

## **MSCA 602: Applied Linear Statistical Models**

### **Section AA**

**Fall 2007**

**Instructor:** Dr. Fassil Nebebe

Wednesday – 17h45-20h15

Venue of Lectures: GM 210

**Office:** GM 209-3

**Office hours:** Wednesday, 14h00–15h30 or by appointment.

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**FirstClass:** **MSCA 602-2-2007 SecAA**

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### **1. COURSE DESCRIPTION**

The course deals with systematic treatments of linear statistical models for regression, analysis of variance and experimental design with special emphasis on applications in business and economics. Topics include regression analysis - the use of dummy variables, model building techniques in the presence of many explanatory variables, the use of transformations, and diagnostics; analysis of variance and covariance models, random effects models, the study of interactions; and elements of experimental designs. Case studies will be employed to illustrate tools for fitting, checking, interpreting and using linear models.

### **2. INSTRUCTIONAL METHODS**

- Lectures; assignments; computer lab sessions; term project (individual or team work).

### **3. COURSE OBJECTIVES**

The course aims at exploring the fundamentals of regression modeling and experimental designs that are considered most essential for use in applied business research, in particular the modeling of data that are inherently linear in structure. Upon completion of this course, students are expected to: read and appreciate regression techniques and/or experimental designs that are applied in business research; identify situations when use of linear models is appropriate; construct correct linear models; use statistical software packages and effectively present their findings from applying data modeling within the context of business research.

### **4. INTEGRATION**

- Class examples and computer based assignments on real data sets.
- Term project in application settings involving real data sets in all areas of interest to the class.

### **5. PRINCIPAL TEXT\***

- Kutner, M.H., C.J. Nachtsheim, and J. Neter. *Applied Linear Regression Models*. 4th ed. Boston, Mass.: McGraw-Hill/Irwin, 2004.

#### **OTHER TEXTS\* and SAS software references**

- Bowerman, B.L. and R.T. O'Connell. *Linear Statistical Models: An Applied Approach*. 2nd ed. Boston, Mass.: PWS-KENT, 1990.
- Dielman, T.E. *Applied Regression Analysis - A Second Course in Business and Economic Statistics*. 4th ed. Belmont, CA: Duxbury Press, 2005.
- Elliott, R.J. *Learning SAS in the Computer Lab*. Second Edition. Duxbury Press, 2000.
- SAS OnlineDoc 9.1.3 for the Web: <http://support.sas.com/onlinedoc/913/>

\***Note:** Acquisition of the principal texts, or of some other book at a similar level, is advised. However, the lectures may not directly follow any particular text book and may contain materials not found in any of them. The chapters and sections listed below correspond to the principal text.

## 6. TOPICS COVERED - CHAPTERS AND SECTIONS

Readings from the course text <b>excluding proofs</b>	Chapter	Sections	
		Required	Optional
<b>Simple Linear and Multiple Linear Regressions</b> Inference; model building; diagnostics; remedial measures and validation.	1	All	-
	2	All	-
	3	3.1-3.6, 3.8-3.10	3.7
	4	4.1-4.3	4.4-4.6
	6	All	-
	7	All	-
	8	8.1-8.6	8.7
	9	All	-
	10	All	-
<b>Time Series Regression</b> Modeling trend by using polynomial functions; modeling seasonal variation by using dummy variables; detection and remedial methods for autocorrelation; forecasting with autocorrelated errors.	12	All	-
<b>Qualitative Dependent Variables</b> Logistic Regression	14	14.1-14.7	14.8-14.14
<b>Single-Factor and Two-Factor Studies</b> Single-Factor and Two-Factor ANOVA models, Randomized Block Design, Elements of Analysis of Covariance	Handouts		

## 7. GRADING SCHEME

The final grade will be based on a number of **assignments** which will be due at various points during the term, a **midterm exam**, a **term project** and a **final examination**. Assigned tasks are to be handed in at the beginning of class on due dates. **NO LATE WORK WILL BE ACCEPTED**. The grading scheme is as follows:

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<b>Assignments</b>	<b>25%</b>	<b>Project</b>	<b>25%</b>	<b>Midterm</b>	<b>20%</b>	<b>Final exam</b>	<b>30%</b>
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## 8. REMARKS

- Appendix A of the course text provides some of the basic results in probability and statistics. It is extremely important that students review these concepts.
- MSCA 602 is on the JSMB Intranet System - FirstClass, and is accessible to registered students with valid IDs. Log on to <http://jmsb.concordia.ca> to learn more. This is a comprehensive resource where up-to-date course info on assignments, exercise sets, term project (guidelines for preparation project proposals and project reports), and lecture notes are deposited.

- Extensive use will be made of the computer, principally the SAS (Base SAS, SAS/STAT, SAS Graph) system running on PC. Students who never used SAS are urged to familiarize themselves with the system as soon as possible. The SAS texts listed above are useful references. The JMSB has a license for the software, and CD copies may be purchased for academic use from the *Center for Instructional Technology (CIT)* at GM-502-21.
- Class examples are based on computations run on SAS with several pages of output. All relevant outputs are posted on the site. **Please bring the printouts** of the program files (files with SAS extension) and the result or listing files (files with LST extension) to class.

## Homework

A typed cover page giving the student's name, assignment number, and due date should accompany the submissions. As much as possible, answers should be typed and supporting SAS output clearly labeled. The 4 homework assignments will constitute 25% of the total mark for the course.

## Project

*The Objective of the term project* is the resolution of one important problem of **choice** and a clear interpretation in terms of the subject-matter concepts. Individual or a two-person-team proposal describing the project for approval as to its suitability for the course must be submitted **no later than the beginning of week 8** of the term. A well-organized report (see project guideline) must be handed in one week following presentations in class (tentatively scheduled – December 5, 2007).

## Policies:

Students are free to discuss homework assignments and projects among each other on a conceptual level. However, wholesale copying of problem solutions is prohibited. Late assignments are unacceptable