Psychology 612
Advanced Statistical and Research Methods for Psychology II SPRING 2007

Instructor:	Patrick E. McKnight, Ph.D.
Office:	David King 2064/2065
Office Hours:	Tues 8:30am-10:30am and by appointment
Phone:	(703) 993-8292
E-mail:	pmcknigh@gmu.edu
Class Location:	Fine Arts Buidling B106
Class Date/Time:	Tuesday 1:30pm-4:10pm
Class website:	http://mres.gmu.edu/PSYC612/

Teaching Assistants

TA	Secs	Office Hours
Julius Najab jnajab@gmu.edu	205 206	W 2-4pm
Susan Han shan8@gmu.edu	209 212	M 10:30-12:30pm
David Cades dcades@gmu.edu	205 206	TR 10-11am

Please refer to the lab syllabus for specific instructions on the locations and time for your assigned lab.

Course Pre-requisites

In order to cover the most important material and ensure adequate student preparation, I insist that students come with the knowledge of basic statistical procedures. Successfully completing PSYC 611 or its equivalent ought to be an imperfect indicator of that knowledge. To be more specific, the knowledge I refer to is the understanding and appreciation of how to apply the following concepts and terms: measures of central tendency (e.g., mean, median, mode), measures of dispersion (e.g., variance, standard deviation, range), tests of difference (e.g., t-tests, ANOVA), measures of association (e.g., correlation, covariance), tests of association (e.g., multiple regression, chi-square), and research design. Students who recognize that they are not prepared to take the course will be **strongly** encouraged to take a more introductory course. Those students who feel confident and prepared to take the course will be required to sign a statement that they acknowledge these prerequisites and that they take responsibility for either possessing the required knowledge or studying to acquire the knowledge.

Required Textbooks

Campbell, D.T. and Stanley, J.C. (1963/2005) Experimental and quasi-experimental designs for research. Houghton-Mifflin: Boston, MA. (ISBN: 0-395-30787-2)

Tabachnick, B.C. and Fidell, L.S. (2007). Using multivariate statistics, 5th Edition. Pearson/Allyn and Bacon: Boston, MA. (ISBN: 0-205-45938-2)

Abelson, R.P. (1995). Statistics as principled argument. Lawrence Erlbaum Associates, Hillsdale, NJ. (ISBN: 0-8058-0528-1).

van Belle, G. (2002). Statistical rules of thumb. Wiley-Interscience: New York. (ISBN: 0-4714-0227-3)

Optional Textbooks

Students who struggle with general writing or basic understanding of statistical terminology may benefit from Zinsser's book "On writing well" and Gonick and Smith's humorous "The cartoon guide to statistics", respectively. I recommend both books for all students since we all struggle with writing and basic concepts. These books present both topics in very easily digestable formats.

Zinsser, W. (2006). On writing well, 30th Anniversary Edition: The classic guide to writing nonfiction. Colllins: New York.

Gonick, L and Smith, W. (1994). The cartoon guide to statistics. HarperCollins: New York.

Additional Reading

I provide additional articles for download throughout the semester. These articles are noted in the course outline (see Tentative Schedule below) but there might be relevant but unplanned readings that come to my attention during the course. I will post

all additional readings to the course website and send out a note about the posted articles. I do not anticipate adding much more reading than what is already assigned but be forewarned that it might happen.

Course Overview and General Approach

Psychology 612 is the second course of a two-course sequence that serves to introduce psychology graduate students to statistics, research methodology, research design, and measurement. Traditional graduate psychology statistics courses emphasize statistical techniques as a matter of declaritive knowledge. Students are expected to know each procedure and its "appropriate" application. An alternative approach tends toward technical discourse (e.g., matrix algebra, formula memorization, and hand calculations) and requires greater attention to minute detail and mathematical vernacular. A less used but equally suitable approach treats statistics as a method of principled argument. The method I use for this course is a hybrid of the three approaches. You will be expected to know the statistical terminology, apply your knowledge in a both carrying out the procedures as well as interpreting the results, and then you will be expected to use the results in a manner consistent with scientific discourse.

Course Objectives

The purpose of this course is to further your *introduction* to data analysis, research design, and measurement. Your coursework to date ought to have prepared you well by covering measures of central tendency, measures of dispersion, measures of association, and measures of difference. Due to time constraints, I do not intend to review these terms or their purposes so I urge every student to review that material **prior** to this course. What I do intend to cover is a comprehensive view of univariate, bivariate and multivariate statistics - why we use statistics, why you should learn these tools, and what are the most important features to learn and understand. You will gain practical skills in interpreting, applying and explaining statistical procedures. The combination of an interactive lecture and a weekly laboratory will offer each student the opportunity to see the procedures, conduct the procedures yourselves, and then teach one another what you learned. This approach is the common medical model of education - see one, do one, and teach one - that results in better retention and deeper understanding.

Specific Objectives

The primary objective is to familiarize you with the following procedures and analytic approaches. By familiar, I mean that you will be able to identify the key features of each, communicate these features to others, and know when and how to apply them to real data. I organized them below according to general areas related to statistics, research methods, and measurement, however, as you will soon realize, the categories listed in the objectives table below are not unique and represent fairly arbitrary distinctions.

Procedures:	▷ Regression	▷ ANOVA	▷ GLM
Details:	▷ Predicted	▷ Expected	▷ Residual
Models:	▷ Fixed	▷ Random	▷ Mixed
Designs:	▷ Experiment	▷ Quasi-Experiment	▷ Observation
Complexity:	▷ Univariate	▷ Bivariate	▷ Multivariate
Approach:	▷ Cross-sectional	▷ Longitudinal	▷ Mixed
Level:	▷ Within	▷ Between	▷ Mixed
Effects:	▷ Direct	▷ Mediation	▷ Moderation
Context:	▷ Discovery vs. Justification		
Process:	▷ Hypothesis Testing vs. Parameter Estimation		

Grading Criteria

Exams

To evaluation your familiarity with the concepts we cover, I will administer brief exams every week following the lecture and lab. The exams will be online, taken at your convenience but will be time-limited and need to be completed no later than **the end of Sunday (11:59pm) of the week assigned**.

Each exam requires you to either compute statistical values, interpret results, or suummarize readings. I chose weekly exams rather than the standard midterm and final exam structure to ensure that each student reads the assigned material and stays informed about his/her performance. You may drop the lowest score on the exams to ensure that absences do not adversely affect your class standing. Please be sure to make arrangements to be available at some point each week to complete the exams. There will be no makeup exams if you miss more than one.

Lab Performance

Every student will participate in a lab section conducted by one of my three TA's. The TAs' responsibility is to teach you how to **apply** the material I cover in class. You - the student - are responsible for learning how to conduct and interpret the appropriate procedures. At the conclusion of every week's lab, you will turn in the **successfully completed** assignment for credit. Those credits count toward your overall grade (see grade table below).

Attendance and Participation

I expect all students to attend every lecture and come prepared to discuss the assigned readings. The lecture format will be didactic, interactive, and demonstrative. Attendance will not be taken but your absense will likely result in your failure to grasp certain concepts. Also, failure to participate will only serve to lessen the utility of the lectures. I encourage everyone to come prepared to each lecture with questions, comments, and interest.

Project Proposal

Doctoral students and interested masters level students (i.e., optional) must complete a project proposal that will be graded by your advisor. The proposal serves as a basis for a second year project to be submitted at the completion of your second year in the program. The specific guidelines for the proposal come from your advisor. I suggest you start right away discussing your ideas with your advisor. Proposals are due to your advisors no later than May 1st and grades from your advisors are due no later than May 15th. Please note that your advisor must oversee your work on the proposal. I am happy to assist where statistics and methodology are concerned but first consult your advisor and the course TA's before asking me for specific help.

Lecture Format

The lecture will consist of three 45 minute segments. The first segment will review the assigned readings, the second segment will highlight the material necessary to fully understand the assigned reading, and the final segment will present more advanced concepts for those students interested in extending their knowledge into these advanced topics. During the first 45-minute segment, I intend to cover the reading in a cursory fashion. That cursory coverage will not help you if you have not read the assigned readings prior to class. I strongly encourage you to read the material **before** lecture so this time can be maximally productive for your educational experience. The second 45-minute segment focuses only on the aspects that are not explicitly covered in the readings but are essential for your full understanding of the material. The final segment will address mathematical, conceptual, and philosophical aspects of the topic.

Lab Format

The statistics lab content will largely parallel the course content. Please consult your TA's lab syllabus for specific topics covered each week. Attendance at the lab is essential for you to master the skills discussed in the lecture.

Grading

Grades will be assigned based upon your exam performance and your performance on laboratory assignments. Numeric grades can be computed by entering in the relevant data into the table below. Converting between the numeric grades (TOTAL) and letter grades follows the standard method: A (TOTAL > 90), B ($90 >$ TOTAL > 75) and C (TOTAL < 75). The final grades may differ than your own computed grades because I reserve the right to add 5 "benefit of the doubt" points for those who show 1) a dramatic improvement throughout the semester, 2) an obvious effort to learn the material, or 3) an obvious mastery of the material that is not reflected in the grade and the extra points will shift that student's grade to another level. The grades you compute from the table below serve as merely the minimum grade you are likely to receive from the course.

GRADING TABLE

Performance Marker	Score	Ph.D.	Masters/Other	Sub-Total
Weekly Exams		Score $\times .6$	$Score \times .7$	
Laboratory Performance		Score $\times .2$	Score $\times .3$	
Research Proposal		Score $\times .2$	NA	
			TOTAL	

Academic Honesty

I must state for the record that cheating of any kind will be dealt with by rules set forth in the University Honor Code (see http://www.gmu.edu/catalog/apolicies/index.html). I prefer never to have any academic integrity problems arise during the semester. The aim of graduate education is to learn material that many others have not learned and master this material to ensure your future success. The degree you receive reflects the hard work you put into the coursework. Please do not cheat yourself by misrepresenting your effort. Do the work or accept the grade like an adult. Incidently, nobody (except you) ever looks at your graduate grades. Grades are a holdover from your undergraduate years. Spend your effort learning the material and avoid being overly grade conscious. With a concerted effort to learn, you will not be tempted to cheat.

Disability Accomodations

If you are a student with a disability and you need academic accommodations, please see me and contact the Disability Resource Center (DRC) at 703-993-2474. All academic accommodations must be arranged through that office.

Tentative Schedule

The following table outlines the dates, topics, and relevant readings. Please read all the material *prior* to the class date. It is imperative that you read the material before I present so that you can participate and fully appreciate the lecture and class interactive sessions.

Lec:Date	Topic	Readings
1: 1/23	RM ANOVA	T & F - chapters 8 and 17 T & F - Appendix A
2: 1/30	Data Reduction	T & F - chapter 13 Overall (1964)
3: 2/6	Psychometrics	Thompson and Vacha-Haase (2000) Cortina (1993) Borgatta and Bohrnstedt (1980)
4: 2/13	Evidence I	Abelson chapters 1-3
NA: 2/23	LAST DAY TO DROP	
5: 2/20	Evidence II	Abelson chapters 4-6
6: 2/27	Evidence III	Abelson chapters 7-9
7: 3/6	Statistical Graphics and Data Presentation	Ehrenberg (1977)
NA: 3/13	SPRING BREAK	
8: 3/20	Rules of Thumb I	Belle (2002)
9: 3/27	Rules of Thumb II	Belle (2002)
10: 4/3	Rules of Thumb III	Belle (2002)
11: 4/10	Choosing Statistical Procedures	T& F - chapter 2 Chervany, Benson, , and Iyer (1980)
12: 4/17	Persuasion	Gigerenzer (1993)
13: 4/24	Theory Testing	Runyan (1981)
5/1	PROPOSALS DUE TODAY	
14: 5/1	Review	
12/15	PROPOSAL GRADES DUE TODAY	
5/15	**FINAL EXAM** 1:30pm-4:15pm	

References

Belle, G. van. (2002). *Statistical rules of thumb.* New York: Wiley.

Borgatta, E., & Bohrnstedt, G. (1980). Level of measurement: Once over again. *Sociological Methods and Research*, *9*, 147-160.

Chervany, N., Benson, P., , & Iyer, R. (1980). The planning stage in statistical reasoning. *The American Statistician*, *34*(4), 222-226.

Cortina, J. (1993). What is coefficient alpha? an examination of theory and applications. *Journal of Applied Psychology*, *78*, 98-104.

Ehrenberg, A. (1977). Rudiments of numeracy. *Journal of the Royal Statistical Society*, *140*, 277-297.

Gigerenzer, G. (1993). The superego, the ego, and the id in statistical reasoning. In G. Keren & C. Lewis (Eds.), *A handbook for data analysis in the behavioral sciences: Methodological issues.* New York: Erlbaum.

Overall, J. E. (1964). Note on the scientific status of factors. *Psychological Bulletin*, *61*, 270-276.

Runyan, W. (1981). Why did van gogh cut off his ear? *Journal of Personality and Social Psychology*, *40*, 1070-1077.

Thompson, B., & Vacha-Haase, T. (2000). Psychometrics is datametrics: The test is not reliable. *Educational and Psychological Measurement*, *60*, 174-195.