Failures to Replicate		**Homework 6:** Paired Samples and Independent Samples t-Tests
Week 11	Mon, Nov 5 Registration begins for Spring Semester 2019. Tues, Nov 6: Election Day – classes suspended; University offices closed.	21: Researcher Degrees of Freedom	Simmons et al. (2011)	Monday Notes
	Wed, Nov 7	22: Multiple Levels of a Variable	342 [336]	**Homework 7:** Replicability in Psychological Science
	Fri, Nov 9	23: Calculating Within-Groups Variance (Excel)	318, 326-327	
Week 12	Mon, Nov 12	24: Calculating Between-Groups Variance, and the F ratios	318-324, 327-328, 329-331, 340-344	Monday Notes
	Wed, Nov 14	25: Using Software to Run a One-Way Independent Groups ANOVA (JASP, G*Power)		
	Fri, Nov 16	26: Interpreting and Reporting the Results of a One-Sample t-test		Monday Notes **Homework 8:** One-Way Independent Groups ANOVA
	Mon, Nov 19	27: Putting It All Together		
	Wed, Nov 21	Exam 3 Prep and Review		
	Fri, Nov 23	**Exam 3**		

		NO CLASS: Thanksgiving Break	
Week 13	Mon, Nov 26	28: Choose Topic and Research Literature	
	Wed, Nov 28	29: Discuss Background	Monday Notes
	Fri, Nov 30	30: Methods and Stimuli	
Week 14	Mon, Dec 3	31: Testing	
	Wed, Dec 5	32: Data Analysis (in groups)	
	Fri, Dec 7	Wrap up	**Final Paper Binder Check**
	Sat, Dec 8 Reading Day: no examinations scheduled		
	Mon, Dec 10 Final examinations begin		
	Sat, Dec 15 Final examinations end		
	Wed, Dec 19 Deadline for 2018 Fall semester grades to be posted to UDSIS		