

**MBA Q600:  
Applied Business Statistics  
Winter 2015 Course Outline**

**January 15, 2015**

**COURSE OBJECTIVE**

Statistics involves the collection, organization, presentation, analysis and interpretation of data. The purpose of business statistics is to use data to inform business decision making so that the best possible actions are taken. In this introductory course we study the following important topics in statistics: descriptive statistics, probability, discrete and continuous random variables, sampling distributions, confidence intervals, hypothesis testing, experimental design and analysis of variance, regression analysis, and nonparametric statistics.

**TEACHING STAFF AND COURSE INFORMATION**

Instructor	(Partial) Teaching Assistant
<b>Dr. John Miltenburg *</b>	<b>Mr. Ali Vaezi *</b>
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Office Hours: RJC – 217-F Before and after class	Office Hours: by appointment only (send e-mail to arrange)
Tel: (905) 525-9140 ext. 20693 (at RJC-217-F)	

\* Personal questions can be e-mailed to the instructor. All questions about course content must be posted on the Avenue Discussion Board so that all students can participate in the questions, answers and discussion.

Course ID, Class Time, Location: Q600E C01 (night class) -- Monday 7:00 pm to 10:00 pm, room RJC-263

Course Avenue Website: reachable from ... <http://avenue.mcmaster.ca>

**COURSE ELEMENTS**

Credit Value: 3	Leadership: No	IT skills: Yes	Global view: Yes
Web: Yes	Ethics: No	Numeracy: Yes	Written skills: Yes
Participation: Yes	Innovation: Yes	Team skills: No	Verbal skills: Yes

**COURSE DESCRIPTION**

This course introduces the statistical analysis methods that are commonly used for managerial decision making. Extensive use is made of a statistical software package MegaStat (which is an Excel add-in).

The course begins with a review of descriptive statistics, probability, random variables, and discrete and continuous probability distributions. Then the course studies sampling, confidence intervals, hypothesis testing, correlation analysis, analysis of variance, simple and multiple regression, and non-parametric statistics.

**LEARNING OUTCOMES**

Upon completion of this course, students will be able to complete the following tasks:

- Use descriptive statistics to summarize a set of data,
- Recognize the characteristics under which a managerial situation could be described by various discrete probability distributions (binomial, Poisson, hypergeometric) and continuous distributions (uniform, normal, exponential),
- Use these distributions to answer managerial probability questions,
- Use sample results to make estimates of population parameters,
- Use sample results to test theories (hypotheses) about population parameters,
- Use sample results from two (or more) sets of data to determine if there are differences between two (or more) population parameters,
- Use covariance, analysis of variance, and regression to estimate the relationship between two (or more) sets of data,
- Use the Excel add-in MegaStat to do data analysis, build confidence intervals, perform hypothesis tests, and conduct regression analysis,
- Interpret and use MegaStat statistical output (in Excel).

## REQUIRED COURSE MATERIALS

**Textbook:** Business Statistics in Practice, 2nd Canadian Edition (2011), by Bruce Bowerman, Richard O’Connell, Julie Aitken Schermer, and James Adcock. We will not use the current 3rd edition of the textbook. The publisher has printed a supply of black-and-white copies of the 2nd edition for sale in the bookstore and from students who took the course in the fall 2014 term. When the supply runs out students will have to buy the book on their own on the internet, etc.

Do not purchase the ‘Connect On-Line Access Card’. We will not use this feature.

The textbook web site is [http://highered.mcgraw-hill.com/sites/0070000237/student\\_view0/index.html](http://highered.mcgraw-hill.com/sites/0070000237/student_view0/index.html).

**Software:** We will use an Excel add-in called MegaStat. Depending on the computer, operating system, and Excel version ...  
 PC with Excel 2013: [http://novella.mhhe.com/sites/0071339604/student\\_view0/megastat\\_software.html](http://novella.mhhe.com/sites/0071339604/student_view0/megastat_software.html)  
 PC with Excel 2010 (or 2007): [http://highered.mcgraw-hill.com/sites/0070000237/student\\_view0/megastat\\_tutorials.html](http://highered.mcgraw-hill.com/sites/0070000237/student_view0/megastat_tutorials.html)  
 Mac with Excel 2011: [http://highered.mcgraw-hill.com/sites/0070000237/student\\_view0/megastat\\_tutorials.html](http://highered.mcgraw-hill.com/sites/0070000237/student_view0/megastat_tutorials.html)  
 Download the material appropriate for your computer (PC or Mac), operating system (e.g. Windows 7, 8), version of Excel (e.g. 2010, 2011, 2013).

The MegaStat.zip file you download will have a help file for installing MegaStat. And there is a video tutorial ‘Installation and Setup of MegaStat’ at the second or third website.

**Lecture Notes:** Download the Lecture Notes each week from the course website. It is not necessary to print out the Lecture Notes. During class students are expected to also write notes on paper.

## EVALUATION

Component	Maximum Mark	
<b>Weekly attendance</b>	4	0.5 marks per week in weeks 2,3,4,6,7,8,10,11,12,13. Students must not arrive late or leave before the break.
<b>Weekly quiz</b>	4	Short quiz written at the beginning of class in weeks 2,3,4,6,7,8,10,11,12,13. 10-minutes, 10-questions, 10-marks, open-textbook, online-on-Avenue. A total of 70 or more quiz marks during the term earns 4 marks; then 65 total quiz marks earns $4 \times 65 / 70 = 3.7$ marks, 57 marks earns $4 \times 57 / 70 = 3.26$ , etc.
<b>Group Presentations</b>	4	2 marks per presentation for two group presentations
<b>Group Discussions</b>	2	1 mark per discussion for two group presentation discussions
<b>Exam #1</b>	28	In-class, problems-2½ hours, computer-½ hour
<b>Exam #2</b>	29	In-class, problems-2½ hours, computer-½ hour
<b>(Final) Exam #3</b>	29	Scheduled by MBA Office, problems-2½ hours, computer-½ hour
<b>Total</b>	<b>100</b>	

At the end of the course students overall percentage grade will be converted to a letter grade in accordance with the following conversion scheme. If appropriate, the letter grade will be adjusted upwards or downwards to give a class median of A-.

LETTER GRADE	PERCENT	LETTER GRADE	PERCENT
A+	90 – 100	B+	75 – 79
A	85 – 89	B	70 – 74
A-	80 – 84	B-	60 - 69
		F	00 – 59

## Lectures, Quizzes, Attendance, Exams, Presentations

Weekly class is divided into 3 parts:

- 1) During the first 10 minutes of class students complete a 10-question (descriptive or very simple calculation) on-Avenue quiz on the assigned reading for the week (see Course Schedule below). Students must use their own computers and can use the textbook and a calculator. The quiz will open early at 6:55pm but will close at exactly 7:11pm. No extra time will be given.
- 2 A and B) During the next 100 minutes the instructor gives the part A of the lecture. This part of the lecture is also available via podcast. Part B of the lecture is available only via podcast. See Avenue for details on where to view the podcasts. Lecture Notes and Excel files for both parts of the lecture are available on Avenue.
- 3) After a 10 minute break, two student group presentations are done during the last 45 minutes of class. Each group presentation is 10 to 15 minutes long and is followed a 5 minute question-and-answer-and-discussion led by another group.

Attendance is taken at part 2A. Attendance at part 3 is required only for students giving a presentation or leading a discussion.

It is not possible to ‘make up’ marks that are lost due to missing a quiz, lecture, presentation, or discussion.

The instructor will lecture from the Lecture Notes (available on Avenue). During class students are expected to write notes, to use their computers to download problem data from Avenue, and to use MegaStat. There are no weekly hand-in assignments. Instead students must complete assigned weekly Practice Problems on their own. This may be done after the weekly lecture, but must be completed before the exams. Detailed solutions and data sets for all Practice Problems are available on Avenue.

All exams are 170 minutes long. Exams are not comprehensive; rather each only covers material since the previous exam. All exams have a 2/3 hour ‘problem part’, and a 1/2 hour ‘computer part’ in which students solve problems using Megastat. Students must use their own computer for the ‘computer part’; and their computer must be able to access Avenue to download data and to upload answers to Avenue dropboxes. Students must be very familiar all of this because no extra time or help will be given during the ‘computer part’ of the exams. Students can use a notebook computer from the Concierge Desk. These computers are difficult to use, and students will not be given any extra time or help during the exams.

Students may use their textbook during the exams and a McMaster standard calculator (Casio FX-991) or equivalent. Notes written in the textbook must not be excessive. If notes are excessive the student will not be allowed to use the textbook during the exam. ‘Post-it’ tabs may be inserted into the textbook; but no other papers may be inserted into the textbook. Students must bring an HB pencil to the exams.

Students may not use an electronic textbook or a photocopy of a textbook or share a textbook or share a calculator during the exams. Students may not use the Lecture Notes or their personal notes during the exams.

Students who miss an exam with the approval of the MBA Academic Services Office (as described later) will have all the marks and all the content for the missed exam moved to the final exam. There are no make-up exams.

Students are pre-assigned by first letter of last-name to groups of 2 or 3 students. Each group is assigned to Present (P) two presentations and to be the Discussant (D) for two other presentations (see Course Schedule below). The subject of the presentation is a supplement exercise problem from the textbook. The presentation is 10 to 15 minutes long and is done at the front of the classroom on the students own computer. Bring a USB key with your presentation in case there is a computer problem. In the presentation most students in the group present the problem, locate the problem on the course overview schematic, use statistical vocabulary and descriptive statistics to describe the data, use inferential statistics to analyze the data, and draw insights and conclusions. MegaStat must be used extensively. The questions in the supplement exercise problem must be answered and, in addition, other interesting results must be presented. The presentation must be printed (in a professional format), signed, dated, etc. and handed to the instructor before the presentation. The presentation grade depends only on the quality, quantity, and professionalism of the statistical work and the printed material handed in. Another group is assigned to be the Discussant (D). The discussant group begins the 5-minute question-and-answer session with two questions on statistical aspects of the presentation that are not too easy, too difficult, or too long and are of interest to the entire class. The questions cannot be very similar to the questions in the original supplementary exercise problem. The questions must be printed (in a professional format), signed, dated, etc. and handed to the instructor before the presentation.

Quizzes and exams are not returned. Exam solutions are taken up in class. Problems with grades (attendance, quiz, exam, presentation, discussion) must be resolved with the instructor within 2 weeks of the grades being posted on Avenue.

### **Communication and Feedback**

Students who are uncomfortable in directly approaching an instructor regarding a course concern may send a confidential and anonymous email to the respective area chair or director: <http://www.mbastudent.degroote.mcmaster.ca/contact/anonymous>  
Students who wish to correspond with instructors or TAs directly via email must send messages that originate from their official McMaster University email account. This protects the confidentiality and sensitivity of information as well as confirms the identity of the student.

### **Academic Dishonesty**

It is the student’s responsibility to understand what constitutes academic dishonesty. Please refer to the University Senate Academic Integrity Policy at: <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>

## Copyright

McMaster University has signed a license with the Canadian Copyright Licensing Agency (Access Copyright) which allows professors, students, and staff to make copies allowed under fair dealing. Fair dealing with a work does not require the permission of the copyright owner or the payment of royalties as long as the purpose for the material is private study, and that the total amount copied equals NO MORE THAN 10 percent of a work or an entire chapter which is less than 20 percent of a work. In other words, it is illegal to: i) copy an entire book, or ii) repeatedly copy smaller sections of a publication that cumulatively cover over 10 percent of the total work's content. Please refer to the following copyright guide for further information: <http://library.mcmaster.ca/about/copying.pdf>

## MISSED EXAMINATION/ TESTS/ CLASS PARTICIPATION

When students miss a regularly scheduled midterm, test or class participation for legitimate reasons as determined by the MBA Academic Services Office, the weight for that midterm/test/participation will be distributed across other evaluative components of the course at the discretion of the instructor. Documentation explaining such an absence must be provided to the MBA Academic Services Office within five (5) working days upon returning to school.

To document absences for health related reasons, please provide the Petition for Relief for MBA Missed Term Work and the McMaster University Student Health Certificate, which can be found on the DeGroot website at:

<http://mbastudent.degroot.mcmaster.ca/forms-and-applications>

Do not use the McMaster Student absence Form as this is for undergraduate students only. University policy states that a student may submit a maximum of three (3) medical certificates per year after which the student must meet with the Director of the program.

To document absences for reasons other than health related, please provide the Petition for Relief for MBA Missed Term Work and documentation supporting the reason for the absence.

Students unable to write a midterm at the posted exam time due to the following reasons: religious; work-related (for part-time students only); representing university at an academic or varsity athletic event; conflicts between two overlapping scheduled midterm exams; or other extenuating circumstances, have the option of applying for special exam arrangements. Such requests must be made to the MBA Academic Services Office at least ten working days before the scheduled exam along with acceptable documentation. Instructors cannot themselves allow students to unofficially write make-up exams/tests. Adjudication of the request must be handled by the MBA Academic Services Office.

All applications for deferred and special final examination arrangements must be made to the MBA Academic Services Office. Failure to meet the stated deadlines may result in the denial of these arrangements. Deferred examination privileges, if granted, must be satisfied during the examination period at the end of the term immediately following. There will be one common sitting for all deferred exams. Please refer to the MBA Calendar for further details.

If any attendance, quiz, or exam is missed without a valid reason, students will receive a grade of zero for that component. If the MBA Academic Services Office adjudicates that the component was missed for a legitimate reason, then the content of the missed component and the marks for the missed component will be distributed as described earlier in this course outline in the section on "Lectures, Quizzes, Attendance, Exams". No exceptions will be made.

## 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 examinations on or before the last date for withdrawal from a course without failure (please refer to official university sessional dates). Students must forward a copy of such SAS accommodation to the instructor immediately upon receipt. 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.

## Course Schedule

Week Date	Topics (Lecture Notes are on Avenue.)	Practice Problems (Solutions are on Avenue.)	P - Presentation Group, D - Discussion Group
1. Jan. 5	Ch. 1: Introduction, Ch. 2: Descriptive Statistics Podcast 1 – Ch 1, Podcast 2a – Ch 2a	Ch 1 – 7, 15, 21, 22 Ch 2 – 5, 7, 22, 28, 29, 31, 35, 41,49, 54, 62, 65	
2. Jan. 12	Ch. 2: Descriptive Statistics, Ch. 3: Probability Week 2 Quiz – Ch 2,3 Podcast 2b – Ch 2b, Podcast 3 – Ch 3	Ch 3 – 9, 17, 20, 26, 34, 37, 42,43, 44	Prob. 2.67 – P 1, D 2 Prob. 2.69 – P 2, D 1
3. Jan. 19	Ch. 4: Discrete Random Variables Ch. 5: Continuous Random Variables Week 3 Quiz – Ch 4,5 Podcast 4 – Ch 4, Podcast 5 – Ch 5	Ch 4 – 3, 12, 15, 19, 22, 25, 33, 35, 37, 45, 51 Ch 5 – 6,11,23,25,26,27,31,55, 65,69 Ch 6 – 7, 9, 21, 25, 29	Prob. 2.70 – P 3, D 4 Prob. 3.56-60 – P 4, D 3
4. Jan. 26	Ch. 6: Sampling Distributions Week 4 Quiz – Ch 6, Podcast 6 – Ch 6		Prob. 4.61 – P 5, D 6 Prob. 5.84 – P 6, D 5
5. Feb. 2 In-class <u>Midterm Exam #1</u> covering Chapters 1 to 6: ‘problems’--2½ hours; ‘computer test’--½ hour			
6. Feb. 9	Ch. 7: Confidence Intervals Ch. 8: Hypothesis Testing Week 6 Quiz – Ch 7,8 Podcast 7a – Ch 7a, Podcast 7b – Ch 7b	Ch 7 – 5, 7, 13, 17, 19, 25, 35, 37, 43, 45, 55, 59, 63, 67, 71, 72, 75, 81, 83, 93	Take up solutions to Midterm Exam #1
Feb. 16 to Feb. 21 Midterm Break – No classes		Ch 8 – 13, 23, 25, 27, 29, 33, 37, 39, 41, 43, 51, 53, 55, 65, 67, 69 Ch 9 – 3, 5, 11, 14, 15, 17, 31, 35, 43, 45	
7. Feb.23	Ch. 8: Hypothesis Testing Ch. 9: Statistical Inferences – two samples Week 7 Quiz – Ch 8,9 Podcast 8 – Ch 8, Podcast 9 – Ch 9	Ch 10 – 3, 4, 11, 15, 17, 22, 25	Prob. 7.84 – P 7, D 8 Prob. 7.102 – P 8, D 7
8. Mar. 2	Ch. 10: Experimental Design and ANOVA Week 8 Quiz – Ch 10 Podcast 10a – Ch 10a, Podcast 10b – Ch 10b		Prob. 8.80 – P 1, D 3 Prob. 9.52-3 – P 3, D 1
9. Mar. 9 In-class <u>Midterm Exam #2</u> covering Chapters 7 to 10: ‘problems’--2½ hours; ‘computer test’--½ hour			
10. Mar.16	Ch. 11: Correlation & Simple Regression Week 10 Quiz – Ch 11 Podcast 11a – Ch 11a, Podcast 11b – Ch 11b	Ch 11 – 3, 7, 17,29,35,39,47,54,60,69, 73 Ch 12 – 7, 15, 19, 23, 28, 34, 38, 43, 48	Take up solutions to Midterm Exam #2
11. Mar.23	Ch. 12: Multiple Regression Week 11 Quiz – Ch 12 Podcast 11c – Ch 11c, Podcast 12a – Ch 12a	Ch 13 – 3, 5, 11, 17, 25, 31	Prob. 10.35 – P 7, D 2 Prob. 11.74 – P 2, D 7
12. Mar.30	Ch. 13: Nonparametric Statistics Week 12 Quiz – Ch 13 Podcast 12b - Ch 12b, Podcast 13a - Ch 13a	Ch 14 – 2, 8, 13, 15, 23	Prob. 11.75 – P 4, D 6 Prob. 12.52 – P 6, D 4
13. Apr. 6	Ch. 14: Chi-Square Tests Week 13 Quiz – Ch 14 Podcast 13b – Ch 13b, Podcast 14 – Ch 14		Prob. 13.32 – P 8, D 5 Prob. 13.33 – P 5, D 8
14. Apr. ? -- to be scheduled by the MBA office (MASO) (Final) <u>Exam #3</u> covering Chapters 11 to 14: ‘problems’--2½ hours; ‘computer test’--½ hour			

### Notes:

1. Data sets used in the Lectures are posted on Avenue with the Lecture Notes. Data sets used in the Practice Problems are posted on Avenue with the Practice Problem Solutions. Data sets for all problems marked in the textbook with an arrow (which includes the supplementary exercise problems for the presentations) are available at the textbook web site: [http://highered.mcgraw-hill.com/sites/0070000237/student\\_view0/index.html](http://highered.mcgraw-hill.com/sites/0070000237/student_view0/index.html).

2. If the university closes (due, for example, to bad weather) causing a class to be cancelled, the missed class will be made up by scheduling a make-up class on the following Friday evening (7 to 10 pm). An announcement will be made on Avenue.