Department of Marketing and Consumer Studies
MCS*6060/ MGMT 6840
Multivariate Research Methods / **Multivariate Techniques**
Winter 2018

Instructor: Dr. Towhidul Islam, Professor
Room: MINS 206
Email: islam@uoguelph.ca

Lecture & Lab: Mondays 11.30 -2:20 pm, Room MINS 207
Consultations: Mondays 2:30 – 4:30 pm or by Appointment

Course Description and Objectives:
A review of selected multivariate analysis techniques as applied to marketing and consumer research. Topics include linear and logistic regression, mediation and moderation analysis, design of experiments, analysis of variance, and discrete choice analysis (DCA) including latent segmentation. The course uses a 'hands-on' approach with small sample databases available for required computer program analysis.

Learning Outcomes:

A. Analyze experimental, survey or secondary data using multivariate research methods including Regression Analysis, Moderation and Mediatiion, Analysis of Variance, Discrete Choice Analysis.
B. Replicate existing research findings in multivariate research methods.
C. Behave and apply ethical standards when conducting and reporting academic and applied research in marketing and consumer behavior.

Course Materials and Resources:
This course uses a variety of materials and resources. One of your primary resources will be the course website (http://courselink.uoguelph.ca). All announcements, required and recommended readings, assignments and updates will be posted here. You will also be able to access any handouts you may have missed through this site.

Suggested Texts for Reading Selected Chapters (We will not follow any particular text)

Regression, Moderation and Mediation

- James, G., Witten, D., Hastie, T. and Tibshirani, R. (2013), An Introduction to Statistical Learning with Applications in R, Springer, New York.
- Hayes, A. F. (2013), Introduction to Mediation, Moderation and Conditional Process Analysis - A Regression Based Approach, The Guilford Press, New York.
- Aiken, L. and West, S. (1991), Multiple Regression: Testing and Interpreting Interactions, Sage Publications, London.
- Hosmer, DW., Lemeshow, S. and Sturdivant, R. X. (2013). Applied Logistic Regression. 3rd Edition, John Wiley and Sons, New York.

Experimental Designs

- Montgomery, D. (1997), Design and Analysis of Experiments, Fourth Edition, Wiley
- Kuehl, R. (2000), Design of Experiments: Statistical Principles of Research Design and Analysis, Second Edition, Duxbury.
- Aizaki, H., Nakatani, T. and Sato, K. (2015). Stated Preference Methods using R, CRC Press

Analysis of Variance

- Keppel, G. and Wickens, T. D. (2004). Design and Analysis: A Researcher's Handbook, 4th Edition, New Jersey.
- Iacobucci, D. (2016). Analysis of Variance (ANOVA), Earlie Lite Book, Inc., Nashville, TN

Discrete Choice Analysis

- Ryan, M., Gerard, K. and Amaya, M. (2007). Using Discrete Choice Experiments to Value Health and Health Care, Springer
- Louviere, J. J., Hensher, D. and Swait, J. (2000). Stated Choice Methods: Analysis and Application, Cambridge University Press
- Train, K. (2003), Discrete Choice Methods with Simulation, Cambridge
- Aizaki, H., Nakatani, T. and Sato, K. (2015). Stated Preference Methods using R, CRC Press

Multiple Topics

- Trochim, W. (2005) Research Methods: The Concise Knowledge Base, CENGAGE Learning
  Free Access: **http://www.socialresearchmethods.net/kb/**

Evaluation Procedure:

		60%	55%
Assignments	**Modules**	**Weight (MSc)**	**Weight (Ph.D.)**
1	Regression Analysis	12%	11%
2	Moderation and Mediation Analysis	12%	11%
3	Design of Experiments	12%	11%
4	Analysis of Variance	12%	11%
5	Discrete Choice Analysis (DCA)	12%	11%

For each assignment, you will get at least 7 days for submission from the assignment handover date. Unless you have discussed an extension well ahead of the due date, late penalties will apply. Extensions will only be granted on the basis of extenuating circumstances.

Final Exam: Open book (no laptop, internet access) during exam time: 30% (MSc.), 35% (Ph.D.)
Concepts, interpretation, article reviews

Class Work & Participation (not Attendance): 10%

Software: R Studio and SPSS

Bring laptop in class with R (https://cran.r-project.org/) and R-Studio (https://www.rstudio.com) Plus SPSS installed.

Class Schedule

Week and Module (and Labs)	Lecture Topics & Readings
Week 1-2: **Regression Analysis** Lab Week 1: Introduction to SPSS, Binary & Effect coding, Regression analysis Lab Week 2: Regression with Categorical Explanatory Variables Lab Week 3: Regression with Categorical Dependent Variable - Logistic Regression	▪ Introduction to Multivariate Data Analysis and Techniques ▪ Multiple Regression Analysis, Diagnostics & Assumptions ▪ Regression with transformed (e.g. log) independent and dependent variables ▪ Regression with categorical explanatory variables ▪ Regression with categorical dependent variable: Logistic Regression ▪ Association vs. Causation: Confounding and Endogenous selection bias **Readings: Simple and Multiple Regression** ▪ James et al. (2013), Chapter 3: Linear Regression; Chapter 4.3: Logistic Regression **Readings: Logistic Regression** ▪ Peng, CJ, Lee, KL and Ingersoll, GM. (2002). An Introduction to Logistic Regression Analysis and Reporting. The Journal of Educational Research, 96 (1), 3-14. ▪ James et al. (2013), Chapter 4.3: Logistic Regression ▪ Hosmer and Lemeshow (2000) Chapter 1: Introduction to Logistic Regression Model; Chapter 3: Interpretation of the Fitted Logistic Regression Model
Week 3-4 :**Moderation and Mediation Analysis** Lab Week 3: Introduction to PROCESS and Moderation Analysis Lab Week 4: Mediation Analysis & Moderated Mediation, Mediated Moderation	o Moderation & Mediation o Moderated Mediation & Mediated Moderation o Bootstrapping and Monte Carlo Simulations o Treatment-Mediator Interaction o Sensitivity Analysis **Readings:** ▪ Hayes (2013) Chapter 4: The Simple Mediation Model, Chapter 7: Fundamental of Moderation Analysis ▪ Baron, R. and Kenny, D. (1986), The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations, Journal of Personality and Social Psychology, 51 (6), 1173-1182 ▪ Muller, D., Judd, C. M. and Yzerbyt, V. (2005), When Moderation is Mediated and Mediation is Moderated, Journal of Personality and Social Psychology, 89 (6), 852-863. ▪ Zhao, X., Lynch, J. and Chen, Q. (2010), Reconsidering Baron and Kenny: Myths and Truths about Mediation Analysis, Journal of Consumer Research, 37, 197-206. ▪ Islam, T. and Meade, N. (2017). The direct and indirect effects of economic wealth on time to take-off, International Journal of Research in Marketing, in press
Week 5-6: **Experimental Designs for ANOVA, Best-Worst Scaling & Choice Experiments** Lab Week 5: Latin Squares, BIBD, Factorial designs Lab Week 6: Choice Experiments: unlabelled and Alternative Specific Designs	o Designs for Analysis of Variance (ANOVA) o Between, Within, Mixed & Nested Design o Blocking o Latin Squares o Balanced Incomplete Block Design (BIBD) and Applications o Orthogonal /Factorial Designs for Discrete Choice Experiments o Choice experiments using BIBD o Alternative Specific Choice Experiments (L^{MA} design) o Effect Size, Power and Sample Size **Readings:** ▪ Iacobucci, D. (2016). Chapter 7: Experimental Design ▪ Montgomery (1997): Chapter 5: Randomized Blocks, Latin Squares, and Related Designs, Chapter 6: Introduction to Factorial Designs ▪ Kuehl (2000): Chapter 9: Incomplete Block Designs: An Introduction ▪ Louviere, Hensher and Swait (2000) Chapter 4: Experimental Design, Chapter 5: Design of Choice Experiments ▪ Aizaki et al. (2015): Chapter 3 Discrete Choice Experiments ▪ Green (1974): On the Design of Choice Experiments Involving Multifactor Alternatives, Journal of Consumer Research, 1, 61-68.

Week 7	**Winter Break**
Week 8, 9 & 10: **Analysis of Variance** Lab Week 8: Analysis of Variance (ANOVA) and Diagnostics Lab Week 9: Contrasts and Simple Effects, Effect Sizes, Fixed and Random Effects Lab Week 10: Repeated Measures ANOVA and MANOVA	○ Introduction to **ANOVA** ○ Simple, Main and Interaction Effects ○ Planned Contrasts ○ Multiple Comparisons – Post Hoc ○ Effect sizes ○ Analysis of Covariance (ANCOVA) ○ Repeated Measures **ANOVA** **Readings:** ▪ Iacobucci (2016) Chapter 3: Two-Way, Three-Way and Higher Order ANOVA; Chapter 4: Omega-squared and Effect Sizes; Chapter 5: Contrasts and Simple Effects; Chapter 8: Repeated Measures; Chapter 9: Analysis of Covariance ▪ Keppel and Wickens (2004): Selected Chapters
Week 11, 12 & 13: **Discrete Choice Analysis** Lab Week 11: Discrete Choice Analysis (DCA): Data setup and Coding Lab Week 12: MNL and Managerial Insights Lab Week 13: Choice Model Extensions	▪ Stated preference (SP) and Revealed preference (RP) data ▪ Decision Making: Individual/Group/ Joint Decision Making ▪ Preference Stability, Preference Consistency, Heterogeneity ▪ Preference Elicitation using different methods ▪ Conceptual Framework : Random Utility Model ▪ **Choice Models:** ▪ Multinomial Logit Models (MNL), Assumptions ▪ Mixed Logit Model ▪ Nested Logit Model **Readings:** ▪ Ryan, Gerard and Amaya (2007): Chapter 1: Discrete Choice Experiments in a Nutshell, Chapter 3: Practical Issues in Conducting a Discrete Choice Experiment ▪ Train (2003): Chapter 2: Properties of Discrete Choice Models ▪ Louviere, Hensher and Swait (2000) Chapter 2: Introduction to Stated Preference Models and Methods ▪ **Applications:** ▪ Islam, T. (2014), Household Level Innovation Diffusion Model of Photo-Voltaic (PV) Solar Cells from Stated Preference Data, *Energy Policy*, 65 (February), 340-350. ▪ Russel et al. (2017), The Impact of Front-of-pack Marketing Attributes versus Nutrition and Health Information on Parents' Food Choices, Appetite 116, 323-338.

Note: The schedule of learning activities may require modification from time to time. Any changes will be announced in class and/or on the Courselink site. If you are registered with the Centre for Students with Disabilities and will require some form of accommodation in the completion of the required learning activities for this course, please meet with me during the first week of classes.

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. The Academic Misconduct Policy is detailed in the Graduate Calendar: http://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/sec_d0e1687.shtml

University Grading Scheme

This course follows the University grading scheme outlined in the University Calendar*:

A+	90-100%	**Excellent:** An outstanding performance in which the student demonstrates a superior grasp of the subject matter, and an ability to go beyond the given material in a critical and constructive manner. The student demonstrates a high degree of creative and/or logical thinking, a superior ability to organize, to analyze, and to integrate ideas, and a thorough familiarity with the appropriate literature and techniques.
A	85-89	
A-	80-84	
B+	77-79	**Good:** A more than adequate performance in which the student demonstrates a thorough grasp of the subject matter, and an ability to organize and examine the material in a critical and constructive manner. The student demonstrates a good understanding of the relevant issues and a familiarity with the appropriate literature and techniques.
B	73-76	
B-	70-72	
C+	67-69	**Acceptable:** An adequate performance in which the student demonstrates a generally adequate grasp of the subject matter and a moderate ability to examine the material in a critical and constructive manner. The student displays an adequate understanding of the relevant issues, and a general familiarity with the appropriate literature and techniques.
C	65-66	
F	0-64	**Fail:** An inadequate performance.

Code of Conduct – The Top Ten

The following conduct is expected of all of our students:

- Come to class prepared to learn and actively participate (having completed assigned readings, learning activities etc.).
- Approach your academic work with integrity (avoid all forms of academic misconduct).
- Arrive on time and stay for the entire class. If you happen to be late, enter the classroom as quietly as possible. At the end of class, apologize to the faculty member for the interruption. If you have to leave class early, alert the faculty member in advance.
- If you know in advance that you are going to miss a class, send an email to the faculty member letting him/her know that you will be absent, with a brief explanation.
- While in class, refrain from using any written material (e.g., newspaper) or technology (e.g., the Internet, computer games, cell phone) that is not relevant to the learning activities of that class. Turn off your cell phone at the start of each class.
- Listen attentively and respectfully to the points of view of your peers and the faculty member. Don't talk while others have the floor.
- Raise your hand when you wish to contribute and wait to be called upon. Challenge others appropriately, drawing on reason and research rather than unsubstantiated opinion, anecdote and/or emotion. Keep an open mind and be prepared to have your point of view challenged.
- Provide thoughtful feedback at the completion of all courses (we are committed to continuous improvement but need your input to help us decide what to focus on).