MSIS 5303 (Prescriptive Analytics)
CRN xxxxx
Spring 2018 – Version 1a
Spears School of Business
Oklahoma State University

Instructor:-Facilitator/Coach:

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Course Site: (Brightspace by D2L): http://online.okstate.edu or http://my.okstate.edu (choose Online Classroom after logging in)
Online Learning Support: spearsonline@okstate.edu
Phone: 405-744-4048
Facebook: Follow Spears School Online Learning on Facebook! https://www.facebook.com/SpearsOnline/

Overview of the Course

The primary objective of this course is to develop skills in prescriptive analytics, one of the fundamental keystones of the "data analytics" or "data science" world. 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

Decent spreadsheet and linear 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 prescriptive analytic 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/prescriptive analytics 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.

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

Note: THIS IS A COURSE IN PRESCRIPTIVE ANALYTICS.
We use Excel because it is familiar to many. There are many other platforms one can use. This course is not about spreadsheet competence, it is about analytics competence that is useful across platforms. It is important to separate the platform used (many could be selected) from the meaningful, useful analytic content (Prescriptive Analytics).

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 BRIGHTSPACE. The ISBN: 978-1-61549-328-9 (direct purchase from publisher).

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.

Grading Policy/Deliverables (points)

Checkpoint 1 – Linear Algebra Fundamentals – 70
Checkpoint 2 – Modeling Stage I – 150
Checkpoint 3 – Modeling Stage II – 210
Checkpoint 4 – Modeling Stage III – 205
Checkpoint 5 – Multi-objective and decision analysis – 120
Gold Star Assignments – 100
Quiz Points - 60
Project/End of Semester Exercise – 85

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 some of the "Gold Star" assignments.

Description of Course Requirements

In general, the class content will be presented as follows. 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. As an incentive, I will be asking you to turn in a (SMALL) subset of these practice problems and we (Justin and I) will be providing feedback on them. Solutions will be provided 'after the fact', with target numbers provided "ahead' of the due date in some cases (typically not gold stars). Note that this is just for practice problems, not checkpoint questions.

A graduate assistant - Justin Weyand – will be assisting us. (More information on Justin later) We will try to give 24-48 hour turnaround on e-mails during the week (both he and I act as a team). 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 (unknown) situations that we will face in the future. 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 Brightspace content and associated with the appropriate 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 discussed in Video (-1). Our goal in any graduate level class should be to learn concepts that can be applied in any context – we do this here in an analytics sense.

Each problem assigned during the course of the semester has specific learning objectives related to prescriptive analytics and these same learning objectives are seen (in a different combination) in the checkpoint questions. The context might be different, but the way to model the situation has previously been seen conceptually (e.g., linear weighted averages).

Exams/Checkpoints

I AM HIGHLIGHTING THIS PORTION OF THE 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 Brightspace, 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. **Justin and I can be consulted during the checkpoints, but not your classmates or other sources.** (Refer to Vince Lombardi – "perfect practice makes perfect!".) 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 2018, there will be a plethora of Gold Star activities:

GS Video (-1) activity, GS M12a – 5 points each
GS M5, GS M8, GS M10a, GS M10b, GS M11, GS M12b, GS M13, GS M14, GS M16 – 10 pts each.
Interactive Exercises in Book Modules 8,10,11,12,13,14,16 (60 points)

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

Modules 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.

The Video (-1) assignment requires one to watch the Video (-1) and act according to provided directions. The other Gold Star assignment are explained on a separate document.

My observations over the last 8 years of doing this class (out of the almost 30 years I have taught this or similar classes, and 25 years 'on-line') 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. BUT – to help facilitate this, I am adding a little extra 'checking' in between the checkpoints.

However, I have also found in the last 8 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 2013-2017 academic years showed that the addition of the quizzes did in fact accomplish the stated goal.

Project/End of Semester Course requirement

I plan on assigning a project that is a little more than a checkpoint question and can be done in groups of 2 if you'd like. Or, and this might be preferred - if you have a project idea you'd like to pursue, I'll entertain that as well. We will talk more as the semester unfolds.

The project will be meant to be integrative and may not have a right answer, just like reality.

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

Drop Policy
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 Banner Student Self Service.

Academic Integrity

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/

Accessibility
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 Brightspace)

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. I'll always error on the side of giving more time than less time.

Grading Metric for Book Module Quizzes – Spring 2018

The basic premise: You can drop one quiz. I'll drop the lowest scored quiz (by percentage).

	Module	No. of Questions	
	8	5	
	10	5	
	11	5	
	12	6	
	13	5	
	14	5	
	16	6	

So … add up all the correct answers, dropping the lowest total quiz. Take the number of correct answers, multiple by 2, and that is the total quiz points (with a max of 60). Thus, you could have a few missed questions during the semester and still obtain 100% of your Quiz totals.