**MSIS 5303 (Prescriptive Analytics)**

**CRN xxxxx – Fall 2022**

**Version 1a**

**Spears School of Business  
Oklahoma State University**

**~~Instructor:~~ Facilitator/Coach:**

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

**Contact Information:**  
Office: 449A BUS   
Email: rick.wilson@okstate.edu

Phone: (405) 744-5084

Office hours: I am available at a mutually agreeable time either electronically or video or carrier pigeon. Reach out and we’ll find a good time.

Course Site: (Canvas): <http://canvas.okstate.edu>

Canvas Tutorials for Students: <https://osuonline.okstate.edu/Canvas.vbhtml>

Greenwood Center for Online Excellence Support: [spearsonline@okstate.edu](mailto:spearsonline@okstate.edu)

Phone: 405-744-4048

Facebook: Follow Greenwood Center for Online Excellence 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 in practice and their wide-range of applicability.

**Course Prerequisites**

Decent spreadsheet and linear algebra proficiency (though we will review the latter in our first exercise of the semester!).

**Computer Requirements**

* Reliable high-speed broadband Internet connection
* Intel Core i5 Processor
* 16GB RAM

**Software Requirements**

* Windows 10 or Mac OS Catalina preferred
* [Google Chrome](https://nam04.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.google.com%2Fchrome%2F&data=02%7C01%7Cshona.gambrell%40okstate.edu%7C6eb84993ea624726ca4708d759642098%7C2a69c91de8494e34a230cdf8b27e1964%7C0%7C0%7C637076158881388420&sdata=4ePwNiNCGe7KMzxI6bbJx0YjX7%2FPImbPA4fCl6kek3Q%3D&reserved=0) or [Mozilla Firefox](https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.mozilla.org%2Fen-US%2Ffirefox%2Fnew%2F&data=02%7C01%7Cshona.gambrell%40okstate.edu%7C6eb84993ea624726ca4708d759642098%7C2a69c91de8494e34a230cdf8b27e1964%7C0%7C0%7C637076158881398415&sdata=eWkkN5h3crgCPDkFZB30SOUBliaRFXZf0vWv78NQCB8%3D&reserved=0) web browser (click on links to download)
* [VLC Viewer](https://nam04.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.videolan.org%2Fvlc%2Findex.html&data=02%7C01%7Cshona.gambrell%40okstate.edu%7C6eb84993ea624726ca4708d759642098%7C2a69c91de8494e34a230cdf8b27e1964%7C0%7C0%7C637076158881398415&sdata=WZt5AaJZJyhEkfOdEfIN9HqcAu%2BE%2BEVrXBjdHIWFvxo%3D&reserved=0) video player (click on link to download)
* You will be using the SOLVER in EXCEL. (It works fine in both PC and Mac, but the Mac version has its moments. OpenSolver is also useful … contact me for more details). It is your responsibility to make sure the Solver works in your spreadsheet software and that I can see the model when you turn in assignments.

Note: THIS IS A COURSE IN PRESCRIPTIVE ANALYTICS.

We use Excel (and the Solver) 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).

**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 applications in scheduling, resource allocation, distribution, routing, etc.
* Analyze decision making situations with such models and use them to assist in making decisions.
* 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 (i.e., the “Serenity Prayer of Analytics”.)

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 CANVAS for details on gaining access directly from the publisher. There is a revision in the works but it has been delayed and I’ll blame the pandemic.

There is no hard copy of the book. There is a pdf of each chapter available on line now.

**Grading Policy/Deliverables (points)**

Checkpoint 1 – Linear Algebra Fundamentals – 90

Checkpoint 2 – Modeling Stage I – 190

Checkpoint 3 – Modeling Stage II – 250

Checkpoint 4 – Modeling Stage III – 225

Gold Star Assignments – 160

Book Quiz Points - 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 perhaps a few “Gold Star” assignments.

Specific timing of the deliverables is shown on the course calendar, course maps, and other class supplemental documents.

**Course Deliverables**

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 a pseudo “in-class exercise”, followed by out-of-class practice homework problems which the student attempts ‘off-line’. Then, the student can check their work with published solutions (and often times video to accompany the solutions).

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 (GA Tyler H. and I) will be providing feedback on them (Gold Star Assignments) . Solutions will be provided ‘after the fact’.

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. In summary: I will expect you to do both the practice problems (not collected) and GoldStar problems (collected and evaluated). If you choose to not follow this, you are simply making your successful completion of the much harder and more realistic sized Checkpoint question problems less likely. I would prefer you to do things that make your success MORE likely! ☺.

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 early class videos introducing the class. 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 everywhere! In Canvas, on a calendar in our class documents, the course map, and anywhere else that makes sense. If you do what I ask you to promise to do in GS #0, you’ll be ‘over-informed’.

**GA Tyler H. and I can be consulted during the checkpoints (and anytime else of course), but not your classmates or other sources.** Each problem will be worth a similar number of points, but may differ slightly based upon the degree of difficulty. The partial credit grading rubric is a function of the modeling concepts that are present in each problem and whether they are properly addressed.

CHECKPOINT due dates – extended “WEEKEND SPECIAL” - The Checkpoints have Monday deadlines so that I can offer some help for questions on the day they are due (not up to the last minute though, since they are due at midnight) while offering you the entire ‘last-minute approach’ of using the weekend. You’ll have 7-10 days (if not more) to do the problems though. Consider the following wise advice from my friend and colleague Sarah Johnson - “The Due Date is not the Start Date.” 😊. Start early, finish more successfully.

**Gold Star Assignments**

I call these type of assignments “Gold Star” because most (but not all) of your points earned are based upon a good faith effort to complete a practice problem. This is like the “Gold Stars” you were awarded back in grade school or at piano lessons, etc. Full credit though typically requires a correct solution

For Fall 2022, there will be 12 Gold Star activities (numbered 0 through 11). They will be worth 10,15 or 20 points. See the separate listing of course deliverables.

**Book Quizzes**:

There are interactive Exercises (Quizzes) in Book Modules 4, 8,10,11,12,13. These are in the book, not on Canvas.

Time frames/due dates are posted on Canvas. Again for timing, see the deliverable calendar.

Modules 4,8,10,11,12,13 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 book quizzes are primarily created to help stop what I call ‘algebra leakage’. This is a phenomenon that I’ve observed that occurs because of the easy to use templates we discover during our modeling maturation process. There will be a few quiz questions in Module 10 and Module 12 that we will not cover in class (I’ve modified a little of what we cover over time). I am also in the process (through August 2023) of revising the book, which will include revising the quiz questions and a little reordering of topics for future generations. Because of all these ‘moving parts’, I wanted to be very lenient on how we assess this portion of the class.

Grading of Quizzes for Modules 8,10,11,12,13: Each quiz has either 5 or 6 questions. If you get 3 out of the 5/6 questions correct (50% or better score), you ‘earn’ quiz points of 15 points. If you get 2 of the 5/6 questions correct, you ‘earn’ quiz points of 5 points. Otherwise, 0 points. Overall, the most amount of quiz points you can earn on these quizzes will be 75.

Grading of Quiz 4: You will have up to 3 tries ONLY on Quiz 4 (the rest of the quizzes are “one and done”). Successfully completing 80% of the questions will earn you 10 points. See short video explanation in Canvas for this separate quiz treatment.

So – Total Quiz points available are 10+75 = 85.

**Course Response Time and Process**

Tyler Hickman will be assisting us. We will try to give 24 hours turnaround for inquires during the week and 48 hours for inquiries over the weekend. (Both he and I work 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 (thank you, Vince Lombardi!). That’s why I do not have a discussion board – I want to be the one to help you. It is my job, I love it, and I want to help you do things the right way.

I am committed to make sure 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!) are glad to help out on all questions, and is one (of many) reason we don’t leave the answering of questions to random bulletin boards and discussion groups.

This Fall, we will again be having a “Class Bulletin Board” (Canvas really doesn’t have a tool for this so we made one!). When we get asked a good question individually, we will post and answer the question (without attribution!) so all can learn from it. We start the semester with good bulletin board material from past semesters (sounds like we’re preparing for an emotional sports match!!! “Bulletin board material!”).

Note: There were no additions for Spring 2022 and just a few during Summer 2022 so maybe it is comprehensive now? Anyway, take a look.

**Class Observation based on 30+ years of successful class experiences:**

My observations over the last 10 years of doing this class (out of the 32 years I have taught this or similar classes, and 30 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 (I think the instructional designers call this ‘interpolated testing’).

However, I have also found in the last 10 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 2013-2022 academic years showed that the addition of the quizzes did in fact accomplish the stated goal.

**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/*](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 Accessibility Services, please go to: <https://accessibility.okstate.edu/>

Syllabus Attachment

For more student resources, go to: <https://academicaffairs.okstate.edu/student-support/index.html>

**Class Schedule (see spreadsheet/files on Canvas)**

See separate documents on course deliverables, course maps, etc. The syllabus is already too long. Sorry – but we want to be very, very clear. I have tried to provide you with abundant information on all things course related in the first big module

section of Canvas. You are ultimately responsible for knowing when and what is due. And if I haven’t made it clear – please ask very early!!!! I want everyone to be successful and to get off to a good start.

Even though it will be redundant, I’m likely going to have a “FAQ” or a “FID” (frequently ignored directions☺) summary video (Cliffs Notes!! Rick’s Notes?!!) that will up front reinforce the course details so everybody gets off to a good start (Also see Rick’s Rules, a blatant rip-off of Gibbs Rules for you NCIS fans out there).