University of Manitoba
Department of Sociology
Winter Term (3 Credit Hour Course) 2014

SOC7400 ADVANCED QUANTITATIVE RESEARCH METHODS A01 (CRN: 24553)

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Class: Tuesday 2:30 – 5:15 p.m. (335 Isbister Building)
Office Hours: By appointment

Recommended Texts:
Tabachnick, B.G. & L.S. Fidell. (2013). *Using Multivariate Statistics*. Sixth Edition.
Boston: Allyn and Bacon.
- While the above text is not required for students to purchase, it is highly recommended, especially if students want a quantitative data analysis book for reference (now and in the future).

Course Prerequisite:
All students must have completed an undergraduate course in research methods and statistics. This is an absolute minimum requirement. Students who only meet the basic criteria will probably not do well in this course. As such, students should have completed (and received a high grade) the equivalent of SOC4570.

Course Objectives and Description:
SOC7400 is an advanced quantitative course in research methods. Emphasis will be placed on the practical application of statistical techniques, and students will have plenty of opportunity to apply these methods to data. In this regard, IBM SPSS will be used extensively in this course. Students should have proficient knowledge of this statistical software package.

The goal of this course is to cover a wide range of multivariate topics in a conceptual, rather than a mathematical approach. Social science students are not statisticians, and the reality is that most will not (appropriately so) become statisticians. To this end, the focus of this course will be on the applied applications of multivariate research methods with emphasis on design and interpretation, rather than specific mathematical computations.

It is assumed that students will have a comprehensive understanding of univariate and bivariate statistics. In particular, students should be able to 'speak' comprehensively about the following material: level of measurements, descriptive statistics, inferential statistics, analysis of variance (ANOVA), bivariate categorical data, correlation, and basic OLS regression.

In order to ensure that students comprehend these terms and statistics, I suggest that students 'dust off' their undergraduate honors level research methods texts in an effort to re-acquaint themselves. For individuals who are still not confident with statistical reasoning, I suggest reading either of the following:

Sirkin, R. Mark (2006). *Statistics for the Social Sciences.* Third Edition. Newbury Park: Sage.

Field, Andy (2005). *Discovering Statistics Using SPSS.* Second Edition. Newbury Park: Sage.

Given that this is an advanced course, primary focus will be on multivariate statistical analysis. Specific topics to be covered are (all of which will be posted on the course website):

1) OLS regression – including interaction terms & path analysis
2) Data screening prior to analysis
3) Exploratory Factor analysis
4) Logistic regression
5) Missing values analysis
6) Other multivariate techniques (time permitting)

Another major component of the course will involve using IBM SPSS syntax, which will be taught throughout the term. No prior knowledge of using IBM SPSS syntax is necessary.

Course Evaluation

Grades:

Percentage	Letter Grade	Descriptive Scale	GPA
90 to 100	A+	Exceptional	4.5
80 to 89	A	Excellent	4.0
76 to 79	B+	Very Good	3.5
70 to 75	B	Good	3.0
66 to 69	C+	Satisfactory	2.5
60 to 65	C	Adequate	2.0
50 to 59	D	Marginal	1.0
0 to 49	F	Failure	0.0

Students should be aware that the above grades are only guidelines. Different cut-off percentages may be used depending on final grade distributions.

Due dates:

Factor analysis assignment   March 18th   30%
Take-home exam   Given on March 25th, due April 1st   25%
Research project   April 15th   45%

<u>Factor analysis assignment:</u> In this assignment, you will practice the steps involved in constructing a subjective measurement scale. This process will start by identifying a concept that you are interested in measuring. In identifying this concept, you can draw on the dataset you are currently using for your final research paper or use another dataset, although it is recommended that you maintain continuity with your course requirements. Ideally, at least 8 (preferably between 10 to 15) operationalized variables

should be used to identify the concept, and which is used at the initial extraction phase of the factor analysis. These variables should be interval or ratio, but also may be ordinal level ones that you treat as interval data.

You are not permitted to work in groups. However, you can ask questions among your classmates. If you know that another classmate is using the same dataset, make sure to confirm you both are not using the same measures for the assignment, in order to avoid matters of academic dishonesty. If there are concerns, please contact me as soon as possible.

The final product of the assignment is a factor analysis report, which should be no longer than 20 double spaced pages (with a standard 12 pt font such as times new roman or cambria, 11 pt font for arial). Tables are included in the final page total. Tables should be constructed for the following: comparison of PCA and PAF non-rotated extractions; scree plot test;

Assignment Requirements

Once you have your data, you can start exploratory factor analysis. The following steps are required for the assignment and subsequent report. It is suggested you use subtitles in your report.

1. Theoretical rationale for the use of EFA among variables selected to measure a latent construct
2. Description of the sampling methods and participants
3. Description of the initial items selected, including means and standard deviations
4. An evaluation of the assumptions required for exploratory factor analysis
5. Assessment of factorability tests
    a. Correlation matrix for zero-order associations
    b. Bartlett's test of sphericity
    c. KMO
    d. MSA
    e. Determinant
6. Factor extraction
    a. Initial extraction should be done using both PCA and PAF will all items
    b. Compare results. Identify which extraction method is best suited for analysis and why
    c. Identify how many factors should be retained for analysis and why
        i. % of explained variance
        ii. Eigenvalues
        iii. Scree test
7. Apply factor rotations
    a. Provide descriptions and an interpretation of the rotated factors by assessing the factor matrix for orthogonal rotations and the structure and pattern matrix as well as inter-factor correlations for oblique rotations
    b. Explain what rotation solution you selected based on how many factors. Justify why you made these decisions by providing a brief explanation of the various rotations undertook prior to selecting your final rotation/# of factors
8. Evaluate the internal consistency of the identified factors (e.g., Cronbach's alpha)

9. Obtain factor scores and supply new names in your dataset. Conduct a bivariate test of statistical inference by selecting one variable (either as an independent or dependent variable) that is hypothesized to be significantly related to your generated factors.
10. Create a summative composite index based on the rotated factors. Conduct the same bivariate statistical inference test as the factor scores. Compare results.
11. As a way of providing a conclusion, give an overall assessment of your EFA model. Also include study limitations and suggestions for future research

Research project: Students will be required to design and develop a research project using secondary data. Students are responsible to select a dataset to analyze. The research project will involve generating testable research hypotheses that can be empirically evaluated. Students must select at least one multivariate statistic discussed in class. Students must also create at least one composite index based on an exploratory factor analysis (but not the one used for the EFA assignment) for their final research paper, and some evidence must be given confirming its shared variance.

This research paper will form a substantial part of your final grade (45%). The grade will be divided into three parts. First, 5% of the grade will be on data analysis. Students must submit a SPSS syntax file (along with the appropriate data file), which follows the specific organizational structure taught in class. Students must also submit all their relevant SPSS output files, which have been properly formatted and organized (grade will be attached to your final paper). The data analysis portion is due on the same date as the final paper.

Second, the last two classes will involve in-class presentations of your work. The presentations will be done using PowerPoint or equivalent software. The goal is to allow students to present their work as well as provide students with an opportunity to solicit feedback before the final paper is due. The presentation should simulate a conference presentation and should be 15 minutes in length (with an additional 5 minutes for questions and/or comments from the class). The presentation will form 15% of the final grade (grade will be attached to your final paper).

Finally, the research paper will form 25% of the final grade. The format of the research paper should replicate quantitative articles that are published in social science scholarly journals. It is hoped that the final project will result in a publishable-quality paper. The length of the paper should not exceed 25 double spaced pages (with a standard 12 pt font such as times new roman or cambria, 11 pt font for arial) with references, tables, and figures. The final product should take the following form:

1) A brief review of the sociological (or other relevant) literature applicable to your topic.
2) The deduction of hypotheses and research questions.
3) A description and evaluation of the sample and its suitability.
4) A discussion of the measures and constructs to be used in the analysis.
5) Attention to the reliability and validity of the measures (evidence that assumptions have been met). This would include a discussion of the potential flaws in the measurement procedure and what you have done to correct (or reduce) it.
6) An overview of the analytical procedures.

7) A test of the hypotheses should be conducted using appropriate statistical techniques.
8) A discussion of the results should be presented with appropriate conclusions (including limitations of the study, policy implications, and suggestions for future research).

Given the expected complexity of the assignment, it is advised that students select their topic, consult with the instructor, find a dataset, and start the data analysis early in the term. There are plenty of places to find a secondary dataset. Below are some suggested data sources:

- University of Manitoba Data Library (Gary Strike)
  - www.umanitoba.ca/libraries/units/datalib
- Inter-University Consortium for Political and Social Research (ICPSR)
  - www.icpsr.umich.edu
- National Archives of Canada
  - www.archives.ca
- Council of European Social Science Data Archives (CESSDA)
  - www.cessda.org/accessing/catalogue
- European Social Survey (ESS)
  - www.europeansocialsurvey.org
- ZA Online Study Catalogue (ZACAT)
  - http://zacat.gesis.org/webview/index.jsp

Late assignments, exams, and papers:

Late assignments, exams, and papers will be penalized 10% per day (including weekends and holidays) unless permission is granted *prior* to the due date. Late assignments, exams, and papers more than five days overdue will not be accepted under any circumstances. I generally do not allow extensions without some form of certificate (e.g., medical note). In this regard, it is essential that you organize your workload (in this class and others) accordingly.

Tentative Course Schedule

Week	Topic
January 7th	Review of statistics
January 14th	OLS regression
January 21st	Data screening prior to analysis
January 28th	Filler class to complete above units
February 4th	IBM SPSS syntax
February 11th	IBM SPSS syntax
February 18th	*Reading week – no class*
February 25th	Exploratory factor analysis
March 4th	Exploratory factor analysis
March 11th	Logistic regression
March 18th	Missing cases analysis
March 25th	Other multivariate techniques
April 1st	Research paper presentations
April 8th	Research paper presentations

Student Conduct and Academic Regulations of the University

Voluntary Withdrawal: The final date for voluntary withdrawal from this course is March 19th, 2014. There are no refunds on this date – see the Fall/Winter Calendar for details.

Academic Dishonesty: University policy on academic integrity will be enforced. A full description of academic integrity matters, including plagiarism and cheating, can be found in Section 8 of the General Academic Regulations and Requirements of the University of Manitoba. The Faculty of Arts also reserves the right to submit student work that is suspected of being plagiarized to Internet sites designed to detect plagiarism.

Electronic Devices: Students are required to silence all electronic devices (cellular phones, Blackberries, I-phones, pagers, etc.) when in the classroom. If there is a reason that you require your device to remain on 'ring' mode (i.e., sick child at daycare), please inform me at the start of the class. Students are not permitted to send or receive text messages during class. A student found texting during class would be asked to leave. Students are welcome to bring laptop computers to class for note-taking purposes only. Students found using social networking sites or surfing the Internet during class will be asked to leave. Finally, please remove earphones during class lectures.

Classroom Disruptions: Students should recognize that excessive talking, late arrival, or early departures from the classroom are disrupting for both the instructor and classmates. Please be considerate of others in the class. Continual disruption by a student may result in disbarment from the course. Please notify the instructor at the onset of class if you need to leave early or if you have to come late to the next class.

Unclaimed term work disposal:
Any term work that has not been claimed by students will be held for four (4) months from the end of the final examination period for the term in which the work was assigned. At the conclusion of this time, all unclaimed term work will become property of the Faculty of Arts and be destroyed according to FIPPA guidelines and using confidential measures for disposal.

Accommodations

Special Needs: Students with special learning needs (who for legitimate reasons require extra time to write a test, or who require aids or other supports) should identify themselves to the instructor at the beginning of the term in order to arrange suitable accommodation.

Religious Holidays: The University recognizes the right of all students to observe recognized holidays of their faith, which fall within the academic year. With instructor discretion, necessary arrangements can be made to ensure studies are not jeopardized. The instructor should be notified of a student's intended absence in advance and at least three weeks notice of absence should normally be given where special arrangements are sought.