MSIS 5303 – Quantitative Methods in Business
(Management Science Methods or Prescriptive Business Analytics)
Spring 2016 – Version 2
Spears School of Business
Oklahoma State University

Instructor:

~~Dr~~. Rick L. Wilson, Professor of Management Science and Information Systems

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Distance Learning Support: Email: spearsdistance@okstate.edu
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Technical Assistance Video Lectures: http://ra.okstate.edu/stw_ssb/cepd/VideoHelp

Overview of the Course

The primary objective of this course is to develop skills in quantitative modeling
(specifically what is being termed prescriptive analytics today) of business problems
and opportunities. The main focus of the course exposes students to the readily
available optimization analysis tools (such as linear programming) that are standard
in today's spreadsheets. Emphasis will be placed on understanding how such
modeling techniques can be used to **assist** the decision-maker, when they are
applicable, and an identification of technique limitations.

Course Prerequisites

Spreadsheet and algebra proficiency (calculus helpful but an Urban Legend as a
requirement☺).

Course Goals

Decision making in organizations is a partnership between humans, models and data.
This course focuses on primarily the partnership between humans and mathematical
models, and will provide the student with additional 'tools in their tool-belt' to
facilitate more effective decisions.

Course Objectives/Process

By the end of the course, students will be able to:
• Create sophisticated spreadsheet models using EXCEL Solver that address so-
  called desktop applications in scheduling, resource allocation, distribution, etc.

- Analyze decision making situations and understand limitations, drawbacks and advantages of using spreadsheet models and their output to assist in making decisions.
- Understand the limitless potential of larger 'killer applications' that are possible even with just a semester's worth of exposure.
- Employ the concepts of management science modeling in practice even WITHOUT sophisticated models, specifically related to identifying objectives, decisions under the control of the organization, the constraints faced in the situation, and the usefulness of sensitivity analysis to derive alternative solutions.

All four of these course objectives address Learning Goals 3 and 4 for the MBA Program: Decision Analyses and Critical Thinking.

eBook

Solving the Solver: A Practical Introduction to the Use of Management Science in Business through Spreadsheets, 2013. 2nd edition. R. L. Wilson. Great River Technologies. See file on D2L. The ISBN: 978-1-61549-328-9 (direct purchase from publisher). 978-1-61549-704-1 is the access card from the bookstore.

You will be using the SOLVER in EXCEL.

There is no hard copy of the book. The choice was to continue to use other books at 3 times the cost – or use a more directed one that fit the class better (that was, of course, 1/3 the cost). Hmmm, the best choice would be … (if it makes you feel better, I don't have a hard copy of the text – print it out, who'll know?). There is a pdf of each chapter available on line now and has been for a couple of years.

Grading Policy/Deliverables (points)

Checkpoint 1 – Fundamentals – 120
Checkpoint 2 – Modeling Stage I – 180
Checkpoint 3 – Modeling Stage II – 230
Checkpoint 4 – Modeling Stage III – 230
Checkpoint 5 – Multi-objective and decision analysis – 120
Gold Star Assignments – Miscellaneous – 120
Extra credit – 20 (these are additional points that can be earned)

Letter grades will be assigned according to the standard scale (90/80/70/60) applied to the 1000 points. The scale may be lowered as warranted. Most of your points are earned turning in spreadsheets with solved models – exceptions would be Checkpoint 1 and most of the "Gold Star" assignments.

Description of Course Requirements

In general, two categories of class content will be presented. New material related to quantitative models will first be presented to the students (with specific learning objectives as highlighted below), followed by out-of-class practice homework problems

which the student attempts 'off-line'. The next module will then illustrate solutions to these homework problems. This process will be repeated throughout the semester.

A graduate assistant Karthik Kondragunta will be assigned to assist with your questions - both for the homework and the exam questions. His e-mail is karthik.kondragunta@okstate.edu.   During the 'work week', I will ask him to try to give 24 hour turnaround on e-mails. (I'm available as well, we try to share the load – better to have two sets of eyes vs. one).

As the videos will indicate, I view my role as a coach or facilitator. As such, practice problems help us implement the important mantra 'perfect practice makes perfect'. Note that the mantra is NOT 'practice makes perfect'. A very important difference.

I am always very concerned that we learn how to quantitatively model the correct way because our goal is not just to get the answer, but to learn higher level concepts to apply to situations that we will face in the future (that we have no way of anticipating what they will be, or what context). Thus, the instructional team (me and my TA – sounds like a song title!) is glad to help out on all questions, and is one (of many) reason we don't leave the answering of questions to bulletin boards and discussion groups. (I'll either regale you with my stories of how stupid I found learning programming by groups at a later date – or I'll spare you - but same concept applies here – PERFECT PRACTICE MAKES PERFECT).

The practice homework problems are just that – for practice. They are usually not collected (see exception below under "Gold Star" assignments), but are useful in understanding the baseline modeling capability necessary to successfully complete the class. The suggested practice problems will be posted separately in the 'calendar' section of D2L content. Associate the practice problems with the Book Modules.

The 'checkpoint questions' discussed below will require the use of **integrating** these homework 'fundamentals' (using concepts as building blocks) to solve the more challenging questions. **YES THE CHECKPOINT QUESTIONS ARE MORE DIFFICULT THAN THE PRACTICE HOMEWORK PROBLEMS.** It is the 'concept vs. context' issue I talk about in Video (-1). Our goal in any graduate level class should be to learn concepts that can be applied in any context – that's what we do here in an analytics sense.

Exams/Checkpoints

I AM HIGHLIGHTING THIS PORTION OF THIS SYLLABUS SO THAT YOU WILL NOT FALL INTO TROUBLE THAT OTHERS HAVE BEFORE YOU!! Checkpoints are individual work. If you share spreadsheets with each other, discuss anything about the checkpoint with other students, family members, psychics, etc., **that is academic misconduct and will be dealt with according to the rules set forth in the Academic Integrity handbook which can be accessed from OSU's web page. If this kind of academic integrity violation occurs, an F! will be awarded for the class.** Please don't consider doing this.

Due dates will be posted on the dropbox, on D2L, in e-mail, and anywhere else I can think about it. If you do what I ask you to promise to do in GS #1, you'll be 'over-informed'.

I will have dropboxes open for each of the five checkpoints. Students will place solutions (primarily spreadsheets) there when they feel they have a correct solution. **Karthik and I can be consulted during the checkpoints, but not your classmates or other sources.** Each problem will be worth a different amount of points depending on degree of difficulty.

Gold Star Assignments

I call these type of assignments "Gold Star" because they are primarily (though not entirely!) effort based scores based upon either completion of a book activity, or good faith effort to complete some practice problems. Like the "Gold Stars" you were awarded back in grade school or at piano lessons, etc. They do require a certain degree of success to be awarded credit.

For Spring 2016, there will be a plethora of Gold Star activities:

GS #1 - Video (-1) activity (10 points)
Interactive Exercises in Book Modules 4,7,8,10,11,12,13,14,16 (80 points)
GS #2 - Working LP Model (associated with Book Module 8) (15 points)
GS #3 - Working LP model (associated with Book Module 12.5) (15 points)

Time frames/due dates are posted on D2L. See the color coated spreadsheet calendar.

Modules 4,7,8,10,11,12,13,14,16 in the book have built-in interactive "multiple-guess" exercises at the end of the chapter (called quizzes!). The book will keep track of completion, there will be due dates, and you'll get one chance at answering the questions.

Module 7 will be worth "2x". To get all 80 points, you must complete at least 80% of the quizzes (Module 7 counts twice) with an 80% correct score (the infamous 80 by 80 equal 80 metric). Check at the end of the syllabus for the explicit description of the translation of 'quiz points' to GS points.

The Video (-1) assignment requires one to watch the Video (-1) and act according to provided directions. The Book Module 8 assignment is self-explanatory (once we get there), as will the Book Module 12.5 modeling question.

My observations over the last 5 years of doing this class (out of the 25+ years I have taught this or similar classes) is that for most, a little Pavlovian dinner bell is necessary to get 100% participation in doing practice problems ahead of checkpoints, given that they are not 'collected'.   Student success is increased when they follow the "learning cycle" of "New material – practice problems on new material – learn from successes/mistakes – mastery complete – time to move on." Thus, I am more concerned about a good faith effort and you self-checking your solutions then I am about 100% mastery UNTIL the measurement of Checkpoint performance.

However, I have also found in the last 5 years that the ease in which EXCEL allows us to do sophisticated modeling has allowed some of our (developed early in the semester) needed algebra skills to "leak out" later in the semester due to an overreliance on "modeling by analogy". The quizzes are meant to add 'just a little bit more depth' to the process to ensure even greater success. Results from 2013-2015 academic years showed that the addition of the quizzes did in fact accomplish the stated goal.

Extra Credit:

This semester, one of my former students (Julena Bonner) has asked for assistance in collecting data for her dissertation. In order to accommodate her, I've offered the possibility for ==20 extra credit== points to be earned by helping her out.

Should this not be applicable to you (see below), I will also offer you the chance to earn ==20 extra credit points== in a different way TBD. For those who cannot do the "Julena" way, I'll have requirements for my own extra Credit assignment ready to go by the mid way point of the semester. It will be related to either doing an application review that I can use in the course, creation of a checkpoint question that can be used later, etc.

Here is what Julena provided me:

"…This semester you will be given the opportunity to participate in a study regarding the workplace. If you choose to participate you may earn extra credit point for this class, as well as a cash payment for your participation. To participate you must be working full-time (30+ hours a week) and have daily contact with your supervisor and coworkers. Alternatively, if you do not meet these criteria you may choose to recruit someone who is working 30+ hours a week and has daily contact with his/her supervisor and coworkers. This study requires participants to complete an initial demographic survey, and then two short, daily surveys (less than 5 minutes) each day for two work weeks.

You will receive more details regarding this opportunity during the semester from Julena Bonner, who is administering this extra credit opportunity. All questions regarding this opportunity should be sent to Ms. Bonner at julena.bonner@okstate.edu. …"

Julena Bonner
PhD Candidate
Management Department

We will talk more about this as the semester progresses, and everyone will have equal opportunity to ==earn the 20 points.==

Make-up/Incomplete Policy

I typically do not allow incompletes. Exceptions are sometimes made on a case-by-case basis. Honestly, drop now if you think you may have to request an incomplete due to workloads later in the semester. Be reasonable about what you can do.

University Policies

<u>Drop Policy</u>
Information about university drop policy and dates is at this website:
http://registrar.okstate.edu/
Click on "class schedules," and "short, internet, and outreach courses"
To drop this course, contact the Registrar's office, (405) 744-6876, or drop through SIS (Student Information Services).

<u>Academic Integrity</u>

Oklahoma State University is committed to the maintenance of the highest standards of integrity and ethical conduct of its members. This level of ethical behavior and integrity will be maintained in this course. Participating in a behavior that violates academic integrity (e.g., unauthorized collaboration, plagiarism, multiple submissions, cheating on examinations, fabricating information, helping another person cheat, unauthorized advance access to examinations, altering or destroying the work of others, and fraudulently altering academic records) will result in your being sanctioned. Violations may subject you to disciplinary action including the following: receiving a failing grade on an assignment, examination or course, receiving a notation of a violation of academic integrity on your transcript (F!), and being suspended from the University. You have the right to appeal the charge. Contact the Office of Academic Affairs, 101 Whitehurst, 405-744-5627, academicintegrity.okstate.edu.

http://academicintegrity.okstate.edu/

<u>Accessibility</u>
Any student in this course who has a disability that may prevent him or her from fully demonstrating his or her abilities should contact the instructor as soon as possible, so we can discuss accommodations necessary to ensure full participation and facilitate your educational opportunity. For more information about OSU Student Disability Services, please go to: http://www.okstate.edu/ucs/stdis/

Class Schedule (see spreadsheet/files on D2L)

Checkpoint estimated due dates will be given, and as the time gets near, will be 'cemented'. CP questions are normally made available 7-10 days prior to their due date. Gold star assignments will be made typically 4-7 days in advance as appropriate.

<u>Grading Metric for Book Module Quizzes – Spring 2016</u>

The basic premise: Get at least 80% correct (which is basically being allowed to miss 1 question out of 5 or 6), earn a 'quiz point'. Earn 8 'quiz points' (out of 10 possible) – get (the maximum) 80 points for that portion of the Gold Star Assessment.

Note: Gold Star is 120 total points – 80 for the quizzes, 10 for Video (-1) assignment, 15 each for Module 8 and Module 12.5 assignments.

	Module	No. of Questions	Required for 'quiz point'
	4	5	4
	7	12	10 = 2 points, 8-9 = 1 point.
	8	5	4
	10	5	4
	11	5	4
	12	6	5
	13	5	4
	14	5	4
	16	6	5

Translation of 'Quiz points' to Gold Star Points -

8-10 "Quiz points"   = 80 Gold Star Points
7 "Quiz points"   = 70 Gold Star Points
6 "Quiz points"   = 60 Gold Star Points
5 "Quiz points"   = 45 Gold Star Points
4 "Quiz points"   = 30 Gold Star Points
3 "Quiz points"   = 15 Gold Star Points
0-2 "Quiz points"   = 0 Gold Star Points