

PSYCHOLOGY 245
Statistics & Research Methods
Fall 2019

Class time: MWF, 11:00-11:50

Location: LBC 315

Instructor: Dr. Rachael D. Reavis

Email: reavira@earlham.edu

Office: 305 LBC

Office Hours: Go to <https://www.rachaelreavis.com/appointments> to schedule an appointment. If none of the times work or you need to schedule something farther out, please email me with multiple available times so we can quickly schedule something that works for both of us.

Co-Instructor: Angel Muñoz

Email: munozan@earlham.edu

<https://www.angel-munoz.com/appointments>

Teaching Assistant: Hyeonji Kim

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Teaching Assistant: Julia Schetelig

Email: jaschet18@earlham.edu

Tutoring Information: 1st floor CST; Tuesdays, 7-8p and Thursdays, 4-5p

TEXTBOOKS:

***Both textbooks are free and available in PDF on Moodle.**

Price, P., Jangiani, R., Chiang, I., & Leighton, D. (2017). *Research Methods in Psychology, 3rd Ed.*

Retrieved from: <https://opentext.wsu.edu/carriecuttler/>

Lane, D., Scott, D., Hebl, M., Guerra, R., Osherson, D., & Zimmer, H. (n.d.) *Introduction to Statistics.*

Retrieved from: <http://onlinestatbook.com/>

Optional:

Levitin DL. (2016). *A Field Guide to Lies and Statistics.* New York NY: Dutton. (*Optional extra credit assignments will be taken from this book*). [Available on Rachael's door, LBC 305 – must be kept in Psych Loft]

Journal articles and lecture slides on Moodle: <http://moodle.earlham.edu>

Please factor in the costs of printing PowerPoint slides. You can print 3-6 slides per page.

I expect students to have the slides as they take notes.

COURSE DESCRIPTION & OBJECTIVES:

This course serves as an introduction to experimental design and the analysis of research data in psychology. Topics include methods for observing, measuring and describing behavior, generating and interpreting graphs, distributions both normal and non-normal, descriptive statistics, correlation and inferential statistics. Students will learn to use the statistical software JASP (and R for those interested) in data description and analysis. Students who complete the course should not only be able to design a research project, but select the appropriate analysis for that project, carry it out, interpret it and communicate the results clearly to others. They should be more critical consumers of statistical information presented in both professional and popular sources.

This course is designed as a required sophomore level course for psychology and neuroscience majors, and an elective for other social science students who might be interested. This course fulfills the Analytical (Quantitative) Reasoning General Education requirement.

SPECIFIC COURSE GOALS

By the end of the semester, you should be able to:

1. Identify strengths and weaknesses in research design and understand how those affect interpretations of data.
2. Select the appropriate statistical test based on the data and research question.
3. Conduct the appropriate statistical test using JASP, R, or both.
4. Write the results of a study in a properly formatted APA-style paper, following the conventions of Psychology and Neuroscience.

EARLHAM LEARNING GOALS

- **Communicate**
 - Students will communicate their knowledge and critical thinking primarily through lab reports, exams, and homework.
- **Investigate**
 - Students will investigate research questions using increasingly complex study designs and through brief literature reviews.
- **Apply**
 - Students will apply their statistical and research knowledge to research questions and begin to learn how to conduct research independently. Psychology and neuroscience majors will continue to apply these skills in their subsequent research courses and their senior research project.

COURSE CREDIT EXPLANATION

Successful completion of PSYC 245 will result in 3 academic credits. The class meets for roughly three hours per week. For each hour spent in class, students are expected to study/prepare for a minimum of two additional hours. This is [federally defined](#) and a college-wide expectation. Thus, for three credits, students are expected to be in class for (almost) three hours a week and preparing outside of class for six hours a week, for a minimum of 9 per week.

EVALUATION

Your final grade will be based on attendance/participation, lab reports, problem sets, homework, quizzes, and exams.

REQUIRED READINGS

A basic list of chapters is provided on this syllabus. However, throughout the semester some of these may be altered. **The most up-to-date list of readings will be on Moodle (which may include journal articles as well).** Readings will come from your textbooks, be posted on Moodle, or can be accessed from the Earlham library's website. **It is expected that you will have completed the readings listed on Moodle for a specific date before coming to class on that day.**

PARTICIPATION & ATTENDANCE

Students are expected to participate in all class activities, which may include in-class discussions, demonstrations, working through statistical problems, and more. Regular attendance and participation in activities will be critical to your enjoyment and mastery of the material and will be expected from everyone. Students who are on their phones or decline to participate in activities/discussions will not receive credit for that day. Attendance will be taken every day. The information in this class is cumulative—kind of like a language class. If you miss a lecture, the next one may not make much sense. However, I **do not want you to come to class sick.** Therefore, you may still get attendance/participation credit by watching the recorded lecture and writing a three-paragraph, well-thought-out reaction to the day's lecture. Any day that there is an activity or worksheet, you will have to complete those and show me or send me a scanned copy. The lecture summary and any missed worksheets are due within five days of the missed class. Some activities will have to be made up by meeting with a TA and working through an activity. You must meet with your TA for at least 15 minutes. Discussion/activity make-ups, including meeting with a TA must be completed within one week of the missed class. This policy applies to students missing class for Earlham activities, including sports. If you miss a day for sports, you will need to complete the make-up requirement to receive credit.

Attendance and participation will be worth **52 points** in total, with attendance counting for 42 points & participation counting for 10 points. Average participation will result in a participation grade of 7.5. Students whose participation is below average will receive less; students whose participation is above average will receive more.

Course-Specific Goals: 1-4; Earlham Goals: communicate, investigate, apply

PROBLEM SETS

Problem sets will be assigned that will require you to use statistical software. These problem sets are designed to assess your ability to use the statistical software to analyze the data and then to interpret the analysis.

Problem Sets are worth **100 points**.

Course-Specific Goals: 1 – 3; Earlham Goals: apply

LAB REPORTS

Lab reports are designed to assess your ability to communicate in the style of the American Psychological Association (APA style) the method and results of experiments and interpret those results appropriately drawing on the relevant psychological literature. APA style reports will get longer as the semester proceeds. Later reports will be weighted more heavily than earlier reports. Lab Reports are worth **125 points**.

Course-Specific Goals: 1 – 4; Earlham Goals: communicate, investigate, apply

HOMEWORK

On Moodle, you will find Practice Quizzes. I strongly recommend you do these to test your knowledge. There is also a textbook on reserve in CST that has practice problems after every chapter with the answers to odd-numbered problems in the back.

You will find the assigned homework on Moodle. You must turn homework assignments in at the beginning of class the day that they are due. All homework is due at 11:00am. **Late homework will not be accepted or graded.** If you will be absent, you must turn in your work in advance or scan a copy and email it by 11:00am. Your lowest homework grade will be dropped.

Homework is worth **36 points**.

Course-Specific Goals: 1, 2; Earlham Goals: apply

QUIZZES

There will be a quiz for each chapter (with a few exceptions). The quizzes will cover material from the book, assigned journal articles, and lecture. There are 9 quizzes, but only your 8 best quizzes will count towards your final course grade. Quizzes can only be made up in advance. If you are sick on the day of the quiz, that will have to count as your dropped quiz.

Quizzes are worth **64 points**.

Course-Specific Goals: 1, 2; Earlham Goals: apply

EXAMS

Exams may be a mixture of multiple choice, short answer, and essay. **Most of the exam questions will come from class and assignments (whether slides, activities or discussions) but some may also come solely from the textbook or other assigned readings.** There are 3 exams during the semester. The cumulative final is optional and can take the place of your lowest exam score.

There will be no make-up tests. If you miss an exam, you will need to take the final. If you know in advance that you will miss the exam, you may take it early. **Finally, if you arrive after the first student has completed his or her exam, you will not be permitted to take the test, and you will receive a zero for the test.**

Exams are worth **123 points (41 points each)**.

The final exam for this class is scheduled for Monday, December 9 at 4:30pm.

Course Specific Goals: 1, 2

EXTRA CREDIT

- You can earn up to 10 points of extra credit (added to your final grade out of 500 points) by participating in experiments carried out in the psychology department. You can sign up for these studies using Sona Systems (check Moodle for instructions).
- You can also earn up to 10 points of extra credit (added to your final grade out of 500 points) by reading *A Field Guide to Lies and Statistics* (also more recently published as *Weaponized Lies: How to Think Critically in the Post-Truth Era*) and completing the extra credit assignments on Moodle.
- **Late extra credit assignments will not be accepted.**
- **Students may earn up to 15 extra credit points in total** (added to your final grade out of 500 points). This means that you cannot get the maximum 10 points on *both* participation *and* the optional reading assignments. You can combine them however you like to reach a maximum of 15 points.
- Extra credit is offered to the class as a whole, and individual requests for extra credit are not appropriate. Extra credit points applied to a specific test or bonus questions on the test do not count against this total.

GRADING

Participation/Attendance	52	A-: 450-464.5 A: 465-499.5; A+: 500
Problem Sets	100	B-: 400-414.5; B: 415-434.5; B+: 435-449.5
Lab Reports	125	C-: 350-364.5; C: 365-384.5; C+: 385-399.5
Homework	36	D-: 300-314.5; D: 315-334.5; D+: 335-349.5
Quizzes	64	F: 299.5 or below
Exams (41 points each)	123	
TOTAL	500	

There are three unit tests and one final, but one of them will be dropped.

There are nine quizzes, but one of them will be dropped.

There are five homework assignments, but one of them will be dropped.

There are 500 possible points in this course.

Because there is ample extra credit (up to 15 points (3% of your grade), or 1/3 of a letter grade), I do not round grades. For example, 399.5 is a C+. Take advantage of your extra credit opportunities.

POLICIES & ETIQUETTE

LATE/MAKEUP POLICY

LAB REPORTS & PROBLEM SETS

It is important to hand in your assignments on time. It allows me to give you the quickest feedback, and assignments have been scheduled at certain times to help learning. If you do not turn in your lab reports or problem sets on time, you will lose a letter grade for the first 24 hours that it is late, and another letter grade for each part of 12 hours thereafter. Thus, the best grade that can be received for an assignment turned in 2 hours late is a B, a C for one turned in 25 hours late, and a D for a one turned in 37 hours late. I generally grade promptly. Assignments turned in late will be graded when I have additional time, and I will not make an effort to get late assignments back to you quickly. You will have ample time to complete your written assignments. If you choose to wait until the last minute you run the risk that your computer dies or you catch the flu. ***These will not be excuses for late assignments and you will be penalized, so do not procrastinate.*** Assignments are due on Moodle. ***Failure to attach files or attaching corrupted files is not an excuse for late work.*** I recommend that you sign on to a different computer than the one you where you uploaded your file and try and download it to make sure it is uploaded properly. You are responsible for backing up your work. (See next page for technology guidelines.) To demonstrate that you have read your syllabus (and to earn an extra attendance point), please email me a picture of a rabbit during the first week of class.

Free late points: Each student will receive three free late points. Each point can be used to eliminate a day's late penalty. These can be used on three separate assignments, all in one assignment, or in a combination of two assignments. They can only be used for lab reports and problem sets. Students who do not use their late points will have them added to their extra credit total. If late points are used as extra credit, they will count toward the 15-point maximum.

TESTS & QUIZZES

See policy in the evaluation section. As one test & one quiz are dropped, I **do not allow students to make up quizzes/tests**, except in rare circumstances.

PARTICIPATION/ATTENDANCE

See the Attendance/Participation section above for information about class days that are missed.

HOMEWORK

Late homework will not be accepted. (One assignment will be dropped.)

STUDENT MEETING POLICY

Use <https://www.rachaelreavis.com/appointments> or <https://www.angel-munoz.com/appointments> to schedule appointments with your instructors. You do not need to check with us first—just sign up. When you sign up, you need to indicate specifically what you want to discuss. Prior to your scheduled appointment you need to complete all the assigned reading and practice quiz problems for that topic if you are meeting about class material you do not understand. If you arrive at our meeting and have not done all the assigned work and practice problems, we will not be able to meet with you. This is to ensure that our time together is productive and that we have enough time to meet the needs of all students.

EMAIL ETIQUETTE

Many of you may be familiar with proper email etiquette when engaging in professional communication (like that between professors and students). Others of you may not have had experience with these types of communications, which is why I am including them here.

You are encouraged to contact me via e-mail with any questions that you may have, but I ask that you **check the syllabus and Moodle *first*** to see if your question can be answered. If every student asks me information that they can locate themselves, the time to answer them adds up quickly, and it takes away from my time to prepare quality lectures, provide feedback, and assist students in other ways. Please be courteous to me and to your fellow classmates and check the available resources.

Appropriate email: (a) begin with a greeting; (b) state who you are and which class/section you are in; (c) end with an appropriate signature. Don't forget to use spell-check!

Example of appropriate e-mail format:

'Rachael,

My name is [YOUR FULL NAME] and I am in your [NAME OF COURSE]*. I have a question about X. I looked for the answer [in Moodle, on the syllabus, in the book, etc.], but I haven't been able to find it. Can you help?

Thanks,

[YOUR NAME]'

*You don't have to tell me your course after the first few weeks, once I've learned your names.

Example of inappropriate e-mail format resulting in no response (lack of greeting; no personal identification; no reference to course name/section; no signature; spelling errors):

'So i was wonderign when you were gonna post the notes?'

Proper e-mail etiquette is *extremely* important in that (a) it enables me to be more efficient in helping you because I won't lose time trying to figure out who you are or what you are asking; (b) **it is a vital skill to have in the 'real world.'** Jobs and student positions have been lost because of unprofessional emails.

If you communicate with professionals outside of Earlham, be sure to use last names and titles, such as Ms. Smith or Dr. Johnson. If you are uncomfortable using a professor's first name at Earlham, ask them how they would prefer to be addressed. Almost all of your professors have doctorates, so Ms. and Mr. would not be appropriate unless a professor tells you otherwise. If you are uncomfortable using first names, Professor Reavis or Dr. Reavis is appropriate for Rachael. Dr. Muñoz is appropriate for Angel.

ACADEMIC HONESTY

Learning to think for yourself is at the heart of a liberal arts education and global citizenship. Treasure and cultivate these skills. Papers and other work, including digital creations, downloaded or copied from other sources, or in which words or ideas belonging to others have been deliberately misrepresented as your own, will receive an automatic F, as they thwart your learning process and damage the integrity of knowledge-discovery. **Homework assignments, problem sets, or lab reports that contain plagiarized portions will receive an automatic F.** If you are aware of a violation of academic integrity, it is your responsibility to take action. An excellent place to find help in knowing when and how to cite others' work appropriately can be found on the [Libraries page](#). The site also includes Earlham's full statement on academic integrity and procedures for addressing academic violations of the Student Code of Conduct.

TECHNOLOGY GUIDELINES¹

To be successful in college and beyond, you need to develop work habits that take potential technological problems into account. These habits will serve you in your career. Technological problems are a fact of life and are not considered unforeseen issues. (Your dorm falling into a sinkhole would qualify as “unforeseen”). Start early and save often. Always keep a backup of your work. Carbonite and Backblaze are two services that will automatically back your work up into a cloud. Or you can invest in an external hard drive. Or you can email yourself your work.

Computer viruses, lost flash drives, corrupted files, incompatible formats, WiFi connectivity problems – none of these unfortunate events should be considered an emergency. Technology problems will not excuse late work. Take the proper steps to ensure that your work will not be lost forever. Learn the locations and operating hours of all the computer labs on campus. Do not procrastinate. The Help Desk is also available (helpdesk@earlham.edu).

RESOURCES

TUTORING

Tutoring services are recommended for any student who receives lower than a C on an exam, or whose overall GPA is a 2.7 or lower. Tutoring is a **free resource** available to all students. TAs have weekly group tutoring sessions, and you should take advantage of those first. You may sign up for a tutor [here](#).

COUNSELING SERVICES

College can be a stressful time and can exacerbate existing issues or bring new ones up. Seeing a counselor is a healthy way to deal with stresses and mental health issues. Please do not hesitate to make an appointment with at [Counseling Services](#).

¹ Drawn from material by George H. Williams

STUDENTS WITH DISABILITIES

Students with a documented disability (e.g., physical, learning, psychiatric, visual, hearing, etc.) who need to arrange reasonable classroom accommodations must request accommodation memos from the Academic Enrichment Center and contact their instructors each semester. For greater success, students are strongly encouraged to visit the [Academic Enrichment Center](#) within the first two weeks of each semester to begin the process. Please let me know if you have accessibility issues with any of our materials.

Students in PSYC 245 **do not need** documented accommodations to request the following:

- A quiet place to take an exam or quiz
- Extended and uninterrupted time on exams or quizzes
 - Students *do* need accommodations if they intend to take the exam/quiz, go to another class, and return to take it later. In these documented cases, I will work with the student to find a time on the test day when the exam can be completed uninterrupted.
- Using a smart pen or other device that records lecture

SCHEDULE OF TOPICS & ASSIGNMENTS

** Please note that this schedule is tentative and may change as circumstances require.*

8/21, Day 1, Week 1	Topic: Introduction, Syllabus
8/23, Day 2, Week 1	Topic: Scientific Method & Experiment Basics Reading: Research Methods Chapter 1.1-1.4; Research Methods Chapter 2.4, 2.5 <i>Fuel of the Future</i> (Moodle) Extra Credit Due: Plausibility
8/26, Day 3, Week 2	Topic: Levels of Measurement Reading: Research Methods, Chapter 4.1 Quiz 1: Chapter 1.1-.14, 2.4, 2.5 Due: Homework 1 Extra Credit Due: Identifying Expertise
8/28, Day 4, Week 2	Topic: Reliability & Validity Reading: Research Methods, Chapter 4.2
8/30, Day 5, Week 2	Topic: Reliability & Validity Quiz 2: Chapter 4.1-4.2 Due: Homework 2
9/2, Day 6, Week 3	Topic: Collecting Data Reading: Research Methods, 6.4, 6.5, 7.2, 7.3; <i>Election Forecasting</i> (Moodle)
9/4, Day 7, Week 3	JASP (or R) Introduction Computer Lab Extra Credit Due: How Numbers Are Collected
9/6, Day 8, Week 3	Topic: Data Organization & Central Tendency; Distributions & z -scores Reading: Research Methods, 12.1 Intro to Stats, p. 46-51, 256-262 Extra Credit Due: Axis Shenanigans
9/9, Day 9, Week 4	JASP (or R) Analyze Walking Speed Lab & APA Computer Lab Extra Credit Due: Fun with Averages
9/11, Day 10, Week 4	Topic: Distributions/ z -Scores Quiz 3: Research Methods, 6.4, 6.5, 7.2, 7.3, 12.1 Stats, p. 46-51, 256-262 Due: Problem Set 1
9/13, Day 11, Week 4	Topic: Correlation Reading: Research Methods, 6.2 Optional Reading: Stats, p. 170-177 Due: Walking Speed Lab Report
9/16, Day 12, Week 5	Topic: Regression Reading: Stats, p. 462-465 Extra Credit Due: Hijinks with How Numbers Are Reported

9/18, Day 13, Week 5	<p>Topic: Review</p> <p>Quiz 4: Research Methods, 6.2; Stats, p. 462-465</p> <p>Due: Problem Set 2</p>
9/20, Day 14, Week 5	<p>EXAM 1</p> <p>**CLASS IS NOT HELD ON THIS DAY**</p> <p>**EPIC EXPO**</p> <p>STUDENTS MUST TAKE EXAM 1 ON WEDNESDAY, THURSDAY, OR FRIDAY NO LATER THAN 11 ON FRIDAY.</p> <p>PICK UP EXAM FROM SOCIAL SCIENCE ADMIN (LBC 225)</p> <p>TAKE EXAM IN LBC 309</p>
9/23, Day 15, Week 6	<p>Topic: Probability</p> <p>Reading: Stats, p. 186 – 192 p. 196-197 (Gambler’s Fallacy)</p>
9/25, Day 16, Week 6	<p>Topic: Hypothesis Testing</p> <p>Reading: Research Methods 13.1 Stats, p. 369-376</p> <p>Extra Credit Due: Probability</p>
9/27, Day 17, Week 6	<p>Topic: Decision Errors</p> <p>Reading: Stats, p. 377-378</p> <p>Quiz 5: Research Methods 13.1 Stats, p. 186-192, 196-197, 369-378</p> <p>Extra Credit Due: Overlooked, Undervalued</p>
9/30, Day 18, Week 7	<p>Topic: Central Limit Theorem</p> <p>Reading: Stats, p. 299-310, 399-403</p> <p>Due: Homework 3</p>
10/2, Day 19, Week 7	<p>Topic: One-Sample t-test</p> <p>Reading: Research Methods, 13.2 (p. 248-252)</p>
10/4	No Class, Mid-Semester Break
10/7, Day 20, Week 8	<p>Topic: Power & Confidence Intervals</p> <p>Reading: Research Methods 13.3 (p. 263-266) Stats, p. 454-457</p> <p>Due: Homework 4</p>
10/9, Day 21, Week 8	<p>Topic: Paired t-test</p> <p>Reading: Stats, p. 428-431 Research Methods, 13.2, p. 252-253 (dependent t)</p> <p>Quiz 6: Research Methods, 13.2 (p. 248-253); 13.3 (p. 263-266) Stats, p. 299-310; p. 399-403; 428-431; p. 454-457</p>
10/11, Day 22, Week 8	<p>JASP (or R)</p> <p>Paired t, Wilcoxon</p> <p>Computer Lab</p>

10/14, Day 23, Week 9	<p>Topic: Independent t-test Reading: Research Methods, 13.2 (p. 253-254), Stats, p. 406-409 Due: Problem Set 3</p>
10/16, Day 24, Week 9	<p>Topic: Chi Square, Goodness of Fit Reading: Stats, p. 601-604 Due: Stress & Anxiety Questionnaire</p>
10/18, Day 25, Week 9	<p>JASP (or R) Independent t, Mann Whitney U, Chi Square, Goodness of Fit/Independence Computer Lab <i>Rachael out of town; Beth teaching</i></p>
10/21, Day 26, Week 10	<p>Topic: Review Quiz 7: Research Methods 13.2 (p. 253-254), Stats, p. 406-409; p. 601-604 Due: Homework 5</p>
10/23, Day 27, Week 10	Topic: Review
10/25, Day 28, Week 10	EXAM 2
10/28, Day 29, Week 11	<p>Paired Associates Experiment Computer Lab Due: Stress & Anxiety Lab Report</p>
10/30, Day 30, Week 11	<p>Topic: Multilevel Design (ANOVA) Reading: Research Methods, 13.2 (p. 254-257) Extra Credit Due: Four Case Studies</p>
11/1, Day 31, Week 11	<p>JASP (or R) Multilevel Design Computer Lab <i>Last Day to Drop</i></p>
11/4, Day 32, Week 12	<p>Topic: Multilevel Repeated Measures Reading: Research Methods, 13.2 (p. 257-258) Stats, p. 562-565</p>
11/6, Day 33, Week 12	<p>Topic: Multilevel Repeated Measures Quiz 8: Research Methods, 13.2 (p. 254-258) Stats, p. 562-565</p>
11/8, Day 34, Week 12	<p>JASP (or R) Repeated Measures ANOVA Computer Lab Due: Paired Associates Lab Report</p>
11/11, Day 35, Week 13	<p>JASP (or R) Stroop Experiment & Analysis Computer Lab Extra Credit Due: Conclusion</p>

11/13, Day 36, Week 13	Topic: Factorial ANOVA Reading: Stats, p. 532-541 Due: Problem Set 4
11/15, Day 37, Week 13	Topic: Factorial ANOVA Quiz 9: Stats, p. 532-541
11/18, Day 38, Week 14	JASP (or R) Factorial ANOVA Computer Lab
11/20, Day 39, Week 14	Topic: Which Test? Interpret JASP Output Due: Problem Set 5
11/22, Day 40, Week 14	Topic: Replicability & Open Science Reading: Research Methods, 13.4 Due: Stroop Effect Lab Report
<i>11/25, 11/27, 11/29</i>	<i>No Class, Thanksgiving Break</i>
12/2, Day 41, Week 15	Topic: Review
12/4, Day 42, Week 15	Topic: Review Due: Problem Set 6
12/6, Day 43, Week 15	EXAM 3
12/9, 4:30p	FINAL EXAM