Psych 3020: Research Methods II Syllabus

Instructor: Kyle Hardman
Contact: kh832@mail.missouri.edu
Office hours: Tuesdays, 2 - 3:30 pm, after class (most of the time), or by appointment.
Office location: McAlester Annex, which is the small building just north of McAlester hall. Once inside the front door, turn right and go up the stairs. Once upstairs, go down the hall to your left.

Course Purpose

Whenever we have an unanswered question about psychology, researchers use statistics to help answer those questions. Is a type of therapy effective? Is there a relationship between money and happiness? Reliable answers to these kinds of questions are obtained through the use of statistics. This course is designed to teach you about:

1) The kinds of questions that you can answer with data and statistics, such as:
   - Is there a relationship between these variables?
   - Is there a difference between different groups?
   - How do we determine if a difference or relationship is statistically meaningful?
   - And more!

2) How to use a variety of standard statistical tests that give answers to the above questions:
   - To compare the averages of one or two groups we use t-tests. We will cover one-sample, two-sample, and paired t-tests.
   - To compare the averages of multiple groups we use analysis of variance (ANOVA). We will cover one factor and two factor designs. Time permitting: Within-participants designs.
   - To examine what relationship is between two variables, we will use regression. Time permitting, we will cover relationships between multiple variables and nonlinear relationships between variables.
   - To measure the strength of relationship between two continuous variables, we use correlation.
   - To test the proportion of responses in a number of different categories, we will use the chi-squared test. We will do both single factor and two factor (i.e. contingency table) designs.
   - Time permitting, we will also discuss ways to do statistics with as few assumptions about the data as possible with nonparametric statistics.
Textbook

*Fundamental Statistics for the Behavioral Sciences* by David C. Howell

**The textbook is optional.**

The most recent edition of the textbook is the 8th edition. However, I recommend the 7th edition of the book because the last chapter of the book is different between the two versions and the 7th edition’s last chapter is more useful for this class.

This is a good textbook with lots of little details that won’t be covered in the class, so I recommend reading it if there is something that we covered in class that you didn’t understand or you want to learn more about.

**8th Edition**

ISBN: 1285076915

**7th Edition**

ISBN: 0495811254
Assignments

Exams and quizzes: 180 points out of 190 assigned*
• Quiz 1: 20 points
• Exam 1: 90 points
• Exam 2: 80 points

Final project: 100 points
• Two worksheets: 7 points each
• Final project: 86 points

Lab assignments: 200 points out of 235 assigned*
In class assignments: 20 points out of 25 assigned*

Total: 500 points possible of 550 assigned

*When more points are assigned than are possible, it means that you have an easier time earning all of the possible points, because you can miss more points and still get all of the possible points. Assume that 40 points are possible and 50 points are assigned in some section. In this case, you only need to get 80% correct out of 50 points to get the full 40 points possible. Any points beyond 40 do not count for anything.

Exams and Quizzes

There will be a quiz early in the semester on basic concepts in statistics, such as the parts of plots, mean, median, mode, etc.

The first exam will cover the basics of inferential statistics, confidence intervals, t-tests, and one-factor ANOVA.

The second exam will cover regression and correlation, two-factor ANOVA, and within-participants ANOVA.

There will not be a final exam.

Final Project

Over the course of the semester, you will learn how to do a number of statistical procedures and will get some practice using them. The project is designed to help you crystalize your understanding of what you have learned.

I will give you a simulated data set, information about the data set (e.g. what the dependent and independent variables are), and some hypotheses that can be tested using the data. Most likely, I will write the Introduction and Method sections of an article that give all of the background you need.

You will test the provided hypotheses using the statistical techniques you will learn in this class. The final product that you turn in will be the Results section of an APA format article. For each hypothesis I give
you to test, you should explain what hypothesis you are testing, the statistical technique you used to
test it, and what the results of the test were. There will be more detailed provided in the full
assignment.

During the semester, as preparation for the final project, you will work on two worksheets that will help
you to perform the correct statistical analyses on the data for the project.

Lab assignments

You will do a number of lab/homework assignments in the course that will help you to 1) practice using
recently taught material, 2) give you feedback about your understanding of the material, and 3) give me
feedback about your understanding of the material.

Labs are generally assigned on Fridays when we are in a computer lab. I will walk you through the lab,
showing you how to use Minitab, which is a piece of statistical software, to do statistical analyses
related to that lab. I will show you how to use a program to do the basics of whatever you are working
on, then you will work on a number of similar problems. After I have finished showing you whatever
material I have planned, I will stay to answer questions. You will turn in a written assignment, possibly
including computer printouts and graphs.

For at least some labs, you may be able to complete the assignment during class, which means you
won’t need to worry about finishing it later.

In class assignments

There will be a few in class assignments that are effectively participation credit. You just need to be
there and do the assignment to get full credit. For that reason, in class assignments cannot be made up.
The timing of in class assignments is not announced ahead of time.

Grading

<table>
<thead>
<tr>
<th>Letter grade</th>
<th>Minimum %</th>
<th>Points</th>
<th>Letter grade</th>
<th>Minimum %</th>
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<td>C+</td>
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### Schedule – Subject to change!

**Monday** and **Wednesday** of each week, we meet in McAlester 102. **Friday** we meet in Middlebush 7 for computer lab work.

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Date</th>
<th>Topic</th>
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</thead>
<tbody>
<tr>
<td>1/18</td>
<td><strong>No class: MLK Jr. day</strong></td>
<td>3/14</td>
<td>Ch 10: Single regression</td>
</tr>
<tr>
<td>1/20</td>
<td>Syllabus / Ch 1 &amp; 2: Introduction &amp; Basic Terms</td>
<td>3/16</td>
<td>Ch 10: Single regression</td>
</tr>
<tr>
<td>1/22</td>
<td>Ch 3, 4, &amp; 5: Displaying data, Central tendency, &amp; Variability</td>
<td>3/18</td>
<td><strong>Lab 5</strong> on single regression</td>
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<tr>
<td>1/25</td>
<td>Ch 7 &amp; 6: Probability and distributions &amp; Normal distribution</td>
<td>3/21</td>
<td>Ch 9: Correlation / Overview of types of statistical tests / Project worksheet part 2 assigned</td>
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<tr>
<td>1/27</td>
<td>Quiz over introductory material</td>
<td>3/23</td>
<td>Ch 11: Multiple regression</td>
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<tr>
<td>1/29</td>
<td>Ch 8.1/2: Sampling distributions</td>
<td>3/25</td>
<td><strong>Lab 6</strong> on multiple regression and correlation</td>
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<tr>
<td>2/1</td>
<td>Ch 8.1/2: Sampling distributions</td>
<td>3/28</td>
<td><strong>No class: Spring break</strong></td>
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<tr>
<td>2/3</td>
<td>Ch 12.7 (sort of): Z confidence intervals</td>
<td>3/30</td>
<td>Spring break</td>
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<td>2/5</td>
<td><strong>Lab 1</strong> on SD and Z CI</td>
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<td>Spring break</td>
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<td>2/8</td>
<td>Ch 8.3/4: Hypothesis testing</td>
<td>4/4</td>
<td>Ch 17: Two-factor ANOVA</td>
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<td>2/10</td>
<td>Ch 19a: One-factor chi-squared</td>
<td>4/6</td>
<td>Ch 17: Two-factor ANOVA</td>
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<td>2/12</td>
<td><strong>Lab 2</strong> on HT and Chi-squared</td>
<td>4/8</td>
<td><strong>Lab 7</strong> on Two-factor ANOVA</td>
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<td>2/15</td>
<td>Ch 12: 1-sample t-test</td>
<td>4/11</td>
<td>Ch 17: Two-factor ANOVA</td>
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<td>2/17</td>
<td>Ch 13: Paired t-test</td>
<td>4/13</td>
<td>Ch 18: Within-participants ANOVA</td>
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<td>2/19</td>
<td><strong>Lab 3</strong> on t-tests</td>
<td>4/15</td>
<td><strong>Lab 8</strong> on WP ANOVA</td>
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<td>2/22</td>
<td>No chapter: Statistical Models</td>
<td>4/18</td>
<td>Ch 19b: Two-factor chi-squared</td>
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<td>2/24</td>
<td>Ch 16: One-factor ANOVA</td>
<td>4/20</td>
<td>Ch 20: Nonparametric tests</td>
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<td>2/26</td>
<td>Ch 16: One-factor ANOVA</td>
<td>4/22</td>
<td><strong>Lab 9</strong> on Ch 19 and 20</td>
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<td>2/29</td>
<td><strong>Lab 4</strong> on one-factor ANOVA</td>
<td>4/25</td>
<td>No chapter: Critiques of statistical techniques</td>
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<td>3/2</td>
<td>Ch 16: One-factor ANOVA</td>
<td>4/27</td>
<td>Review</td>
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<td>3/4</td>
<td>Computer part of <strong>Lab 4</strong></td>
<td>4/29</td>
<td><strong>Exam 2</strong></td>
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<tr>
<td>3/7</td>
<td>Final project assigned / Project worksheet part 1 assigned</td>
<td>5/2</td>
<td>Help with projects</td>
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<tr>
<td>3/9</td>
<td>Review</td>
<td>5/4</td>
<td>Help with projects</td>
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<tr>
<td>3/11</td>
<td><strong>Exam 1</strong></td>
<td>5/6</td>
<td><strong>No class: Reading day</strong></td>
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**Final exam date:** Thursday May 12th, 10 am to noon. **However,** there is no final exam, just the final project.

Days marked with **Lab** are days when a lab assignment is started, not the day that it is due, which is one week from the day that it is assigned (unless stated otherwise).
Students with disabilities:

Please let me know as soon as possible if:

- You anticipate barriers related to the format or requirements of this course.
- You have emergency medical information to share with me.
- You need to make arrangements in case the building must be evacuated.

If you require disability-related accommodations (such as a notetaker, extended time on exams or captioning), please establish an Accommodation Plan with the Disability Center:

- disabilitycenter.missouri.edu
- S5 Memorial Union
- 573-882-4696

After you have registered, please notify me of your eligibility for reasonable accommodations. For other MU resources for students with disabilities, click on "Disability Resources" on the MU homepage.

Academic Dishonesty

Academic integrity is fundamental to the activities and principles of a university. All members of the academic community must be confident that each person's work has been responsibly and honorably acquired, developed, and presented. Any effort to gain an advantage not given to all students is dishonest whether or not the effort is successful. The academic community regards breaches of the academic integrity rules as extremely serious matters. Sanctions for such a breach may include academic sanctions from the instructor, including failing the course for any violation, to disciplinary sanctions ranging from probation to expulsion. When in doubt about plagiarism, paraphrasing, quoting, collaboration, or any other form of cheating, consult the course instructor.

IF YOU COMMIT AN ACT OF ACADEMIC DISHONESTY IN THIS CLASS AND, WHEN CONFRONTED, DO NOT IMMEDIATELY ADMIT WRONGDOING AND ACCEPT ALL SANCTIONS THAT I IMPOSE, I WILL GIVE YOU A FAILING GRADE IN THE CLASS. Eventual recognition of wrongdoing will not reverse the failing grade. I will probably also make a formal complaint against you with the Provost's office. Even if you admit to cheating, I may still give you a failing grade in the course, a lost letter grade, etc.

Working Together

In this course, I encourage you to work with other students. Statistics is difficult and having other people to discuss it with can be very helpful. However, there is one part of all assignments that you are not allowed to work together on, which is writing. **You must do your own writing.** I have two reasons for this policy:

1. If multiple students turn in assignments for which all or some of the writing is the same, I cannot tell whether or not copying was happening. Copying from another student's work is creating.
2. Writing your own answers will almost certainly help you remember the material. Putting thoughts into a written form forces you to try to be as clear and precise as possible, and the effort of doing that should help you remember.

You can work together on everything up to writing. This includes (but is not limited to) getting data into Minitab, deciding what analysis to use for a question, getting Minitab to do the analysis, and figuring out what parts of the Minitab output you need to answer the questions. You can agree on what the answer to a question is, but you must avoid agreeing on the exact wording to use (the exception of course is when there is a single correct wording, as might be the case for specific statistical jargon, but this is rare in this class).
Intellectual Pluralism

The University community welcomes intellectual diversity and respects student rights. Students who have questions or concerns regarding the atmosphere in this class (including respect for diverse opinions) may contact the departmental chair or divisional director; the director of the Office of Students Rights and Responsibilities; the MU Equity Office, or equity@missouri.edu.

All students will have the opportunity to submit an anonymous evaluation of the instructor(s) at the end of the course.

Lecture Recording

University of Missouri System Executive Order No. 38 lays out principles regarding the sanctity of classroom discussions at the university. The policy is described fully in Section 200.015 of the Collected Rules and Regulations. In this class, students may make audio or video recordings of course activity unless specifically prohibited by the faculty member. However, the redistribution of audio or video recordings of statements or comments from the course to individuals who are not students in the course is prohibited without the express permission of the faculty member and of any students who are recorded. Students found to have violated this policy are subject to discipline in accordance with provisions of section 200.020 of the Collected Rules and Regulations of the University of Missouri pertaining to student conduct matters.