OM 211: Honors Statistical Analysis for Management

Spring 2012 Course Syllabus

Lecture Section 001
(CRN 16705)

Dr. Harvey Singer

Office Hours: Monday from 12:30 to 1:30 PM, Tuesday from 12:00 Noon to 2:00 PM, Wednesday from 11:00 AM to 1:00 PM, Friday from 11:00 AM to 12:30 PM, or by appointment. (Schedule subject to change.)

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Description
Introduces the application of statistical methods to support quantitative decision analysis for resolving business problems. Topical coverage includes descriptive statistics, probability, random variables, probability distributions, sampling and sampling distributions, estimation, hypothesis testing, and linear regression (both simple and multiple). Case studies will be used extensively to integrate, synthesize, and extend the concepts presented so as to foster a “learning by doing” approach that develops and promotes critical thinking skills. Active class discussion via individual and/or group presentations of case assignments will be stressed. Extensive use will be made of hands-on computer software for problem and case study modeling and solution. See the “Topics” section for the list of subjects.

Class Session: Monday and Wednesday from 2:30 to 4:20 PM in Enterprise Hall room 173 (ENT 173).

Prerequisites and Corequisites
1. Cumulative GPA of 3.5 or higher.
2. Prerequisite: MATH 108 or 113, with a grade of B or better or the equivalent as approved by the SOM Office of Academic and Career Services (OACS). Prerequisites are solely and strictly enforced by the OACS. Students not meeting this prerequisite will be dropped by OACS without input from the faculty instructor.
3. Corequisite: MIS 102 with a grade of C or better. As a corequisite, MIS 102 may be taken concurrently or out of sequence with OM 211 (before or after OM 211). Students who have not taken MIS 102 or are not currently taking MIS 102 will not be dropped from OM 211.

4. Essential and expected knowledge: Proficiency in elementary algebra and geometry. Familiarity with recent versions of MS Word and PowerPoint; proficiency with Excel. Deficiencies should be self-remediated.

Registration
1. The course instructor has no authority to resolve any issues concerning student registration. All matters relating to course registration are the exclusive domain of the Office of Academic and Career Services (OACS), and are handled solely by them. OACS is located on the lower level of Enterprise Hall in room 008. OACS can be reached by phone at 703-993-1880 or send e-mail to somserv@gmu.edu.
2. There are no force-adds or schedule adjustments in SOM.
3. Students must be officially registered for the course to receive a grade. Students are solely responsible to verify their own registration status.

Required Textbook
   - The 6th Edition supersedes and replaces all other editions. Specifically, all previous editions and the international edition are unacceptable, as they are different. Any edition of the textbook other than that listed above will not be supported. Students using other editions do so solely at their own risk.
2. The text is supplemental reading and is not a substitute or replacement for classroom instruction.

Calculator
You should have a “scientific” type calculator which can calculate square roots (√), powers (x^y), and exponentials (e^x). (The factorial function is optional).

Laptop Use
1. The use of laptops during class for activities directly related to the ongoing class is allowed and encouraged.
2. Laptops can be distracting to your neighbors, especially for unrelated activities which include, but are not limited to, surfing the Internet, checking email, playing games, and doing homework for this or another class. Such use will result in the loss of the privilege to use a laptop in class.

Undergraduate Program Learning Goals (Goals addressed in this course are in bold)
1. **Our students will be competent in their discipline.**
2. Our students will be aware of the uses of technology in business.
3. **Our students will be effective communicators.**
4. **Our students will have an interdisciplinary perspective.**
5. Our students will be knowledgeable about global business and trade.
6. **Our students will recognize the importance of ethical decisions.**
7. Our students will be knowledgeable about the legal environment of business.
8. Our students will be knowledgeable about team dynamics and the characteristics of effective teams.
9. Our students will understand the value of diversity and the importance of managing diversity in the context of business.

10. **Our students will be critical thinkers.**

**Specific Course Objectives**

1. To master and apply statistical techniques to describe and analyze data;
2. Apply statistical analysis for inference, prediction, and decision making;
3. Understand and detect flaws in statistical reports and analysis;
4. Identify statistical tools for specific managerial applications;
5. Use MS-Excel to perform statistical analysis;
6. Develop the skills necessary to independently analyze business data and model business situations.

**Approach**

1. Geared for the future business professional engaged in decision making or decision support. The emphasis is on business applications, and not mathematics. Lectures will consist of the formal presentation and teaching of the material and basic problem solving skills; discussions and questions are highly encouraged. The classes will also include the practical side of the course, stressing learning by doing through solution of practical problems.
2. The lecture instructor is responsible for teaching the best course possible, including providing the best possible resources which promote learning. Students are individually and solely responsible for their own learning, including the application of the information presented, as evidenced by their participation and as demonstrated by their performance on the graded case studies, quizzes, and exams. The instructor has office hours to meet with students individually to work with them on a one-on-one basis to help their understanding and mastery of the material.

**Disability**

All academic accommodations due to disability must be arranged by the student with the Office of Disability Services (ODS); contact ODS at 703-993-2474. I will cooperate with ODS to the greatest extent possible to accommodate a student’s special needs.

**Honor Code**

1. Students are obligated to strict adherence to the University honor system and code as stated in the 2011-12 University Catalog. You are bound by the code to neither receive nor furnish any assistance of any kind by any means on any graded assignment, test, or quiz.
2. Specifically:
   - All work submitted for a grade, including tests, quizzes, and homeworks, is to be completed individually, on your own, and alone.
   - Copying quiz or test answers from another student and/or allowing your answers to be copied by another student is strictly and absolutely forbidden.
   - Communication and/or collaboration, or suspicion thereof, of any kind between students during tests and quizzes is strictly and absolutely forbidden.
• Using an impermissible aid on any quiz or test such as unauthorized notes or electronic devices with Internet connectivity is strictly and absolutely forbidden.
• Generally, graded case studies are an individual effort only to be performed; no outside assistance of any kind from any person, source, or means is allowed. For group case studies, no assistance from outside the group of any kind from any person, source, or means is allowed. Any evidence or suspicion of receiving assistance on graded case studies will be construed as an honor code violation.
• Removing an exam from the classroom and sharing information about exams with other students is strictly and absolutely forbidden.

3. Any violations of the honor code will result in an immediate filing of formal charges with the University Honor Committee which will be aggressively pursued with great vigor.
4. Registration in this course is taken as your implied compliance with the honor code policy in general and the specific terms cited in item 2 above.

Connectivity
1. It is the student’s responsibility to have reliable and adequate Internet connectivity and access (including GMU computers available on campus).
2. For technical assistance, visit the ITU Support Center at http://itusupport.gmu.edu/ or call 703-993-8870 or send e-mail to support@gmu.edu. However, it is solely the student’s responsibility to determine and resolve any connectivity and other problems.

E-mail Contact
1. I communicate remotely with students only by GMU e-mail. I will not reply to voice mail messages left on my GMU office telephone.
2. For security and confidentiality, I will only reply to GMU e-mail addresses.
3. I will only reply to student e-mail that is signed with your full name and that states your course and section. E-mail without this information will not receive a reply.
4. I check and respond to e-mail during my posted office hours. I do not check or respond to e-mail at night after business hours or on the weekends.
5. Expect a reply to an inquiry within 1 to 2 days after I read your e-mail.

Class Etiquette
Be courteous to and respectful of others in class. Please refer to the document “Lecture Etiquette” posted under the link “Getting Started.”

Class Participation
1. Performance is highly associated with attendance and participation in all classes.
2. Students are expected to attend all classes. The student is solely responsible for all assignments and for all material presented in class (even if missed due to absence).
3. Class participation consists of active engagement in the presentation of material through note-taking, questions, and discussion. Class participation, which requires attendance, contributes materially and measurably to a student’s final course grade.
4. Practice problems may be assigned in class. Students are expected to solve them to gain experience in solving problems.
Course Website on Blackboard
1. Login to https://mymasonportal.gmu.edu and click on the “Courses” tab for the link to your OM 211 lecture section. Note that this is a new website specific to this semester and section and is currently under construction.
2. The Course Content page of the Blackboard course website for OM 211 comprises separate folders containing this syllabus, announcements and assignments, PowerPoint presentations, supplemental notes, sample tests, and student grades. There is an intuitive architecture to the organization of the course website; the student should become familiar with navigating through it.
3. The website is continually being maintained. Course documents are continually created, edited, revised, and expanded; new versions are not re-posted.
4. Important course announcements will be posted in the “Announcements” folder on the Course Content page. You should check the folder often, at least twice a week.
5. As a convenience to alleviate the burden of taking notes in class and to give your full attention to the discussion, lecture presentations are posted in the “Topical Coverage” folder on the Course Content page. The folder is itself organized into separate pages in order of topic and chapter. These pages contain condensed and abridged versions (with shortened coverage and content) of the PowerPoint presentations delivered in lecture. You should be prepared to augment the downloaded versions with your own notes during lecture. These pages may also contain solutions to some of the problems worked in class.
6. Announcements of the coverage of the next class will be posted in the “Next Class” folder on the Course Content page.
7. The “Case Studies” folder on the Course Content page will contain the case studies and/or problem sets assigned from the textbook that are required for submission.
8. It is strongly recommended that students download the pertinent course documents before lecture and before assignment due dates and tests.
9. The course website is an electronic medium to facilitate the transfer and dissemination of the course content. It is provided solely to augment classroom presentation of the material. The web site is not a substitute or replacement for attending class. On-line is not on vacation!

Grading Metrics
1. The course is scored and graded on a point system; the value of the course is 1850 points.
2. The metrics used for determining the final course grade are the scores earned on:
   - all three (3) tests (800 points max),
   - all five (5) quizzes (200 points max),
   - all six (6) case studies/problem sets (800 points max),
   - class participation (100 points max).
3. Each of the aforementioned grading instruments is described in the paragraphs below.
4. A numerical final course total score is calculated as the sum of scores earned on all tests, quizzes, homeworks, and project (out of a maximum possible score of 1850 points).
5. The final course letter grade is assigned objectively, strictly, and solely according to the numerical final course total score. (See “Course Grade” below.)
   - There is no “extra credit” of any kind, for any reason.
   - Final total point scores are NOT “bumped” or rounded up to the next higher letter grade. Grades are not raised because a total score is close to the cutoff between two grades.
6. Students are solely responsible for tracking their grades on Blackboard to make sure that the information entered is accurate.

Case Analysis/Assignments
1. Six (6) case studies will be assigned for submission. Students are expected to solve all assigned case studies, and submit paper copies in class, which will be collected and graded. These assignments are an important component of the learning process, and each assignment/case must be turned in no later than its due date.
2. Graded case studies are an individual effort only to be performed; no outside assistance of any kind from any person, source, or means is allowed. For group case studies, no assistance from outside the group of any kind from any person, source, or means is allowed. Any evidence or suspicion of receiving assistance on graded case studies will be construed as an honor code violation.
3. Descriptions of the case assignments in terms of a statement of work and the required deliverables will be posted on the OM 211 Blackboard course website. At a minimum, the deliverable will consist of a written technical memorandum stating the problem, data, methodologies, and technical results and conclusions.
4. Each case study contributes the points scored (out of points assigned) to the final course score. Altogether, the quizzes count for up to 800 points of the final course score.
5. MISSED CASE STUDIES.
   - A missed case study will be assigned a score of zero.
   - A missed case study may be made up only under extreme circumstances, WITH supporting documentation, AND at the sole discretion of the lecture instructor. Note that one only one (1) make-up (either test or case study) is allowed. (See the “Make-ups” paragraph below).

Tests
1. Three (3) mandatory, non-cumulative, tests will be given, as announced. The tests will be comprehensive of the topics they cover.
2. Each individual test contributes the points scored to the final course score. Test valuation is as follows:
   - Test 1 is worth up to 200 points.
   - Test 2 is worth up to 200 points.
   - Test 3 is worth up to 400 points.
   Altogether, the tests count for up to 800 points of the final course score.
3. Specific topic coverage of all the tests will always be announced in advance of test dates. The tentative coverage is:
   - Test 1: Descriptive Statistics and Exploratory Data Analysis.
   - Test 3: Inferential Statistics (sampling distributions, estimation, and hypothesis testing) and Regression and Correlation (both simple and multiple).
4. Test dates will be announced. Advance notice of the date and specific coverage of each test will be given in class and posted on my OM 211 course website.
5. Tests 1 and 2 will be given during scheduled class meetings. Test 3, the final, will be given in the on the date and at the time stated in the published Final Exam Schedule (see “Schedule” below).
6. Tests are based upon and will be comprehensive of all the material covered as it was presented and covered in class.
7. Each test will consist of multiple word problems; each problem may itself contain several or many parts.
8. All tests are strictly an individual effort. Absolutely NO collaboration or communication between students of any kind is permitted. (See the “Honor Code” paragraph above.)
9. All tests given in class are closed book. Use of the textbook, class notes, etc., is strictly prohibited. Use of a one-page, self-written, study guide may be authorized prior to the test.
10. MISSED TESTS.
   - A missed test will be assigned a score of zero.
   - A missed test may be made up only under extreme circumstances, WITH supporting documentation, AND at the sole discretion of the lecture instructor. Note that one only one (1) make-up (either test or case study) is allowed. (See the “Make-ups” paragraph below).

Quizzes
1. Five (5) mandatory, non-cumulative, quizzes will be given during scheduled class meetings, as announced.
2. Each quiz will be comprehensive of the topic it covers. Specific topic coverage of each quiz will always be announced in advance.
3. Each individual quiz contributes the points scored (out of 40 points) to the final course score. Altogether, the quizzes count for up to 200 points of the final course score.
4. Each quiz will consist of a single word problem which may contain several or many parts.
5. Items 6 through 10 inclusive for “Tests” apply to all quizzes.

Class Participation
1. Performance is highly associated with attendance and participation in all classes.
2. Students are expected to attend all classes. The student is solely responsible for all assignments and for all material presented in class (even if missed due to absence).
3. Class participation consists of active engagement in the presentation of material through note-taking, questions, and discussion. Class participation, which requires attendance, contributes materially and measurably to a student’s final course grade.
4. Participation is quantitatively assessed by a student’s earned score on five (5) quizzes given in class (at anytime during class). Each quiz is worth up to 10 points for a total of up to 50 points towards the final course score.
5. All class quizzes are individual efforts subject to the Honor Code.
6. The first and the last quizzes are for self-evaluation purposes to assess your state of knowledge of statistics and probability prior to and then after formal instruction in this course.

Make-ups
1. One and only one (1) make-up is allowed (either a test or a quiz). Note that lecture quizzes and Test 3 cannot be made-up.
2. Taking a make-up is not automatic. You must qualify and register for any make-up with the lecture instructor (ONLY) prior to registration deadline. (You must provide a valid and bona
fide reason for missing the test or quiz when it was originally scheduled, supported and verified by documentation. All decisions are final; there is no appeal.)
3. Re-testing to replace scores already earned on quizzes and/or tests is strictly prohibited and will not be allowed under any circumstances.
4. A document stating the make-up policies and procedures will be posted on the OM 211 course website under “Announcements.”
5. Make-ups may be of a different format and level of difficulty than the original test/quiz. Also, no study guides will be allowed for any make-up.
6. A missed test or quiz will be assigned a score of zero until it is made-up. After the make-up, the grade on the make-up will replace the zero and will be added into the final total course score.
7. The test/quiz make-up day is Friday, April 27, 2012, ONLY; test room and time is TBA.

**Course Grade**

1. The final course letter grade is assigned rationally and objectively on the sole basis of a student’s performance in the class as measured by the total point score earned by the student on all grading metrics in strict accordance with the schema stated below.
   ➢ Outside influences and obligations will not be factored into the course grade.
2. Midterm course grades will be assigned as whole letters, WITHOUT plus and minus, based on the total of all scores received up to the time of their assignment.
3. Final course grades will be assigned as whole letters, WITH plus and minus.
4. Final course grades are assigned on a point system with a maximum of 1850 points for the course. The final total point score for the course is the sum of the scores earned on all tests, quizzes, lecture quizzes, and graded homework assignments.
5. Final total point scores are **NOT** “bumped” or rounded up to the next higher letter grade. Specifically, a final total point score of 1331 will be assigned a course grade of C- and not C. (Note that a grade of C- is unsatisfactory in SOM; a grade of C or better is required in OM 211 for acceptance into SOM.)
6. Final course letter grade assignments on the 1850 point system are given in the table below.

<table>
<thead>
<tr>
<th>COURSE TOTAL SCORE * FROM</th>
<th>UP TO</th>
<th>COURSE GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1813</td>
<td>1850</td>
<td>A+</td>
</tr>
<tr>
<td>1721</td>
<td>1812</td>
<td>A</td>
</tr>
<tr>
<td>1665</td>
<td>1720</td>
<td>A-</td>
</tr>
<tr>
<td>1628</td>
<td>1664</td>
<td>B+</td>
</tr>
<tr>
<td>1536</td>
<td>1627</td>
<td>B</td>
</tr>
<tr>
<td>1480</td>
<td>1535</td>
<td>B-</td>
</tr>
<tr>
<td>1443</td>
<td>1479</td>
<td>C+</td>
</tr>
<tr>
<td>1332</td>
<td>1442</td>
<td>C</td>
</tr>
<tr>
<td>1295</td>
<td>1331</td>
<td>C-</td>
</tr>
<tr>
<td>1110</td>
<td>1294</td>
<td>D</td>
</tr>
<tr>
<td>0</td>
<td>1109</td>
<td>F</td>
</tr>
</tbody>
</table>

* Point ranges are inclusive.
7. There is no “extra credit” of any kind, for any reason.
8. The above chart will be adhered to strictly and without deviation or compromise.

Schedule
2. The schedules for all “deliverables” will be announced during the semester. Advance notice of the dates and specific coverage will be announced in class and posted on my OM 211 Blackboard course website.
3. The last class is Wednesday, May 2, 2012.
4. The test/quiz make-up day is Friday, April 27, 2012. Time and location are TBA.
5. In conformity with the official Spring 2012 Final Exam Schedule promulgated by the Office of the University Registrar (at http://registrar.gmu.edu/calendars/2012SpringExam.html), Test 3, the Final Exam, is scheduled to be given on Monday, May 14, from 1:30 to 4:15 PM, in the regular classroom ENT 173.
6. Conflicts in the final exam (Test 3) schedule can only be resolved through the Office of Academic and Career Services (not the instructor) at least one week prior to the date of the final, with the appropriate paperwork. Requests not meeting any part of this condition will be automatically denied.

Topics
1. The tentative list of topics is given below, which follows the basic order of topics in the required text.
2. The list of topics is subject to change during the semester. Some sections in the text will be skipped and some material not contained in the text may be presented, as announced.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Chapter</th>
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<tbody>
<tr>
<td><strong>Part I. Describing Technical Data and its Variability (Descriptive Statistics)</strong></td>
<td></td>
</tr>
<tr>
<td>1. Data types and sources</td>
<td>1</td>
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<tr>
<td>2. Data presentation: Tabular and graphical methods</td>
<td>2</td>
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<tr>
<td>Qualitative data</td>
<td></td>
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<tr>
<td>Quantitative (numerical) data</td>
<td></td>
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<tr>
<td>3. Data summarization: Numerical summary statistics</td>
<td>3</td>
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<tr>
<td>Measures of location and variability</td>
<td></td>
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<tr>
<td>Diagnostic uses and inferences from the measures</td>
<td></td>
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<tr>
<td>Exploratory data analysis</td>
<td></td>
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<tr>
<td>Grouped data</td>
<td></td>
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<tr>
<td><strong>Part II. Dealing With Uncertainty (Probability)</strong></td>
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<tr>
<td>4. Basic probability</td>
<td>4</td>
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<tr>
<td>Basic concepts and relationships</td>
<td></td>
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<tr>
<td>Conditional probability</td>
<td></td>
</tr>
<tr>
<td>5. Random variables and discrete probability distributions</td>
<td>5</td>
</tr>
</tbody>
</table>
General random variable and probability distribution concepts
Uniform, binomial, and Poisson probability distributions

6. Continuous probability distributions 6
   Normal distribution
   Exponential distribution

Part III. Inferring from Data with its Variability (Inferential Statistics)
7. Sampling and sampling distributions 7
   Sampling distribution of sample means
8. Estimation theory 8
   Point estimation
   Confidence interval estimation for means: $\sigma$ known and $\sigma$ unknown
   Confidence interval estimation for proportions: $\sigma$ known and $\sigma$ unknown
   Sample size estimation
9. Basic hypothesis testing: One Sample 9
   Error types
   Significance tests for means: $\sigma$ known and $\sigma$ unknown
   Significance tests for proportions: $\sigma$ known and $\sigma$ unknown
   Testing with p-values
10. Two Sample Hypothesis Testing 10
    Comparison of two population means: $\sigma$ known and $\sigma$ unknown
    Analysis of variance (ANOVA)
11. Test of independence 11

Part IV. Modeling Relationships Contained in Data (Regression)
12. Simple linear regression and correlation 12
    Calculating a regression line by the method of least squares
    Correlation, the correlation coefficient, the coefficient of determination
    Computer Solution
    Testing for Significance, Model Verification
    Using the estimated regression equation: estimation and prediction
    Residual analysis
13. Multiple linear regression 13
    The multiple regression model
    Computer calculation and interpretation of the computer output report
    Using the estimated regression equation: estimation and prediction
    Testing for Significance
    Qualitative independent variables
    Residual analysis
    Multicollinearity