Syllabus for Psychology 492
Psychological Measurement
Winter, 2006

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Class Time and Location: Thursday 4:30-6:20, occasionally Tuesday 4:30-6:20, PAS 2083

Lab Time and Location: Tuesday 4:30-6:30: ML 211, ML 216, ML 354, PAS 4288, PAS 3026

Textbook:
Osterlind, S.J. (2006). Modern Measurement: Theory, Principles, and Applications of Mental Appraisal. Upper Saddle River, New Jersey: Pearson Prentice Hall.

Course Objectives:

Measurement is fundamental to science. Theory tests in most sciences generally involve specific predictions requiring controlled and accurate observations. In psychology, we are faced with the problem of measuring variables such as "intelligence," or "aggressiveness" that are inferred from behaviour or self-report. How can we tell if the tests we create are really measuring what we think they are? How can we estimate the precision of our tests? This course will tell you. You will learn not only how to evaluate psychological tests and measures, but also how to construct and refine your own. This knowledge is invaluable in both research and applied settings, as our research results and clinical / applied evaluations are dependent on the tests and measures we use.

Course Structure:

This course is a hybrid between a statistics course and a research methods course. The lecture sessions will be run similar to those of a statistics course, and the labs will run like a research workshop.

In the lectures we will go over the content of the assigned readings step-by-step, in order to learn the basic material. Please read the assigned readings in preparation for the class. The textbook can be tough going at times; the lectures will elaborate on the most important ideas in the chapter. Try to avoid leaving the reading until just prior to the exam. In addition to attending the lectures, there will be weekly assignments involving application of the concepts from the chapter in the textbook and the lecture material.

In the labs, the teaching assistants will assist you in an independent project, which will require individual research and written work from each of you. This will be a measure construction project, intended to help you learn how to devise and refine a psychological test. The project will involve carefully researching a construct of interest, preparing a clear construct definition, inventing a test to measure this construct, and collecting a small data set on your test on which to do a practice psychometric analysis. You will most likely work groups of 3 or 4 for this project, but each of you will write up your work to be submitted independently.

Evaluation:

Your grade in this course will be based on the following:

1. Your performance on 2 midterm exams given in the lecture sessions. Each test will include questions on lectures and readings related to primarily those topics covered since the previous exam. The exams will both be worth 25% of the course grade (for a total of 50% of course grade).
2. Your write-up of the research project (due April 11). You will write up the research as if it were to be submitted to a psychological journal. This research report will be worth 20% of the final grade. The penalty for late submissions is 5% (i.e. 1 mark of 20 possible awarded for this paper) per day.
3. Completion of sections of the lab project, according to deadlines specified throughout the term. There are 6 such sections, worth a total of 12% of course grade. Late penalty is 1 mark per day, so a section worth 2 marks could get a grade no better than 1 mark out of 2 if submitted a day late.
4. Your performance on assignments due throughout the term. There are 7 such assignments, worth a total of 15% of course grade. Late penalty is 1 mark per day (i.e. an assignment submitted 2 days late will be scored 0 for all assignments except assignment 1 which would receive a maximum score of 1).
5. The group presentation of the final project. This is worth 3% of course grade. Note that in total the term project is worth 35% of final course grade (20% for the final paper, 12% for submitting various sections on time, and 3% for the presentation). A grade of zero will be awarded for an incomplete presentation, and a grade of 3 will be awarded for a presentation that is complete. If your group receives a grade of zero, you will have the option of rescheduling the presentation and being penalized one of the 3 marks possible.

Here's the grade breakdown, with all of the associated deadlines:

	Due Date	Lecture	Term Paper
Midterm 1	Feb. 9	25	
Midterm 2	Mar. 23	25	
Assignment 1	Jan. 10	3	
Assignment 2	Jan. 24	2	
Assignment 3	Jan. 31	2	
Assignment 4	Feb. 14	2	
Assignment 5	Mar. 7	2	
Assignment 6	Mar. 7	2	
Assignment 7	Mar. 14	2	
Executive Summaries	Jan. 17		2
Draft of Literature Review	Jan. 24		2
Final Version of Measure	Feb. 14		2
Questionnaire Package	Mar. 3		2
Draft of Method Section	Mar. 7		2
First Draft of Results Section	Mar. 14		2
Presentation of Results in Lab	Mar. 28 or 30		3
Term Paper	April 11		20
TOTALS		65	35

Notes on the Schedule of Topics

1. There are two chapters assigned for the first week of term. The first of these introduces the topic of psychological measurement, and the second of those reviews basic statistical concepts and describes the notation system used in the book. The material in Chapter 2 is intended as a review of material presented in your previous statistics courses. Please pay particular attention to pages 28-32 wherein the notational system is introduced. Bayes Theorem (pages 32-39) will be discussed on Feb. 2. Pages 40-51 present material that is likely new to you, and may not be safely skimmed.
2. The material presented on January 12, and discussed in Chapter 8 of the textbook is the information that is most directly applicable to the laboratory part of the course. The lecture and chapter are concerned with ***how*** we go about creating psychological tests (primarily of the self-report variety). Later lecture topics and readings are concerned with the theory of the statistical properties of the numbers created by our measurement instruments.
3. There seems to be a rumour among senior psychology undergraduates that the laboratory part of the course, run on Tuesdays, is optional and seldom attended. I assure you that this rumour is false. The beginning part of each lab generally involves some supervised exercise such as a facilitated discussion or mini-lecture (e.g. on construct definition), a discussion of how to write a section of a scientific paper, an important group exercise, or some other activity for which it is important to attend the lab. Attending the lab sessions and adhering to due dates is essential to evenly distributing the workload of the term project across the term.
4. I have tried to avoid any due dates immediately following reading week to give you as much of a break as possible. As a result, there is a lot of work for this course due two weeks (March 7) after reading week. The Method Section is due, two assignment are due, and the questionnaire package needs to be completed by March 3rd.
5. There is an assignment based on every major content area of the course with the exception of factor analysis, which is discussed the week prior to the second midterm. Be sure to ask any questions you have of the teaching assistants in the lab time on March 21.

Note for Students with Disabilities

The Office for Persons with Disabilities (OPD), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term.

A Few Other Notes

All students should activate their UW computer accounts each term. The accounts give students access to applications such as word processing, statistical and graphics packages, and electronic email as well as access to the Internet. For those who are not planning to use their UW email addresses, please do one of the following things:

- change your email address on QUEST to the one that you want posted on the University Directory, or
- on the UW account, arrange for the email from your UW account to be forwarded to your alternate email address.

Psychology majors should check the Psychology Undergraduate Web Site (http://www.psychology.uwaterloo.ca/ugradprog/) regularly for updates (e.g., psychology course offerings for F/W/S, volunteer and/or part-time paid research positions, application deadlines for scholarships, etc.)

Lecture Schedule

Approximate Time Table

January 3	**Tuesday**	Discussion of Syllabus, Organization of Labs
January 5		Introduction to Tests and Measurement (Assignment 1) Chapter 1, 2 (pp. 22-32, 40-51 only)
January 12		Process of Test Construction and Item Writing Chapter 8
January 19		Classical Test Theory (Assignment 2) Chapter 3
January 26		Some Applications of Classical Test Theory (Assignment 3) Chapter 5
February 2		Kappa Coefficient, Decision Theory, Bayes' Theorem (Assignment 4) Chapter 2 (pp. 32-40 "Elementary Probability Theory")
February 9		**Midterm 1 (does not include material presented last week)**
February 16		Validity (Assignment 5) Chapter 4
February 20-24		Reading Week
March 2		Test Validity and Selection (Assignment 6)
March 9		Item Analysis (Assignment 7) Chapter 12
March 16		Factor Analysis Chapter 13
March 23		**Midterm 2**
March 30		Project Presentations

Expectations of the Presentation

Presentations are expected to be about 20 minutes in length, with 5-10 minutes to follow the presentation for questions. Each presentation should review the conceptual background for the project, and discuss any relevant measurement issues for the measurement of the construct of interest (roughly 5-8 minutes). Each presentation should explicitly discuss the connection between the construct definition and the domain specification, and how the domain specification is reflected in their measure (between 2 and 5 minutes). Each presentation should briefly review the methodology of data collection (at most a minute unless the data were collected in a non-standard way). The main point of the presentation is the reporting of the results (approximately 10 minutes). Each presentation should present basic psychometric properties of the relevant scores generated by their measure. Item analyses should be reported, where appropriate. Information about the convergent and discriminant validity of the scores produced by their measure should be reported, when possible. Finally, with the few minutes remaining, the group should talk about possible improvements to the measure and directions for future research. Do not spend too much time on the presentation! It is meant to be informal and fun. There is absolutely no need for polish or high-tech razzle-dazzle. The nominal grade of 3 marks is included to ensure that all groups take it seriously. The details above make it clear how to produce a "complete" presentation that will earn full points.

Lab Schedule

Approximate Time Table

January 3	organization of groups
January 10	DISCUSSION OF WRITING A LITERATURE REVIEW discussion of topic, begin background research **Assignment #1 Due**
January 17	CONSTRUCT DEFINITION refine literature review **Read "Essential Terminology: Constructs, Variables, and More" pp. 63-68** **Executive Summaries Due**
January 24	CONSTRUCT COVERAGE AND DOMAIN SPECIFICATION construct definition, domain specification, preparation of table of specifications **Assignment #2 Due, Literature Review Due**
January 31	DISCUSSION OF WRITING A METHOD SECTION item writing **Assignment #3 Due**
February 7	item review and final measure construction nothing due this week – Midterm 1 is on February 9
February 14	**Final Version of Measure Due, Assignment #4 Due**
February 20-24	Reading Week
February 28	DATA COLLECTION **Submit Completed Questionnaire Package (deadline March 3)**
March 7	DATA ANALYSIS I (meet in PAS 2083) **Assignment #5 Due, Assignment #6 Due, Method Section Due**
March 14	DATA ANALYSIS II (meet in PAS 2083) **Assignment #7 Due, First Draft of Results Section Due**
March 21	DISCUSSION OF WRITING THE RESULTS & DISCUSSION SECTIONS Q&A ABOUT FACTOR ANALYSIS nothing due this week – Midterm 2 is on March 23
March 28	PROJECT PRESENTATIONS **Results and Discussion Sections Due (not included in final grade)**
March 30 **Thursday**	PROJECT PRESENTATIONS

Research paper due April 11th.

Note: Discussion topics, "mini-lectures," and important group exercises appear in uppercase. You should be especially sure to attend those lab sessions. Important due dates appear in bold text. The task for the week in service of the term paper appears in lower case. The bulk of lab time will be devoted to these tasks.

Project Objective:

You are to select a construct of interest, develop a test that measures this construct, administer and analyze the test properties, and write a report in APA format. The project will constitute 35% of your grade in this course, when all of its components are included. See page 2 of this syllabus for full details. Drafts of all sections of the term paper (as well as the final product) are to be written independently.

Expectations of the Project

Students in the class will divide into groups comprised of 4 or 5 members. They will select a construct of interest, research it, prepare a construct definition and a domain specification linking the construct to the measure they create. Groups will write items for their measure and prepare a final version of their measure that is no more than a single page in length (typically 30 or so items). Measures are to be prepared in 12 point font on a single side of an 8½ x 11 sheet of paper. The measures will be collected from all groups (given a class size of 125 students, there will be approximately 25 to 30 measures). These will be combined with 3 measures provided by the course TAs, and each student is expected to complete all measures, thereby collecting data for each student to analyze for the course project. The course questionnaire package is typically 35 to 40 pages in length, so I am sure you can appreciate the necessity of keeping groups to a size of 4 or 5 members, and the length of each test to a single page.

Expectations of the Term Paper

The following is an outline for writing the report

Abstract

- 100-120 words (approximately a one-sentence review for every section of paper)
- state the problem under investigation
- the participants
- the experimental method
- the findings (including statistical significance levels)
- conclusions, implications, and applications

Introduction

- identify the construct
- explain why it is important to measure the construct
- explain why it has not been measured in the past, or, if it has been measured before state how your measure will differ/improve upon previous measures
- state the purpose of the paper
- provide the construct definition with the associated domains – be sure to explain the rationale behind the domains
- explain what will be done – for example “a questionnaire will be developed and an item analysis performed to measure…”

Method

- identify the participants (age, sex, affiliation, etc.) – outline recruiting and testing procedures
- state the materials used – describe the test (number of items, domains, sample items, response format and its rationale, time to complete the test, etc.)
- state the procedure (how test was created, rationale for format)

Results

- report statistics for your scales – proceed one scale at a time and give the internal consistency, the mean and range for the scale, review the correlation table, comment on whether the correlation table reflects the reported alpha, and note the variability of the scale
- comment on the items – look at item-total correlations, identify items without variance, note reasons why items will not correlate
- BIDR – indications of social desirability bias with subscales (if applicable) and overall test; evidence for need to alter test to counteract this, was there an expected relationship
    - Above analyses also completed with IPIP
- factor analysis – resulting factor structure, consistency with hypothesized structure, future implications for the test (this is optional)

Discussion

- state clearly what you have done and what you have found
- provide an overall impression of the test and its scales (interpret overall results beyond micro-level statistical analysis)
- explain why certain items are poor and should/could be removed
- comment explicitly on how the test could be improved
- comment upon how the test may be validated
- state the conclusions and theoretical implications that follow from the study

Form and Format

- structure, logic, and coherence
- grammar
- APA style

Weighting of various components

Abstract	5
Introduction	20
Method	15
Results	20
Discussion	25
Structure	5
Grammar	5
APA	5
TOTAL:	100

Note on avoidance of academic offences: All students registered in the courses of the Faculty of Arts are expected to know what constitutes an academic offence, to avoid committing academic offences, and to take responsibility for their academic actions. When the commission of an offence is established, disciplinary penalties will be imposed in accord with Policy #71 (Student Academic Discipline). For information on categories of offences and types of penalties, students are directed to consult the summary of Policy #71 which is supplied in the Undergraduate Calendar (section 1; on the Web at http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm). If you need help in learning how to avoid offences such as plagiarism, cheating, and double submission, or if you need clarification of aspects of the discipline policy, ask your TA or course instructor for guidance. Other resources regarding the discipline policy are your academic advisor and the Undergraduate Associate Dean. Students who believe that they have been wrongfully or unjustly penalized have the right to grieve; refer to Policy #70, Student Grievance, http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm.

For more information on categories of academic offenses, most notably plagiarism, see "Avoiding Academic Offences" (http://arts.uwaterloo.ca/arts/ugrad/academic_responsibility.html).

Some Comments on the Group Project

The term project involves a lot of group work. Groups will share the burden of background reading and will share with each other the fruits of their labours. Likewise, I encourage each group to share the burden of data entry. Groups are encouraged to collaborate in the data analysis phase of the project. All writing of the term paper, both in its final product and in drafts of its constituent parts is to be conducted individually. Any text that you submit for evaluation should be your own or else enclosed in quotation marks and properly cited. It is as simple as that.

Some Comments on the Assignments

Despite the fact that you have been divided into groups for administrative and practical convenience, the assignment to groups is solely to facilitate completion of the course project. The assignments are to be completed individually. I encourage you to collaborate with each other to assist each other in completing the assignments and understanding the course material. The point is that you should understand and have written what you submit (you must be intellectually / academically responsible for it). If you divide the 4 questions of an assignment among 4 group members, solve one each and simply pass the answers around, you would be responsible for ¼ of the assignment, and ¾ would constitute an academic offense. This is probably obvious to all of you, but students have occasionally claimed in the past that this was unclear to them.

Final Note: This syllabus may be modified slightly as the term progresses. In particular, office hours will need to be selected and may need to change. ***If there is a discrepancy between a hard copy syllabus and the outline posted on ACE, the outline on ACE will be deemed the official version.***