Fall 2015 Graduate Course

OR531

Analytics for Decision Analysis

Wednesday: 4:30 – 7:10pm, Founders Hall 475

Syllabus

Kenneth W. Comer, PhD

kcomer@gmu.edu

Department of Systems Engineering Operations Research
Volgenau School of Engineering

Office hours: By appointment

Overview

Greetings! I'm excited to offer this course on analytics for decision analysis. This course is designed to provide a solid grounding in the theory and practice of modeling using the most common tools available: Microsoft Excel spreadsheets.

Unlike other, more complicated methods such as system dynamics models or discrete-event simulations, spreadsheets are often believed to be simplistic in their ability to support decisions for a large enterprise. In reality, you will learn that most important analytic methods can be implemented in a spreadsheet. There are drawbacks, of course. Spreadsheets become unwieldy with large data sets. And, even if a spreadsheet can handle the data (Excel worksheets have 1,000,000 lines by default!), the process of manipulating, visualizing, and evaluating the data can become quite cumbersome. This creates a market for large-scale statistical packages (SAS, SPSS, MiniTab, S-plus, etc.) in the commercial and government sector and purpose-built open-source statistical software (R) in the academic world.

Excel has one advantage over the purpose-built analytic packages, however: it is installed on every computer that has Microsoft Office. Thus, every laptop and desktop across the institution can load and manipulate an analytic program in Excel. And, even if an enterprise has licensed the large-scale packages, the licenses may be limited and may not be available to you as an analyst in a reasonable time frame. An answer to the decision-maker's question is far more valuable before the decision than after it!

Issues

Modeling and Software. This is a course in which you will practice building a variety of models in Excel spreadsheets. I will present various data sets and ask you to use these to answer questions that are highly typical of managerial problems. In the past, answering these questions required several courses in theory and extensive mathematical treatment. Nowadays, software (when properly applied!) can provide a short cut to getting the answers.

We will also be using a student edition of an Excel-based analytic package called ***Analytic Solver Platform for Education***. Note that this is often referred to by the name of the commercial products, *Analytic Solver Platform* or *Risk Solver*. The two packages are slightly different, and you will be working with the educational trial version of the Analytic Solver package. NOTE: FOLLOW THE DIRECTIONS CAREFULLY IN INSTALLING THE SOFTWARE. I have learned from experience that getting the wrong "trial version" is a complicated error to recover from!

You should also know that these are not the only data manipulation packages – ASPE is not the only game in town. Your company might have licensed software from other vendors, or it may have developed some of these analytic capabilities in a home-grown application. The *techniques,* however, remain universal.

Textbook. I will use *Management Science, The Art of Modeling with Spreadsheets, 4th Edition*, (2014) by Stephen Powell and Kenneth Baker. You will need to purchase a copy of the book in order to get the software codes to install ASPE.

Course Organization and Grading

Students are expected to keep up with all assigned readings in advance of classroom discussions, and to explore the examples for the class. Only when you work through the problems, view the videos, and experiment with your hands on the keyboard will you discover misunderstandings and mistakes.

There will be eight projects assigned during the course. You will have three weeks from the assignment date to complete the project. They are due in Blackboard by midnight on the class day (Wednesday). The projects count for 10 points each, and the lowest grade will be dropped.

A *final project* (model, paper and presentation) due as the final exam will count as the remaining 30% of the grade. Specific guidelines and tips for preparing the project paper will be made available separately. *All papers are due at midnight on the day of our assigned final exam time (11:59pm, December 16, 2015).*

Communication

I plan to make use of Blackboard for this course. About 70% of Mason's courses use Blackboard to communicate academically. This number is likely to grow as more features are added. Please post your assignments to Blackboard and submit the final project documentation there as well. You will also be able to view interim and final grades (yours, of course!).

Inclement Weather

The university will not reschedule a class if only one class session is missed due to snow. But, if more than one session is canceled, the university typically extends final week. This can be very disruptive: in the spring of 2014 the university was holding final exams on the day before graduation!

I plan to avoid this mess by using the Blackboard 'collaborate' option. Early during the semester I will run a short practice session using the Blackboard collaborate tool. Your audio will be conferenced in, you will see my screen, and I will present the lecture. If students have something to present, they need to e-mail it to me and I will flip while you talk. This is not ideal, but it keeps us from being forced into make-up sessions.

Academic Honesty and Collaboration

The integrity of the University community is affected by the individual choices made by each of us. GMU has an Honor Code with clear guidelines regarding academic integrity. Three fundamental and rather simple principles to follow at all times are that: (1) all work submitted be your own; (2) when using the work or ideas of others, including fellow students, give full credit through accurate citations; and (3) if you are uncertain about the ground rules on a particular assignment, ask for clarification. No grade is important enough to justify academic misconduct.

Plagiarism means using the exact words, opinions, or factual information from another person without giving the person credit. Writers give credit through accepted documentation styles, such as parenthetical citation, footnotes, or endnotes. Paraphrased material must also be cited, using MLA or APA format. A simple listing of books or articles is not sufficient. Plagiarism is the equivalent of intellectual robbery and cannot be tolerated in the academic setting. If you have any doubts about what constitutes plagiarism, please see me.

As in many classes, a number of projects in this class are designed to be completed within your study group. With collaborative work, names of all the participants should appear on the work. Collaborative projects may be divided up so that individual group members complete portions of the whole, provided that group members take sufficient steps to ensure that the pieces conceptually fit together in the end product.

Other projects are designed to be undertaken independently. In the latter case, you may discuss your ideas with others and conference with peers on drafts of the work; however, it is not appropriate to give your paper to someone else to revise. You are responsible for making certain that there is no question that the work you hand in is your own. If only your name appears on an assignment, your professor has the right to expect that you have done the work yourself, fully and independently.

Mason is an Honor Code university; please see the Office for Academic Integrity for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you will perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions. When in doubt (of any kind) please ask for guidance and clarification.

Privacy Restrictions

The university, in order to conform to the requirements of federal law (FERPA), now requires that all communications with respect to an academic course be conducted *to and from a George Mason e-mail account*. Thus, I must ask that if you send me an e-mail, you must send it from your GMU account. This can be done via the web-mail application. I will try to observe this policy as well.

Disability Statement

If you are a student with a disability and you need academic accommodations, please contact the Office of Disability Services (993-2474; http://www.gmu.edu/student/drc/). All academic accommodations must be arranged through the ODS.

Reading Assignments

Readings will be assigned each week. See the spreadsheet schedule for details. It is expected that students will read and thoroughly digest each week's readings before class begins.