

BOSTON UNIVERSITY SCHOOL OF MANAGEMENT**SM222: Modeling Business Decisions
Spring 2014 – Section B2 & B9****Professor Koichiro Ito**Email: ito@bu.edu

Office 634

Office Hours: Tuesdays 4:30-5:30 pm & Thursdays 3:30-4:30 pm

Mail file for all assignments: 520F

Teaching Assistants:Section B2: Chen Wang, chenlei2750878@gmail.comSection B9: Yasin Mohammad, yasinmsy@bu.edu

Office Hours for TAs: To be announced

How to reach us?

Please come to my office hours or the office hours of either SM222 TA if you have any questions. TA office hours will be posted on our SMGTools website (under Resources).

For short questions, email can work well too. When you email us, please include the phrase “[SM222]” in the subject line. During the semester, I’ll do my best to answer your email with [SM222] in the subject line within 1 to 2 business days.

1. Course Objectives:

This course is about using data to make decisions. We will use models that convert ideas into equations so that a quantitative decision or prediction can be made.

1. Improve the ability to analyze data and correctly interpret statistical information about the relationships between variables;
2. Translate statistical results into better business decisions;
3. Hone analytical skills so that you can use models to identify the true story told by data;
4. Acquire hands-on, practical experience with common business applications of statistical modeling, including forecasting, and demand estimation
5. Develop quantitative skills to make the best choice from a set of options;
6. Become proficient in using statistical software (Excel) for managerial decision-making.

This course is different from SM221: we are not focused on learning about statistical formulas, but on working with data and using it to inform decisions. SM222 combines statistics, economics, and

operations research methodologies. The skills acquired in SM222 will prove very helpful in the SM323 project and classes.

2. Course Materials

2.1) Required readings

a) SM222: Making Decisions with Data: Spring 2014 Edition (course notes). This can be purchased at FedEx at 115 Cummington St (about \$16). Call ahead to ensure they have copies in stock; if they have sold out of existing copies, they will need some lead-time to produce more.

- YOU NEED THIS VERSION OF THE NOTES. Notes from other sections and older versions of these notes do not contain the same material!

b) Naked Statistics: Stripping the Dread from the Data, by Charles Wheelan, Norton, W. W. & Company, Inc., 2013 ISBN: 0393347777. Available on Amazon and BU bookstore (e-book is also available).

c) Online resources: see the end of this syllabus for a list of online readings for selected lectures.

2.2) A basic calculator for exams

Graphing, programmable or text-based calculators are not allowed for exams; see under “Exams” for more detail.

2.3) A Laptop with Excel (strongly recommended)

The course is designed to give you hands-on experience with data analysis and quantitative problem solving with computers. If you have a laptop, try to bring it to class each day. We will be demonstrating the class material with Excel for Windows.

Make sure you install the Analysis ToolPak add-in and the Solver add-in for Excel. (details on this are in Making Decisions with Data).

For the first required discussion session on Friday, your TA will help you to set up excel.

If you have a Mac, you will need to install Boot Camp + Windows, and use Office for Windows. [this is the SMG recommended solution, and will be necessary for future classes].

Some Mac users have instead tried using the free program StatPlus. Doing so saves a bit of money, but makes it more difficult to keep up in class.

3. Course SMG Tools Sites:

The schedule of readings assigned for each class is posted on this website under Resources. In addition, under the Resources tab, you will find lecture slides, datasets, problem sets and solutions, project information, solutions to all tests, and sample tests. Be sure to regularly check this website for course announcements, the syllabus, and due dates for deliverables.

4. When and Where to Hand in Written Assignments:

The Problem Sets and the Projects should be handed in either at class/section OR placed in the vertical file with the word "SM222" and your professor's name, in **Room 520F** (above the faculty mailboxes) by **6:00 p.m. on the due date**.

Late assignments will have score zero with no exception.

Room 520F and all professors' offices are inaccessible after 6:00 p.m. and before 7:30 a.m. on weekdays, and 24 hrs/day Saturday and Sunday.

5. Course Requirements:

The final grade will be a weighted average of the numerical scores on the following components. We do not assign letter grades to individual components of the course.

<u>Item</u>	<u>Date</u>	<u>Weight in final grade</u>
Project 1	3-Feb	10%
Project 2 part A	18-Feb	5%
Project 2 part B	1-Apr	12%
Test 1	4-Mar	20%
Test 2	8-Apr	25%
Test 3	Final exam week	18%
Problem sets	See class calendar	4%
Class attendance & participation		4%
Ungraded Research Obligation		2%

Details and policies related to each of these requirements are given below.

5.1) Tests

There will be three tests in SM222.

- The first test is scheduled for 6:00 p.m. on the evening of March 4th in CAS 522.

- The second test is scheduled for 6:00 p.m. on the evening of April 8th in CGS 129.

- The third test will take place during the BU final exam period.

We realize that evening tests are an inconvenience. Evening is, however, the only time when we can give the test to all sections of SM222 simultaneously.

If there is a legitimate reason why you cannot take a test at the scheduled time, fill out the "Exam Accommodation form" on SMGtools by February 4th for Test 1 and by March 8th for Test 2. This includes those that have special arrangements for additional time and those with a regularly scheduled academic class that meets during the exam time. If you have an evening job, please arrange not to work on test dates.

The final exam schedule is not yet available. We do not know yet on what date it will be held. We cannot and will not allow students to take the exam at a different time to accommodate travel plans. The only safe strategy is to make travel plans for after the exam period, or to wait until the final schedule is announced.

We excuse absences from a test only if we deem them to be true emergencies. Unexcused absences will result in substantial penalties and may result in an exam grade of 0.

The tests are closed book. You will be allowed to bring a single sheet of 8½" x 11" paper to each exam. You may write any notes that you can fit on both sides of that sheet. The notes have to be handwritten only. Preparing this sheet often proves to be a helpful study aid. You will be asked to hand in the sheet with your exam.

You should bring a calculator to every exam and quiz. However, graphing, programmable or text-based calculators are not allowed for any quiz/test (including the math quiz). You may use your financial calculators from previous courses. If you don't have a calculator you might consider the HP10BII which is the "recommended" calculator for FE323. Alternatively, you can usually buy an adequate simple calculator at Radio Shack for less than \$10. You are not allowed to have any other electronic devices in sight during tests, including cell-phones.

5.2) Problem Sets

There will be seven problem sets. Due dates are posted on the schedule on SMG Tools and at the end of this syllabus.

We do not correct the answers to the problem sets. You get credit for a problem set if you hand in a problem set on time with *all questions completed* and all requested spreadsheets handed in. You will lose points for every blank answer or any answer that does not *demonstrate a serious attempt at completion*. If you have no clue how to answer a question, write something about how you tried to solve the problem, what you understand about the problem, or why you are confused about it.

The problem set grade for the semester will be the average of the grades on the individual problem sets, dropping the lowest grade.

How do you know whether you've gotten the correct answer to a problem? We post the solutions to all problem sets on SMG Tools under Resources→Problem Sets. Because we want to post solutions as

soon as possible after the deadline to allow students time to prepare for the subsequent exam, we post solutions on the evening of the due date. You will not receive credit for any problem set handed in late (after 6:00 p.m. on the due date).

We recommend writing your problem sets by hand. The text of problem sets need not be typed, but must be legible. *Please note that the calculations must be handwritten.* You must show your work. We suggest that you keep a xeroxed copy of each problem set to study for tests and for class discussion.

You get a score of zero for any problem set with an answer or a spreadsheet copied. That grade cannot be dropped.

5.3) Projects

You also hand in projects. In each project, you work on data exercises and make a report that summarizes your results and interpretations.

The Projects can be completed individually or with ONE other student of the same professor.

It is a violation of the honor code to turn in a project to which you did not make a significant contribution. Late projects (those handed in after 6:00 p.m. on the due date) will be penalized 5 points per day.

5.4) Class Attendance and Participation

You are asked to choose a seat when you come to the second lecture (Jan. 21, Tue) and use that seat throughout the semester, to make sure you get all of your attendance and participation points.

Attendance is required at every lecture and for several “required” Friday discussion sessions. See the course calendar for required discussions. Your TA takes **attendance** at lectures and required Friday sections.

I allow you to be absent from required lectures and discussion sessions up to three times during the course when you have a legitimate reason. You do not need to let me know about it, so please do not email me when you are absent from class.

Your TA also takes notes on your participation in class. Try to actively ask questions and say your answers or thoughts in class.

Arriving late, leaving early, or leaving class temporarily is disruptive and unprofessional behavior and may be reflected in your class participation grade. On occasion, there are good reasons for doing so, but they are rare. You should turn off your cell phones during class *even if you have it set to vibrate*. Leaving class to take a phone call is almost as rude as taking the call in class.

5.5) Ungraded Research Obligation (URO)

This class is about analysis of data. Students are also required to participate in the subject pool for **two hour-long sessions** during the term, where you will be an “observation” in a faculty member’s research data. This requirement is similar to what you have done in SM221.

To make sure that you do not do the same study twice, you must complete one session during the first 6 weeks of class and one after that. The sign-up website is <http://bu-smg.sona-systems.com> and the contact people for this are Brigham Hall at bhall2@bu.edu or Remi Trudel at rtrudel@bu.edu. You can sign up the first week of class.

If you prefer not to participate in the subject pool, please let your professor know before the first test. You will then be given alternative written assignments to complete.

6. Additional Course Policies

6.1) TAs

Friday sections are required for six dates throughout the semester (see the course calendar). On days when there is no required attendance at discussion, you are strongly encouraged to go to a section taught by a TA, who will review and clarify the material in a smaller and more personal atmosphere.

6.2) Expectations for Conduct and Participation

I will start our lecture punctually. Please do not be late for lectures.

We are a learning community, and have the obligation to act respectfully toward each other. Arriving late, leaving early, or leaving class temporarily is disruptive and unprofessional behavior and will be reflected in your class participation grade.

You should turn off your cell phones during class even if you have it set to vibrate. Leaving class to take a phone call is almost as rude as taking the call in class.

6.3) Preparation and prerequisites for SM222

SM221 is a pre-requisite for SM222. Microeconomics (EC101) is also a pre-requisite. Please let your professor know if you do not have either of these pre-requisites.

6.4) “Close your laptop” policy

I strongly encourage you to bring your laptop to every lecture. However, we also have “close your laptop” policy when we are not using laptops. Whenever I say “close your laptop”, please do so. Otherwise, you lose your participation points.

6.5) Please bring your name plate

I would like to remember all of your names. Also, having your name plate is helpful for your TA to fill your participation points.

6.6) Honor Code Violations

We believe that the vast majority of students do not cheat and that it is unfair to these students when others get away with cheating. As a result, we actively try to deter and detect cheating. For instance, ***we typically will have different versions of exams and quizzes to discourage and detect copying.***

It is SM222 course policy that any clear evidence of an honor code violation on a test or project will be brought to the Academic Conduct Committee. This is not an empty threat: We have brought several cases of cheating to the Academic Conduct Committee over the past years, both for copying projects and for cheating during tests. The penalty for such offenses, even if they are first offenses, is often suspension from the university.

Any student caught cheating (e.g. copying) on a problem set will receive a grade of 0 on that problem set. Although the 0 grade will be your lowest, it will not be dropped.

You may discuss projects and problem sets with other people in SM222. However, you must be the author of any written work that you represent as your own and you must construct any computer spreadsheets on your own. For the purposes of this course, ***it is a violation of the honor code to copy someone else's computer files or data and then use them as the basis of work that you represent as your own.*** It is also a violation of the honor code to add your name to a team project for which you did not make a substantial contribution.

Assigned Readings for SM222 Lectures

Readings with asterisks (*) are required before the indicated lecture. You are responsible for all required readings for your exams. Other readings are highly recommended.

At the beginning of each lecture, I will ask you a brief question about each required reading.

1 Introduction to Decisions with Data

**Making Decisions with Data*, Chapters 1 & 2

**Naked Statistics*, Chapter 1

*A different game; *Anonymous*. *The Economist*. London: Feb 27, 2010. Vol. 394, Iss. 8671; pg. 6
<http://proquest.umi.com.ezproxy.bu.edu/pqdweb?did=1973666451&sid=1&Fmt=3&clientId=3740&RQT=309&VName=PQD>

2 Forming Questions and Describing Data

**Making Decisions with Data*, Chapters 3 & 4

**Naked Statistics*, Chapters 2 and 3

* "Climate Change: Bell Weather" (*The Economist*, August 11, 2012)
<http://search.proquest.com.ezproxy.bu.edu/docview/1033184840?accountid=9676>
(optional underlying article: http://pubs.giss.nasa.gov/docs/2012/2012_Hansen_etal_1.pdf)

3 Advanced Excel Tools with Data

**Making Decisions with Data*, Chapter 5

*Duhigg, Charles, "How Companies Learn Your Secrets" *The New York Times*, February 16, 2012
http://www.nytimes.com/2012/02/19/magazine/shopping-habits.html?pagewanted=all&_r=0

4 Using Simulation to Describe Standard Errors (case)

**Making Decisions with Data*, Chapters 7 & 8

**Naked Statistics*, Chapter 8 & 9

5 Visualizing Data

**Making Decisions with Data*, Chapter 9

*Solving Equation of a Hit Film Script, With Data, By BROOKS BARNES, NYT, May 5, 2013
http://www.nytimes.com/2013/05/06/business/media/solving-equation-of-a-hit-film-script-with-data.html?pagewanted=all&_r=0

6 Visualizing data (case)

7 Choosing the Right Statistic for the Question

**Making Decisions with Data*, Chapter 6

**Naked Statistics*, Chapter 7

8 Relationships Between Variables

**Making Decisions with Data*, Chapter 10

**Naked Statistics*, Chapter 4

9 Introduction to Regression

**Making Decisions with Data*, Chapter 11

*Hevesi, D. "So How Much Is That Worth?", *The New York Times*, May 04, 2003
<http://www.nytimes.com/2003/05/04/realestate/so-how-much-is-that-worth.html?pagewanted=all&src=pm>

**Naked Statistics*, p. 185-194; Kindle version: Location 3136-3277

10 Regression #2: R2 and SEE

**Making Decisions with Data*, Chapter 12

11 Std. errors on coeffs

**Making Decisions with Data*, Chapter 13

**Naked Statistics*, p. 195-198; Kindle version: Location 3277-3330

12 Review session for Exam 1**13 Experiments 1**

**Making Decisions with Data*, Chapter 14

*Christian, Brian, "The A/B Test: Inside the Technology That's Changing the Rules of Business," *Wired*, April 25 2012
http://www.wired.com/business/2012/04/ff_abtesting

14 Experiments 2 (guest lecture/video & case)

**Making Decisions with Data*, Chapter 14

*Manjoo, Farhad, "The Happiness Machine: How Google became such a great place to work," *Slate*, Jan 21 2013.
http://www.slate.com/articles/technology/technology/2013/01/google_people_operations_the_secrets_of_the_world_s_most_scientific_human.html

15 Multiple Regression 1

**Making Decisions with Data*, Chapter 16

**Naked Statistics*, p. 199-207. Kindle: Location 3332-3499.

16 Multiple Regression 2 (case)**17 Leaving things out of regression**

**Making Decisions with Data*, Chapter 17

**Naked Statistics*, Chapter 12.

18 Nonlinear Terms & Forecasting (Project #2 Part B due)

**Making Decisions with Data*, Chapters 18 & 19

19 Predicting movie grosses case (forecasting/nonlinear)

*Sommer, Jeff. "A Forecast That Obama Could Love," *The New York Times*, November 20, 2010
<http://www.nytimes.com/2010/11/21/business/21stra.html>

20 Review Session for Exam 2**21 Introduction to optimization & optimal pricing**

**Making Decisions with Data*, Chapter 20

*Changing the Formula: Seeking Perfect Prices, CEO Tears Up the Rules; Parker's Washkewicz Weighs Market Power Of 800,000 Parts

Timothy Aepfel. *Wall Street Journal*. (Eastern edition). New York, N.Y.: [Mar 27, 2007](#). pg. A.1
<http://proquest.umi.com.ezproxy.bu.edu/pqdweb?did=1244214161&sid=1&Fmt=4&clientId=3740&RQT=309&VName=PQD>

22 Creating a linear optimization model with constraints

**Making Decisions with Data*, Chapter 21.1

23 Solving the LP model graphically & with solver

**Making Decisions with Data*, Chapter 21.2-21.3

24 Linear Optimization: Solver and sensitivity analysis

**Making Decisions with Data*, Chapter 22

25 Larger LP models**26 Review Session for Exam 3**