### PSY 3801: Introduction to Psychological Measurement and Data Analysis

**Section 012**  
Fall 2014, 4 credits  
Lecture/Lab: online

**Instructor:** Penny Nichol, Ph.D.  
N382 Elliott Hall  
nich0185@umn.edu

**Teaching Assistant:** Michael Wilmot  
N496 Elliott Hall  
wilmo040@umn.edu

**Office Hours:**  
Wednesdays, 1 to 2 p.m.  
Thursdays, 10 to 11 a.m.  
and by appointment

**Note:** even if you cannot attend office hours in person, we will be available by e-mail at those times to answer questions as quickly as possible. There might be the possibility of “meeting” online via Google Hangout. In addition, you are welcome to ask questions within Moodle using the forums. You also are welcome to e-mail us with questions at any time.

### Course Description

PSY 3801 is an introduction to the basic concepts and procedures related to the measurement and analysis of psychological variables. The main goal of this course is for students to understand the data of psychology and the appropriate selection and use of statistical tools to describe and evaluate results of psychological research. This course is completely online, aside from exams. As such, students are expected to watch lectures and participate in learning activities online. To fulfill the University’s mathematical thinking requirement, this course will emphasize the application of statistics to psychological data. Students will learn not only how to compute the statistics necessary for basic psychological data analysis, but will gain a conceptual understanding of the foundations of psychological measurement and the concepts behind statistics, such as sampling distributions and the logic of testing statistical hypotheses. PSY 1001 (or equivalent) and high school algebra (or equivalent) are prerequisites for the course.

### Materials (all are available at the Coffman Union Bookstore)

**Required:**
2. A good calculator

### Assessment and Evaluation

**A. Exams**

There will be two midterm exams and a comprehensive final exam. All exams will take place in S121 Elliott (a computer testing center). You will reserve a time to take an exam about a week or so before each exam takes place. You will have a choice of days and times available for scheduling. Often for exams we will be sharing the testing center with other classes, so please be respectful of the other students. Penny or Michael will be available during exams in case you have questions. If you cannot come to campus to take the exams, please let Penny know as soon as possible so we can discuss alternative exam delivery methods.
The first midterm will cover the material from the start of class up to and including regression. The second midterm will cover the material starting with the normal distribution up to and including the related-samples $t$ test and the confidence intervals associated with that test and the one-sample $t$ test. The final will focus mainly on the portion of the class starting with the independent samples $t$ test through the end of the material, but, given the cumulative nature of the course, there will some material from the first two parts of the course.

The exams will consist of multiple-choice questions delivered though the course Moodle site. Each midterm exam is worth 25 points (50 questions), and the final exam is worth 50 points (100 questions). Each exam will be timed. You will have 60 minutes to take the midterm exams and 120 minutes to take the final exam. Make-up exams: As soon as you know you cannot make a scheduled exam, contact Penny to discuss the possibility of a make-up exam. Make-up exams will be granted only for legitimate excuses with documentation. Make-ups must take place no later than one week after a scheduled exam time, preferably as soon as possible.

B. Assigned Homework Problems

As with any course with a mathematics component, one of the most effective learning tools is working problems. This class is no exception. There will be problems assigned (mostly from the Heiman text) for you to complete. Each set will be worth 20 points. In order to receive full credit, you must show your work or provide rationale for your response. You have three options for turning in the homework assignments: (1) to submit a typed document via Moodle, (2) to e-mail Penny or Michael your assignment, or (3) to turn a paper copy into either Penny’s or Michael’s Elliott Hall mailbox. Your assignment must be received by 4 p.m. Central Time on the day it is due in order to receive full credit.

C. Quizzes

Research (e.g., Roediger & Karpicke, 2006) has shown that repeated testing improves retention of material. Thirteen chapter quizzes will be administered in Moodle. Each multiple-choice quiz will be worth 4 points. You are allowed to take each quiz twice but only the higher score of the two tries for each quiz will count toward your final grade. These quizzes are meant to serve as review tool to help you keep up with course content, so I recommend that you take each quiz after we cover the associated book chapter. Quizzes will primarily cover the material from the textbook, whereas exams will have questions both from the textbook and from lecture. You have until noon Central Time on Wednesday, 12/17/14, to complete all chapter quizzes.

D. Additional Assessments

In order to gain access to the video lecture modules, you must take a syllabus quiz on Moodle. You will receive 4 points for taking this quiz, regardless of your score on the quiz. However, you must score at least 75% (6/8) on the quiz in order to gain access to the videos. (You may take the quiz as often as needed to obtain that minimum value.)

During the first week of the course, you will complete a math diagnostics quiz in Moodle. This quiz is not graded based on how well you do (so do not panic!); you will be awarded 4 points for completing it. The goals of the quiz are to get you back into the habit of working with numbers, especially if it has been a while, and for me to get an idea about your math level at the start of the class. I highly recommend that you refresh your memory about mathematical symbols and operations by watching the “Math Review” lecture module before taking the quiz!
E. Semester Grade

Your grade in this course will be based on:

<table>
<thead>
<tr>
<th></th>
<th>Points</th>
<th>% of grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midterm Exam 1</td>
<td>25</td>
<td>6.54</td>
</tr>
<tr>
<td>Midterm Exam 2</td>
<td>25</td>
<td>6.54</td>
</tr>
<tr>
<td>Final Exam</td>
<td>50</td>
<td>13.09</td>
</tr>
<tr>
<td>Problem Sets (10 sets; worth 20 pts. each)</td>
<td>200</td>
<td>52.36</td>
</tr>
<tr>
<td>Chapter Quizzes (13 highest scores; worth 4 pts. each)</td>
<td>52</td>
<td>13.61</td>
</tr>
<tr>
<td>Syllabus Quiz</td>
<td>4</td>
<td>1.05</td>
</tr>
<tr>
<td>Math Diagnostics</td>
<td>4</td>
<td>1.05</td>
</tr>
<tr>
<td>Research Study Survey Participation –OR– Logbook Assignment</td>
<td>12</td>
<td>3.14</td>
</tr>
<tr>
<td>Intervention Video + Stress Logbooks</td>
<td>10</td>
<td>2.62</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>382</td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

You will be graded on the percentage of points earned, not in comparison to the other students. To assess your grade at any point in the semester, simply add up your points and divide by the total number of points up to that time. Look that percentage up in the table below to see where you stand…

Final grades will be based on the following percentages:

<table>
<thead>
<tr>
<th>Points Earned</th>
<th>Percent</th>
<th>Letter Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>356.6 – 382.0</td>
<td>93.4% – 100%</td>
<td>A</td>
</tr>
<tr>
<td>343.7 – 356.5</td>
<td>90.0% – 93.3%</td>
<td>A-</td>
</tr>
<tr>
<td>331.1 – 343.6</td>
<td>86.7% – 89.9%</td>
<td>B+</td>
</tr>
<tr>
<td>318.4 – 331.0</td>
<td>83.4% – 86.6%</td>
<td>B</td>
</tr>
<tr>
<td>305.5 – 318.3</td>
<td>80.0% – 83.3%</td>
<td>B-</td>
</tr>
<tr>
<td>292.9 – 305.4</td>
<td>76.7% – 79.9%</td>
<td>C+</td>
</tr>
<tr>
<td>280.2 – 292.8</td>
<td>73.4% – 76.6%</td>
<td>C</td>
</tr>
<tr>
<td>267.3 – 280.1</td>
<td>70.0% – 73.3%</td>
<td>C-</td>
</tr>
<tr>
<td>254.7 – 267.2</td>
<td>66.7% – 69.9%</td>
<td>D+</td>
</tr>
<tr>
<td>229.1 – 254.6</td>
<td>60.0% – 66.6%</td>
<td>D</td>
</tr>
<tr>
<td>0.0 – 229.0</td>
<td>0% – 59.9%</td>
<td>F</td>
</tr>
</tbody>
</table>

F. Stress Intervention Research Study/Statistics Logbook Assignment

As part of this course, you are invited to participate in a stress intervention research study. The intervention is intended to help you potentially learn statistics more successfully in the online environment. The study has two parts – one is optional and the other mandatory. If you chose to participate in the optional portion of the study, you will give consent and, starting with week 4, you will answer a brief survey about stress each week for participation credit. If you do not elect to participate in the optional portion, you can complete a statistics logbook for equivalent participation credit (see next paragraph). For the mandatory part of the study, during week 9, every student will watch a short video for credit and following the video and for the three weeks after, everyone will fill out a short log entry (not the same as the statistics log entries!) for credit. All activities associated with this study have the goal of assisting you in managing the stress associated with this type of course. If you have any questions about the study, you may contact the study’s lead researcher, Kelli Howard, at howar473@umn.edu.
If you do not elect to participate in the stress intervention study by answering a brief survey each week for 12 weeks, you can do the alternative assignment for credit, which is to complete a statistics logbook. One of the most important skills a psychologist (or perhaps this can even be generalized to anyone!) can possess is critical thinking. While most of your work in this course will involve critical thinking in some way, during the semester you would keep a “critical thinking logbook” to assess how statistics are portrayed in the popular media by creating and turning in three logbook entries. You will be required to find and read three articles from published popular media sources (e.g., the internet, newspapers, or magazines – NOT psychological or medical journals) that incorporate statistics in some way. After reading each article, write a short report (approximately ½ to 1 page) about whether the statistics presented in the source were used correctly, providing reasons for your response. For this assignment, the first article must include a graphical data display, the second must incorporate descriptive statistics, and the third must describe a psychological study that contains some sort of statistic or graph. You MUST include each original popular media articles with each corresponding logbook entry. Logbook entries are to be typed with 1-inch margins on all sides of the page. Please use an appropriate font and size such as the Word default of Times New Roman 12. Logbooks that are not typed will receive no credit. Each logbook entry is worth 4 points. Logbooks are due no later than the last day of classes for the semester (Wednesday, 12/10) and must be submitted electronically either in Moodle or by e-mail. (See the logbook assignment and sample entry on the course website in the week 4 section for more details.)

G. Course Policies

The following policies are required by the University of Minnesota to be part of the course syllabus. They were written to ensure fair, reasonable, and equitable guidelines in the classroom. The policies are inflexible and non-negotiable.

1. Accommodation for persons with special needs: In compliance with the Americans with Disabilities Act (1990) and the University of Minnesota policy, students with any documented disabilities are eligible for reasonable and appropriate accommodations in this class. A number of accommodations can be made in class if this applies to you. Please contact Penny and the Disability Resource Center as soon as possible if you need special accommodation for this course.

2. Policies and penalties for late work: (1) For assignments, you will NOT receive full credit for late work unless you have a legitimate excuse (e.g., religious observance, intercollegiate athletics, ROTC, National Guard service, subpoenas, University band, University student government, a death in the family, jury duty, or a confirmed medical illness) and Penny’s approval in advance. If Penny has not heard from you within 48 hours of the due date, you forfeit any right to an extension for any reason. Extensions will be granted only for legitimate excuses. If you contact Penny within 48 hours of the due date, but do not have a legitimate excuse, you may still turn in the work for partial credit. However, you still must contact her let her know you are turning in your work late – otherwise you will receive NO credit! You will lose 25% of the total points for the assignment for each day it is late. (Note that the weekend – Saturday and Sunday – count as one day when assessing this penalty.) (2) The exam and quiz policies have been stated earlier in the syllabus.

3. Incompletes: Incompletes will only be granted in the case of medical or personal emergencies. Incompletes can only be given if you are receiving a grade of “C-“ or
higher on work already completed. Contact Penny as soon as you suspect you might need to take an incomplete in the course.

4. **Classroom conduct:** All persons have the right to a civil, productive, and stimulating learning environment. As such, we have the responsibility of respecting the rights, opinions, and environment of others. Anyone whose behavior is disruptive to others will be asked to leave the class. In addition, a student whose behavior suggests the need for counseling or other assistance might be referred to the University’s Counseling Services. Any student who violates the University’s Student Conduct Code might be referred to the Director of the University Counseling Office.

5. **Academic Integrity:** Neither plagiarism nor cheating of any kind will be tolerated in this course. You are responsible for doing all written work independently, without unauthorized collaboration or plagiarizing. (Plagiarizing includes duplicating another student’s written work. Cheating includes having someone else do coursework for you.) Any incidents of plagiarism or cheating will be dealt with severely, including loss of credit for the assignment or course and a report to the college of your major and the Office for Student Academic Integrity. If you have any questions about this policy please see the College of Liberal Arts Student Handbook or the Office for Student Academic Integrity website (http://www.osai.umn.edu/).

6. **Appropriate use of class notes and course materials:** Taking notes is a means of recording information but more importantly of personally absorbing and integrating the educational experience. However, broadly disseminating class notes or the lecture videos beyond the classroom community or accepting compensation for taking and distributing classroom notes or sharing the videos undermines instructor interests in their intellectual work product while not substantially furthering instructor and student interests in effective learning. Such actions violate shared norms and standards of the academic community.

7. **Sexual harassment:** Sexual harassment is defined as ANY unwelcome sexual advance, request, or verbal or physical conduct of a sexual nature. University policy prohibits sexual harassment in any form. Concerns or complaints about sexual harassment should be directed to the University’s Office of Equal Opportunity and Affirmative Action, 419 Morrill Hall (624-9547). Students may also direct their concerns or complaints to staff at Boynton Mental Health, the Boynton Crisis Line, or University Counseling Services.

8. **Definition of grades and academic workload policy:** According to the University Senate policy, the course syllabus must include a definition of grades. The University of Minnesota has adopted the following definition for letter grades:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Achievement that is outstanding relative to the level necessary to meet course requirements.</td>
</tr>
<tr>
<td>B</td>
<td>Achievement that is significantly above the level necessary to meet course requirements.</td>
</tr>
<tr>
<td>C</td>
<td>Achievement that meets the course requirements in every respect.</td>
</tr>
<tr>
<td>D</td>
<td>Achievement that is worthy of credit even though it fails to meet fully the course requirements.</td>
</tr>
<tr>
<td>S</td>
<td>Achievement that is satisfactory and is equivalent to a C- or better.</td>
</tr>
<tr>
<td>F</td>
<td>Represents failure (or no credit) and signifies that the work was either (1)</td>
</tr>
</tbody>
</table>

5
or N completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an I.

I Assigned at the discretion of the instructor when, due to extraordinary circumstances (e.g., hospitalization) a student is prevented from completing the work of the course on time. Requires a written agreement between instructor and student.

In addition, the University Senate requires the following description of workload expectations for courses in which an undergraduate can enroll:

“For undergraduate courses, one credit is defined as equivalent to an average of three hours of learning effort per week (over a full semester) necessary for an average student to achieve an average grade in the course. For example, a student taking a three credit course that meets for three hours a week should expect to spend an additional six hours a week on coursework outside of the classroom.”

Therefore, because this is a 4-credit course, you should expect to spend an additional eight hours a week (outside of watching lectures) on class material in order to earn a C (i.e., average grade) in this course.

H. Course Website

There is a Moodle site for this course. Almost everything you need for the course can be found there – so check the site often! To access the site, go to [myu.umn.edu](http://myu.umn.edu), sign in using the link at the top of the page (i.e., enter your UMN Internet ID and password), and choose “my COURSES” from the tabs at the top of the page. In the active tab, click on the "Moodle Site Link" for PSY 3801 012 INTRODUCTION TO PSYCHOLOGICAL MEASUREMENT AND DATA ANALYSIS [Fall 2014].

Additionally, some versions of your textbook provide access to the associated CourseMate learning site. This site is a great tool for reviewing material, such as eChapters, flashcards, interactive practice problems, and quizzes. If you intend to sign up for CourseMate, the necessary course key code for access (you will need this key, plus the one that came with your CourseMate access card to use CourseMate) can be found on the web site in the Orientation section.

I. Course Schedule

If you find yourself having trouble adhering to the schedule, please contact Penny as soon as possible. This schedule is tentative and subject to change. Any changes will be announced by e-mail and on the course website. Note: In the schedule, all assigned readings (except the syllabus) are from the Heiman text.

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Associated Readings</th>
<th>Associated Lecture Modules</th>
<th>Assignments &amp; Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Orientation</td>
<td>• Syllabus</td>
<td>• Introduction to Course</td>
<td>• Syllabus Quiz (4 pts.)</td>
</tr>
</tbody>
</table>
| 1: 9/2 – 9/5 | Introduction to Course | • Ch. 1  
• Appendix A-1 | • Math Review  
• Terminology  
• How to Type Symbols and Equations in Word and Moodle  
• Types of Variables  
• Scales of Measurement | • Ch. 1 Quiz (4 pts.)  
• Math Diagnostics (4 pts.) |
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<tbody>
<tr>
<td></td>
<td>Introduction to Statistical Concepts</td>
<td></td>
<td>• Intro to Stats Concepts</td>
<td></td>
</tr>
</tbody>
</table>
| 2: 9/8 – 9/12 | Data Display | • Ch. 2 | • Data Display Introduction  
• Data Display-Categorical Variables  
• Data Display-Continuous Variables | • Ch. 2 Quiz (4 pts.)  
• Ch. 3 Quiz (4 pts.)  
• Ch. 4 Quiz (4 pts.)  
• **F, 9/12**: Problem Set 1 due (20 pts.) |
|  | Descriptive Statistics | • Ch. 3  
• Ch. 4 | • Descriptive Statistics-Central Tendency  
• Descriptive Statistics-Variability  
• Descriptive Statistics-Shape |  |
| 3: 9/15 – 9/19 | Correlation | • Ch. 10: 10-1, 10-2, & 10-6 | • Correlation and Regression Introduction  
• Correlation and r^2  
• Factors that Affect Correlation  
• Correlation Examples | • **F, 9/19**: Problem Set 2 due (20 pts.) |
| 4: 9/22 – 9/26 | Regression | • Ch. 10: 10-5  
• Appendix A-3 | • Least Square Regression Line  
• Regression – Standard Error of the Estimate and Relationship with Correlation  
• Regression Examples |  |
| **M, 9/29 & T, 9/30** | **Midterm Exam 1 (25 pts.)** |  |  |  |
| 5: 9/29 – 10/3 | Normal Distribution | • Ch. 2: 2-3a | • The Normal Distribution – Background and Characteristics | • Stress Survey 2 (1 pt., optional) |
|  | Central Limit Theorem | • Ch. 5: 5-5a | • The Central Limit Theorem |  |
| 6: 10/6 – 10/10 | z Scores | • Ch. 5  
• Ch. 2: 2-4b | • z Scores – Formula and Characteristics  
• z Scores – Raw Score Examples  
• z Scores – Finding Relative Frequency or Percentile Rank  
• z Scores – Percentile Rank and Percentage Examples | • Ch. 5 Quiz (4 pts.)  
• Stress Survey 3 (1 pt., optional)  
• **F, 10/10**: Problem Set 4 due (20 pts.) |
<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Ch. References</th>
<th>Notes</th>
</tr>
</thead>
</table>
| 7: 10/13 – 10/17 | Introduction to Hypothesis Testing          | Ch. 6: 6-5, Ch. 7: 7-1, 7-2, 7-3, & 7-8 | - Intro to Hypothesis Testing – Null and Alternative Hypotheses  
- Intro to Hypothesis Testing – Decision Rule, Critical Values, p Values  
- Intro to Hypothesis Testing – Types of Errors and Power  
- Ch. 6 Quiz (4 pts.)  
- Stress Survey 4 (1 pt., optional) |
| 8: 10/20 – 10/24 | Hypothesis Testing: z Test                | Ch. 7: 7-3, 7-4, 7-5, & 7-7 | - z Test Background  
- z Test Components  
- z Test Examples  
- Ch. 7 Quiz (4 pts.)  
- Ch. 8 Quiz (4 pts.)  
- Stress Survey 5 (1 pt., optional)  
- F, 10/24: Problem Set 5 due (20 pts.) |
| 9: 10/27 – 10/31 | Hypothesis Testing: One-Sample t Test       | Ch. 8: 8-1, 8-2, 8-3, & 8-5 | - One Sample t Test Background  
- One Sample t Test Sampling Distribution  
- One Sample t Test Examples  
- Watch Study Video and Complete Stress Log 1 (4 pts.)  
- Stress Survey 6 (1 pt., optional)  
- F, 10/31: Problem Set 6 due (20 pts.) |
| 10: 11/3 – 11/7 | Hypothesis Testing: Related Samples t Test  | Ch. 9: 9-1, 9-4, & 9-5 | - Two Sample Tests Background  
- Related Samples t Test Background  
- Related Samples t Test Examples  
- Ch. 9 Quiz (4 pts.)  
- Complete Stress Log 2 (2 pts.)  
- Stress Survey 7 (1 pt., optional) |
| 11: 11/10 – 11/14 | Independent Samples t Test: Confidence Interval | Ch. 9: 9-2, 9-3, & 9-6 | - Independent Samples t Test Background  
- Independent Samples t Test Equal Sample Sizes  
- Independent Samples t Test Unequal Sample Sizes  
- Independent Samples t Test Examples  
- Complete Stress Log 3 (2 pts.)  
- Stress Survey 8 (1 pt., optional) |
<table>
<thead>
<tr>
<th>Date</th>
<th>Chapter(s)</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/24 - 11/26</td>
<td>Ch. 11: 11-4</td>
<td>Post Hoc Tests Background Fisher’s Protected t/LSD Test Tukey’s HSD Test Post Hoc Examples</td>
</tr>
<tr>
<td>12/1 - 12/5</td>
<td>Ch. 12</td>
<td>Two-Way ANOVA Background Two-Way Between-Subjects Design Variance Components Two-Way Between-Subjects Design Effects Two-Way Between-Subjects Design Source Table Interpretation Two-Way Between-Subjects Design Graphical Interpretation Two-Way Between-Subjects Design Examples</td>
</tr>
<tr>
<td>12/8 - 12/12</td>
<td>Ch. 13</td>
<td>Parametric vs. Nonparametric Tests Introduction to Chi-Square Tests Chi-Square Goodness-of-Fit Test Chi-Square Goodness-of-Fit Examples Chi-Square Test of Independence Chi-Square Test of Independence Examples Chi-Square Test Effect Size Chi-Square Test Effect Size Examples</td>
</tr>
</tbody>
</table>

F, 12/12, T, 12/16, & W, 12/17
Final Exam (50 pts.)
Sign up for a day and time on Moodle

- W, 12/17 at noon CST: Chapter Quizzes close