

B793
Applied Multivariate Statistics
Winter 2017 Course Outline

Human Resources and Management Area
DeGroote School of Business
McMaster University

COURSE OBJECTIVES

As applied researchers, the research we do can use data collected from multiple sources (e.g. survey, administrative data, and operational systems). Some of these data may require extensive processing and “cleaning” to be research-ready. The purpose of this course is to expose students to a variety of statistical techniques that can be used to analyze various types of data and manage the challenges they present. The focus is on building a sound technical foundation, this implies students will understand the core assumptions of techniques and when, and how to use techniques. The application of statistical techniques does not only include technical competency but also the ability to interpret the output and results generated from the techniques. Thus, we will balance understanding the technique with its application and interpretation. A graduate level course in introductory statistics (e.g., MBA Q600) or equivalent, is a prerequisite for this course.

INSTRUCTORS AND CONTACT INFORMATION

Class Location: DSB 421

Mondays 1 – 4 PM

Dr. James Chowhan

chowhan@mcmaster.ca

Office: DSB 428

Office Hours: by appointment

RECOMMENDED COURSE MATERIALS AND READINGS

Meyers, L.S., Gamst, G., & Guarino, A.J. (2017) *Applied Multivariate Research: Design and Interpretation*. 3rd Edition. Thousand Oaks, CA: Sage Publications. (1st and 2nd editions are okay too).

EVALUATION

Components and Weights

Assignments (4 @ 15%)	60%
Presentation	20%
Final Exam	20%

Grade Conversion

At the end of the course your overall percentage grade will be converted to your letter grade in accordance with the following conversion scheme.

LETTER GRADE	PERCENT
A+	90 - 100
A	85 - 89
A-	80 - 84
B+	75 - 79
B	70 - 74
B-	65 - 69
F	00 - 64

Assignments

Students will be required to complete four assignments. For each assignment, students will require an appropriate dataset. This may come from your own research or from elsewhere. To ensure that the dataset is appropriate for the course assignments, students should have their proposed datasets approved by the instructor.

For each assignment, students will be required to briefly articulate a research question they are examining, pre-screen the data, analyze the data using the assigned technique(s) to answer the research question, write a detailed results section in **APA format**, and provide a narrative interpretation and discussion of the results.

Assignments should be submitted electronically, in a single .doc, docx, or .pdf file. A maximum of one additional file may also be submitted (e.g., Stata log output, excel tables, etc...).

All assignments are due by midnight on the date indicated in the course schedule. Late assignments will be penalized at a rate of ten percent (10%) per calendar day.

Presentation

Students will be required to research and make a presentation on an advanced statistical technique or particular topic that is not covered in the course outline. The objective of the presentations is to provide: (1) an overview of the technique; (2) the type of data or research questions for which it is used; (3) its formulation, key assumptions and limitations; (4) an overview of how it compares to other related techniques; and (5) an applied example and illustration of the technique using analytical software (so that fellow students can learn how to apply the technique). It may be useful to provide an illustration of the technique, as it appears in the relevant scholarly literature (e.g., MIS Quarterly, Journal of Applied Psychology). **Early in the semester, before proceeding with preparation for the presentation, students should obtain instructor approval of their topics.** Duplicate presentations will not be permitted. Other faculty and graduate students from the business school may be invited to attend these presentations. The presentations should be about 30-40 minutes long, and will be evaluated on how well the abovementioned criteria are met, the clarity and effectiveness of the exposition, and the quality of the responses to questions.

Possible topics include (but are not limited to): Analysis of variance, Multivariate analysis of variance, Bootstrap Techniques, Censored and Truncated Regression Models, Cluster Analysis, Count Models, Discriminant Function Analysis, Indicators of Reliability, Integration of Mediation and Moderation, Multiple-Imputation, Multidimensional Scaling, Multi-level Modelling, Non-linear Regression, Nonparametric Statistics, Power Analysis, Survival Analysis, Tetrachoric and Polychoric correlations, and Others (etc).

Final Exam

The final take-home exam will consist of several integrative questions related to the course content. More details regarding the exam format and due date will be provided later in the semester.

ACADEMIC DISHONESTY

It is the student's responsibility to understand what constitutes academic dishonesty. Please refer to the University Senate Academic Integrity Policy at the following URL:

<http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicIntegrity.pdf>

This policy describes the responsibilities, procedures, and guidelines for students and faculty should a case of academic dishonesty arise. Academic dishonesty is defined as to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. Please refer to the policy for a list of examples. The policy also provides faculty with procedures to follow in cases of academic dishonesty as well as general guidelines for penalties. For further information related to the policy, please refer to the Office of Academic Integrity at:

<http://www.mcmaster.ca/academicintegrity>

STUDENT ACCESSIBILITY SERVICES

Student Accessibility Services (SAS) offers various support services for students with disabilities. Students are required to inform SAS of accommodation needs for course work at the outset of term. Students must forward a copy of such SAS accommodation to the instructor normally, within the first three (3) weeks of classes by setting up an appointment with the instructor. If a student with a disability chooses NOT to take advantage of an SAS accommodation and chooses to sit for a regular exam, a petition for relief may not be filed after the examination is complete. The SAS website is:

<http://sas.mcmaster.ca>

POTENTIAL MODIFICATIONS TO THE COURSE

The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.

MISSED WORK

Late assignments will be penalized as described earlier. No extensions are available except under extraordinary circumstances. Please discuss any extenuating situation with your instructor at the earliest possible opportunity.

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http://www.copyright.mcmaster.ca/Access_Copyright_Agreement

COURSE SCHEDULE

WEEK	TOPIC	READINGS AND ASSIGNMENT SCHEDULE
1. Monday, January 9, 1:00 PM	Introduction to Multivariate Statistics and Dealing with Data	Meyers, Gamst, & Guarino (2017): Chapters 1 to 4
2. Monday, January 16, 1:00 PM	Multiple Regression – Part 1 • Introductory topics	Meyers et al. (2017): Chapters 4 to 5
3. Monday, January 23, 1:00 PM	Multiple Regression – Part 2 • Special topics (e.g., mediation, moderation, etc.)	Meyers et al. (2017): Chapter 6 (A & B) (Chapter 5 in 1 st Edition) Stewart, G.L. & Barrick, M.R. (2000). Team structure and performance: Assessing the mediating role of intrateam process and the moderating role of task type. <i>Academy of Management Journal</i> . 43, 135-148.
4. Monday, January 30, 1:00 PM	Logistic, Ordinal, & Multinomial Regression	Meyers et al. (2017): Chapter 9 (A & B)
5. Monday, February 6, 1:00 PM	Meta-Analysis	Huffcutt, A.I. (2004). Research perspectives on Meta-Analysis. In S. Rogelberg (Ed.), <i>Handbook of research methods in industrial and organizational psychology</i> (ch. 10). Oxford, UK: Blackwell. Assignment 1 (Multiple Regression) due
6. Monday, February 13, 1:00 PM	Exploratory Factor / Components Analysis	Meyers et al. (2017): Chapter 10 (A & B)
7. February 20-24	• Reading Week	Reading Week

WEEK	TOPIC	READINGS AND ASSIGNMENT SCHEDULE
8. Monday, February 27, 1:00 PM	Structural Equation Modeling – Part 1 • Introduction to SEM	Meyers et al. (2017): Chapter 14 (A, B)
9. Monday, March 6, 1:00 PM	Structural Equation Modeling – Part 2 • Confirmatory factor analysis (CFA)	Meyers et al. (2017): Chapter 11 (A, B) Williams, L. J., Ford, L. R., & Nguyen, N. (2004). Basic and advanced measurement models for confirmatory factor analysis. In S. Rogelberg (Ed.), <i>Handbook of research methods in industrial and organizational psychology</i> (Ch. 18). Oxford, UK: Blackwell. Assignment 2 (Exploratory factor analysis) due Presentation topic should be approved by now
10. Monday, March 13, 1:00 PM	Structural Equation Modeling – Part 3 • Path Analysis with Observed and Latent Variables	Meyers et al. (2017): Chapter 12 A, B, and 13 A, B
11. Monday, March 20, 1:00 PM	Presentations – Advanced Techniques	Assignment 3 (SEM) due
12. Monday, March 27, 1:00 PM	Presentations – Advanced Techniques	
13. Monday, April 3, 1:00 PM	Presentations – Advanced Techniques	Assignment 4 (Meta-Analysis) due
14. Monday April 10,	Exam	Details TBA