OM 210: Statistical Analysis for Management

Fall 2011 Course Syllabus

Lecture Section 004
(Monday, CRN 79382)

Dr. Harvey Singer

Office Hours
Monday from 2:00 to 3:30 PM, Tuesday from 12:00 Noon to 2:00 PM, Thursday from 12:00 Noon to 2:00 PM, Friday from 11:00 AM to 12:30 PM, or by appointment. (Schedule subject to change.)

Phone
(703) 993-1798

Fax
(703) 993-1809

E-mail
hsinger@gmu.edu

Website
https://mymasonportal.gmu.edu

Description
Introduces the application of statistical methods to support quantitative decision analysis for resolving business problems. Includes descriptive statistics, probability and probability distributions, sampling, estimation, hypothesis testing, and linear regression (both simple and multiple). Lecture, recitation format with weekly lecture and weekly recitation; attendance in both lecture and recitation is mandatory and obligatory. See the “Topics” section for the list of subjects.

Lecture Session:
Monday from 11:05 AM to 1:15 PM in Science & Technology II room 7 (STII 7).

Recitations: Students MUST also register for a recitation (any one of OM 210 301 to 311).

Prerequisites and Corequisites
1. Prerequisite: MATH 108 or 113, with a grade of C 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 the MATH 108 prerequisite will be dropped by OACS without input from me.
2. Corequisite: MIS 102 with a grade of C or better. As a corequisite, MIS 102 may be taken concurrently with OM 210; MIS 102 may be taken out of sequence and may even be taken after OM 210. Students who have not taken MIS 102 or are not currently taking MIS 102 will not be dropped from OM 210.
3. Additionally, proficiency in elementary algebra is essential and is expected. Deficiencies in elementary algebra should be self-remediated. Also, the student should be familiar with recent versions of MS Office products, especially MS Word, PowerPoint, and Excel.

Registration
1. The course instructor or graduate teaching assistants (GTA’s) have 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 ($\sqrt{ }$), powers ($x^y$), and exponentials ($e^x$). (The factorial function is optional).

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 the essential concepts and tools of statistics and probability, and to apply these methodologies to solve practical, real-world, problems emphasizing business applications.
2. To provide a sound basis in statistics and probability for the student’s future academic and professional careers.
3. To demonstrate the use of statistics, probability, and statistical models to support decision making in business.
4. To develop the critical thinking and independent problem solving 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 are the formal presentation and teaching of the material and basic problem solving skills; discussions and questions are highly encouraged. Recitations are the practical side of the course, stressing learning by doing through solution of practical problems.
2. The lecture and recitation instructors are 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 homework, quizzes, and exams. The instructor and GTA’s both have office hours to meet with students individually to work with them on a one-to-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 on any graded assignment, test, or quiz.
2. Specifically:
   - All work submitted for a grade, including tests, quizzes, and homeworks, are to be completed individually, on your own, and alone.
   - Communication and/or collaboration, or suspicion thereof, of any kind between students during tests and quizzes is strictly and absolutely forbidden.
   - Any evidence or suspicion of collaboration on graded homework will be construed as an honor code violation.
3. Any violations of the honor code will result in an immediate, automatic, and severe devaluation of the score on that test, quiz, or homework to a failing grade and formal charges will be filed and aggressively pursued with the University Honor Committee.

**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 \url{http://itusupport.gmu.edu/} or call 703-993-8870 or send e-mail to \url{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 lecture and recitation. Please refer to the document “Lecture Etiquette” posted under the link “Getting Started.”

**Class Participation**

1. Performance is highly associated with class attendance and participation.
2. Students are expected to attend all lectures and all recitations.
3. Class participation consists of active engagement in the presentation of material through note-taking, questions, and discussion.
4. The student is solely responsible for all assignments and material presented in class.

**Course Website on Blackboard**

1. Login to \url{https://mymasonportal.gmu.edu} and click on the “Courses” tab for the link to your OM 210 lecture section. (Note: This is a new website specific to this semester and section and is currently under construction.)
2. My OM 210 course website consists of separate pages and links containing this syllabus, announcements and assignments, PowerPoint presentations, supplemental notes, solutions to some textbook and homework problems, 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 Blackboard course calendar will be maintained to provide a current and up-to-date of the schedule of coverage, tests, quizzes, and deliverables.
4. The website is continually being maintained. During the semester, new documents may be created and existing documents may be modified as appropriate. Important course announcements will be posted under the link “Announcements” from the course home page and/or on the course calendar. **You should check the website 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 under the Course Content link from the home page. **The downloadable on-line presentations are condensed and abridged versions (with shortened coverage and content) of the corresponding presentations delivered in lecture.** I continually edit, revise, and expand my slides; I do not re-post the new versions. As stated in the disclaimer at the top of the Course Content page,
the slides that are posted are abridged versions of the slides that I will present during lecture. However, the posted slide sets do contain the salient portions of the material presented. You should be prepared to augment the downloaded versions with your own notes during lecture.

6. Students will be informed beforehand of the pertinent documents to be presented in the next class.

7. It is strongly recommended that students download the pertinent course documents before class (e.g., lecture presentations) and well before assignment due dates and test (sample problems and tests).

8. 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 website 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 1250 points.

2. The metrics used for determining the final course grade are the scores earned on:
   - all three (3) tests (800 points max),
   - all six (6) recitation quizzes (240 points max),
   - all five (5) lecture quizzes (100 points max),
   - all ten (10) submitted and graded problem sets/case studies (110 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 1250 points).

5. The final course letter grade is assigned objectively and strictly 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.

**Homework**

1. Mastery of the subject matter is measured by skill and proficiency in problem solving, which is gained by practice. The assigned homework should be regarded as the minimum amount of practice. (Homework is for the student’s benefit; it keeps the student current and it is a diagnostic tool by which the student may assess understanding and performance.)

2. Problems for each topic will be assigned from the corresponding chapter in the textbook.

3. Homework assignments will be posted under the link “Homework Assignments” from the course home page of my OM 210 course website.

4. Ten (10) sets of problems selected from the textbook will be assigned as homework and will be collected and graded, as announced.

5. Up to eleven (11) points will be assigned to each collected homework assignment submitted on time. Altogether, the graded homeworks count for up to 110 points of the final course score.

6. Submissions of the assigned homework must be handwritten. Printed copies, photocopies, or electronic submissions will not be accepted.

7. Late homework will not be accepted under any circumstances. Missing homework will be assigned a score of zero; zero homework scores will be counted in the total final course score. (No exceptions, regardless of reason, including [but not limited to] medical, family, work, and transportation emergencies.)
8. The submitted homework is an individual effort. Absolutely NO collaboration of any kind is permitted. Any collaboration will be treated as an Honor Code violation.
9. Homework assignments, including their solution and submission, are the sole responsibility of the student.
10. Solutions to some of the problems to some of the homework assignments may be posted under the link “Homework Assignments” after the assignment is due to be submitted.

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 2: Basic Probability, Random Variables, and Probability Distributions.
   • 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 210 course website.
5. Tests 1 and 2 will be given in the recitation. Test 3, the final, will be given in the lecture hall on the date and at the time stated in the published Final Exam Schedule (see “Schedule” below).
6. Tests are based upon the class presentation and discussion of the material covered in lecture. Moreover, the tests will be comprehensive of the material as covered in lecture and recitation.
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 recitation quiz) is allowed. (See the “Make-ups” paragraph below).

Recitation Quizzes
1. Six (6) mandatory, non-cumulative, quizzes will be given in the recitation, 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 recitation quiz contributes the points scored (out of 40 points) to the final course score. Altogether, the quizzes count for up to 240 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 recitation quizzes.

**Lecture Quizzes**
1. Five (5) mandatory, unannounced, unscheduled, “pop” quizzes will be given in the lecture (at anytime during the lecture).
2. Each individual lecture quiz contributes the points scored (out of 20 points) to the final score. Altogether, the lecture quizzes count for up to 100 points of the final course score.
3. A lecture quiz may consist of a single word problem that may be based on the coverage in the previous lecture.
4. All lecture quizzes are individual efforts. Under the Honor Code, absolutely NO collaboration or communication between students of any kind is permitted.
5. A missed lecture quiz will be assigned a score of zero. A missed lecture quiz CANNOT BE MADE UP UNDER ANY CIRCUMSTANCES. (No exceptions, regardless of the reason, including [but not limited to] medical, family, work, and transportation emergencies.)

**Make-ups**
1. One and only one (1) make-up is allowed (either a test or a recitation 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 recitation 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 recitation 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 210 course website under “Announcements.”
5. Make-ups may be of a different format and level of difficulty than the original test/recitation quiz. Also, no study guides will be allowed for any make-up.
6. A missed test or recitation 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, December 2, 2011, 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 1250 points for the course. The final total point score for the course is the sum of the scores earned on all tests, recitation 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 899 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 210 for acceptance into SOM.)

6. There is no “extra credit” of any kind, for any reason.

7. Final course letter grade assignments on the 1250 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>1225</td>
<td>1250</td>
<td>A+</td>
</tr>
<tr>
<td>1163</td>
<td>1224</td>
<td>A</td>
</tr>
<tr>
<td>1125</td>
<td>1162</td>
<td>A-</td>
</tr>
<tr>
<td>1100</td>
<td>1124</td>
<td>B+</td>
</tr>
<tr>
<td>1038</td>
<td>1099</td>
<td>B</td>
</tr>
<tr>
<td>1000</td>
<td>1037</td>
<td>B-</td>
</tr>
<tr>
<td>975</td>
<td>999</td>
<td>C+</td>
</tr>
<tr>
<td>900</td>
<td>974</td>
<td>C</td>
</tr>
<tr>
<td>875</td>
<td>899</td>
<td>C-</td>
</tr>
<tr>
<td>750</td>
<td>874</td>
<td>D</td>
</tr>
<tr>
<td>0</td>
<td>749</td>
<td>F</td>
</tr>
</tbody>
</table>

* Point ranges are inclusive.

9. The above chart will be adhered to strictly and without deviation or compromise.

**Schedule**

1. Go to [http://registrar.gmu.edu/calendars/2011Fall.html](http://registrar.gmu.edu/calendars/2011Fall.html) for the Fall 2011 Semester Calendar.

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 210 Blackboard course website.

3. The last lecture is Monday, December 5; recitation will be held that week.

4. The test/recitation quiz make-up period is Friday, December 2, 2011. Time and location are TBA.

5. In conformity with the official Fall 2011 Final Exam Schedule promulgated by the Registrar’s Office (at [http://registrar.gmu.edu/calendars/2011FallExam.html](http://registrar.gmu.edu/calendars/2011FallExam.html)), Test 3, the Final Exam, is scheduled to be given on Monday, December 19, from 10:30 AM to 1:15 PM, in lecture hall STII 7.

6. Conflicts in the final exam (Test 3) schedule can only be resolved through the Office of Academic and Career Services (not the instructor or GTA’s) 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>
</tr>
</thead>
<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>
</tr>
<tr>
<td>2. Data presentation: Tabular and graphical methods</td>
<td>2</td>
</tr>
<tr>
<td>3. Data summarization: Numerical summary statistics</td>
<td>3</td>
</tr>
<tr>
<td><strong>Part II. Dealing With Uncertainty (Probability)</strong></td>
<td></td>
</tr>
<tr>
<td>4. Basic probability</td>
<td>4</td>
</tr>
<tr>
<td>5. Random variables and discrete probability distributions</td>
<td>5</td>
</tr>
<tr>
<td>General random variable and probability distribution concepts</td>
<td></td>
</tr>
<tr>
<td>Uniform, binomial, and Poisson probability distributions</td>
<td></td>
</tr>
<tr>
<td>6. Normal probability distribution</td>
<td>6</td>
</tr>
<tr>
<td><strong>Part III. Inferring from Data with its Variability (Inferential Statistics)</strong></td>
<td></td>
</tr>
<tr>
<td>7. Sampling and sampling distributions</td>
<td>7</td>
</tr>
<tr>
<td>Sampling distribution of sample means</td>
<td></td>
</tr>
<tr>
<td>8. Estimation theory</td>
<td>8</td>
</tr>
<tr>
<td>Point estimation</td>
<td></td>
</tr>
<tr>
<td>Confidence interval estimation for means: $\sigma$ known and $\sigma$ unknown</td>
<td></td>
</tr>
<tr>
<td>Sample size estimation</td>
<td></td>
</tr>
<tr>
<td>9. Basic hypothesis testing: One Sample</td>
<td>9</td>
</tr>
<tr>
<td>Error types</td>
<td></td>
</tr>
<tr>
<td>Significance tests for means: $\sigma$ known and $\sigma$ unknown</td>
<td></td>
</tr>
<tr>
<td>Testing with p-values</td>
<td></td>
</tr>
<tr>
<td>10. More hypothesis tests: Two Samples</td>
<td>10</td>
</tr>
<tr>
<td>Comparison of two population means: $\sigma$ known and $\sigma$ unknown</td>
<td></td>
</tr>
<tr>
<td>Analysis of variance (ANOVA)</td>
<td></td>
</tr>
<tr>
<td>Test of independence</td>
<td>11</td>
</tr>
<tr>
<td><strong>Part IV. Modeling Relationships Contained in Data (Regression)</strong></td>
<td></td>
</tr>
<tr>
<td>11. Simple linear regression and correlation</td>
<td>12</td>
</tr>
<tr>
<td>Calculating a regression line by the method of least squares</td>
<td></td>
</tr>
<tr>
<td>Correlation, the correlation coefficient, the coefficient of determination</td>
<td></td>
</tr>
<tr>
<td>Using the estimated regression equation: estimation and prediction</td>
<td></td>
</tr>
<tr>
<td>12. Multiple linear regression</td>
<td>13</td>
</tr>
<tr>
<td>The multiple regression model</td>
<td></td>
</tr>
<tr>
<td>Computer calculation and reading a computer output report</td>
<td></td>
</tr>
<tr>
<td>Using the estimated regression equation: estimation and prediction</td>
<td></td>
</tr>
</tbody>
</table>