

MGMT 30600 – Management Science

Spring 2023

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Office: KRAN 463
Office Hours: Mercado: T-Th, 1:30pm – 2:30pm, KRAN 543
Alexander: T-Th, 12:00pm – 1:00pm, KRAN 544
Wang: **W, 9-10:30am**, Th, 10:30am – 12:00pm, KRAN 463

Course Information

Section 01:	Mercado	T-Th 3:00pm – 4:45pm	RAWL 3082
Section 02:	Mercado	T-Th 12:00pm – 1:15pm	RAWL 3082
Section 03:	Alexander	T-Th 10:30am – 11:45am	RAWL 2082
Section 04:	Wang	T-Th 4:30pm – 5:45pm	KRAN G016
Section 05:	Wang	T-Th 9:00am – 10:15am	RAWL 1057

Course Webpage

Brightspace by D2L <https://purdue.brightspace.com>

Required Textbook

The textbook will be a valuable resource throughout the entire semester and is **required**. Homework assignments originate from this textbook along with additional work problems and more detailed conceptual explanations.

Title: *Management Science with Spreadsheet Modeling 4th Edition*

Author: Patrick Johanns

Publisher: Kendall/Hunt

Versions: 4th Edition, 2021

ISBN-13: 9781792456329

E-book ISBN-13: 9781792459924

Direct link to the publisher: <https://he.kendallhunt.com/product/management-science-spreadsheet-modeling>

Course Overview

With abundant and powerful processing capabilities, low-cost data storage solutions, and a ruthlessly competitive, yet incredibly lucrative marketplace, every company in the world seeks data-driven insights to drive strategic goals and objectives. In this course, we will study management science, which focuses on quantitative methods that aid in making effective decisions in a business environment. Students will learn to formulate, solve, and interpret optimization models from various application areas in management, including operations, marketing, accounting, and finance. Insights gained from the mathematical modeling and solution process will be discussed and analyzed. Results will be examined in the context of the decision problem and revision of the model will be proposed and analyzed.

Primary emphasis will be placed on formulating decision problems as optimization or simulation models and solving them in Excel using add-ins (Solver and @Risk). This course will require the use of personal computers and spreadsheet-based decision tool software.

Course Objectives

At the end of this course, students should be able to:

- Objective 1: Develop quantitative methods for optimized business solutions and managerial decision-making.
- Objective 2: Solve management science problems with decision tool software.
- Objective 3: Analyze the results of optimization models.
- Objective 4: Adjust inputs, formulas, and processes to derive business solutions.

Course Integrity

Students are encouraged to discuss readings, computer exercises, homework exercises, and other course content with classmates. Such discussions constitute a valuable aspect of the student's own learning experience. However, all work counted towards a student's grade must be prepared and answered solely by the individual student.

Cheating on homework or exams will result in a score of 0 on that assessment and further punishment is at the instructor's discretion. Students are strongly recommended to read the academic integrity guide published by the Office of the Dean of Students at:

<http://www.purdue.edu/odos/osrr/academic-integrity/index.html>

Purdue University Code of Honor

The purpose of the Purdue University academic community is to search for truth and to endeavor to communicate with each other. Self-discipline and a sense of social obligation within each individual are necessary for the fulfillment of these goals. It is the responsibility of all Purdue students to live by this code, not out of fear of the consequences of its violation, but out of personal self-respect. As human beings we are obliged to conduct ourselves with high integrity. As members of the civil community we have to conduct ourselves as responsible citizens in accordance with the rules and regulations governing all residents of the state of Indiana and of the local community. As members of the Purdue University community, we have the responsibility to observe all University regulations.

"As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue."

To foster a climate of trust and high standards of academic achievement, Purdue University is committed to cultivating academic integrity and expects students to exhibit the highest standards of honor in their scholastic endeavors. Academic integrity is essential to the success of Purdue University's mission. As members of the academic community, our foremost interest is toward achieving noble educational goals and our foremost responsibility is to ensure that academic honesty prevails.

Academic Integrity

Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials and the instructor to potential breeches of this value by either emailing integrity@purdue.edu or by calling 765-494-8778. While information may be submitted anonymously, the more information that is submitted provides the greatest opportunity for the university to investigate the concern.

Commercial Websites

Unless stated otherwise by the instructor, all lecture slides, notes, exams, and all other course materials presented in class or as part of the class are subject to the instructor's copyright. From the Purdue Student Misc. Conduct Regulations, "No individual is permitted to sell or otherwise barter notes, either to other students or to any commercial concern, for a course without the express written permission of the course instructor." Uploading any course materials to non-Purdue affiliated websites without the instructor's permission is in violation of the instructor's copyright and is assumed to be assisting other students in cheating and can be punished as such.

Software

Microsoft Excel with the built-in Solver add-in will be the main software application used throughout the semester. For Mac OS, screenshots and keyboard shortcuts in the course materials will be different and students are responsible for finding the equivalent functionality.

Later in the course, a third-party application that works within Microsoft Excel will be required for simulation modeling. The application is called @Risk and is available free to students in some ITAP labs and through Krannert RemoteApp.

Krannert RemoteApp (a.k.a. Krannert Virtual)

Most applications have been moved from Krannert RemoteApp to ITAP's GoRemote system (<https://goremove.itap.purdue.edu/>) but Palisade @Risk remains. Instructions to access Krannert RemoteApp can be found at <https://kcc.krannert.purdue.edu/Faq/Item/916> and the direct link is <https://remote.krannert.purdue.edu/>.

Tips:

- Web browsers and operating systems may behave differently.
- A VPN connection is required for students off campus.
- Log in with your University username and password. Unlike in previous semesters, students should not change the domain name.
- When saving any files opened in the RemoteApp, please do not save to "Local Disk (C:)", which is the C: drive on the ARCC server. I highly recommend using your Microsoft OneDrive tied to your Purdue account for file storage and version control.

Student Role in the Course

Class participation is crucial for learning course content and maintaining class progress.

1. Be prepared for each class and contribute to class discussions. While in the classroom, students are expected to be active, cooperative learners by raising questions and participating in lecture activities, such as modeling, solving problems, and interpreting solutions.
2. Read the assigned sections from the textbook and routinely monitor Brightspace for updates.
3. Cell phones should be put away for the entire class. Texting during class is a distraction to others.
4. Laptop computers are allowed in class, but refrain from doing non-course activities, as it is distracting to other students.

Student Resources and Information

Student Health

Student life can be incredibly rewarding but sometimes unexpectedly difficult. If you find yourself beginning to feel some stress, anxiety, or a sense of being overwhelmed, try WellTrack at <https://purdue.welltrack.com/>. Sign in and find information and tools about self-help therapy, available at any time.

For COVID-19 concerns, please see the [Fall 2022: What you need to know](#) guidance published July 27. If you find yourself too sick to progress in the course, notify your adviser and notify the instructor via email. We will make arrangements based on the particular situation.

Students who are experiencing symptoms of COVID-19 and need to schedule a test can do so through the [Purdue University Student Health Center](#). At-home COVID-19 tests will be available, at no charge, at each university residence main desk as well as in the over-the-counter (OTC) product [vending machines](#) located around campus. If a student tests positive with an at-home COVID-19 test, they can email the Protect Purdue Health Center at pphc@121.health for assistance with absence notifications or isolation.

Medically Excused Absence Policy for Students (MEAPS)

[Medical Excused Absences](#): Students may occasionally miss class and other academic obligations due to hospitalization, emergency department, or urgent care visits, whether physical or mental health-related. This policy intends to afford arrangements for students experiencing serious and short-term medical situations that cause them to miss coursework or exams. A student should complete the [Medical Excused Absence Request Form](#) to request that an absence notification be sent to instructors.

A student can contact the [Office of the Dean of Students \(ODOS\)](#) to request that a notice of the leave be sent to instructors when a situation involving **hospitalization, emergency department or urgent care visits emerges**. The student can then provide documentation of hospitalization, emergency department or urgent care as proof of legitimate absence to the ODOS as soon as these documents are available.”

Link to Student Absence Policy:

<https://www.purdue.edu/advocacy/students/absences.html>

Protect Purdue

Any student who has substantial reason to believe that another person is threatening the safety of others by not complying with Protect Purdue protocols is encouraged to report the behavior to and discuss the next steps with their instructor. Students also have the option of reporting the behavior to the Office of the Student Rights and Responsibilities. See also Purdue University Bill of Student Rights and the Violent Behavior Policy under University Resources in Brightspace.

CAPS Information

Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at (765) 494-6995 and <http://www.purdue.edu/caps/> during and after hours, on weekends and holidays, or through its counselors physically located in the Purdue University Student Health Center (PUSH) during business hours.

Disability Resource Center

Purdue University is committed to making learning experiences accessible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at drc@purdue.edu or by phone 765-494-1247.

Basic Needs Security

Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. There is no appointment needed and Student Support Services is available to serve students 8 a.m.-5 p.m. Monday through Friday. Considering the significant disruptions caused by the current global crisis as it related to COVID-19, students may submit requests for emergency assistance from the [Critical Needs Fund](#)

Nondiscrimination

Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. A hyperlink to Purdue's full Nondiscrimination Policy Statement is included in our course Brightspace under University Policies.

Adverse Conditions

The decision to delay, dismiss, or cancel classes and/or routine operations for the West Lafayette campus and its online courses is made by the President of the University. However, the instructor reserves the right to delay, dismiss, or cancel class, and students will be notified through Brightspace.

Grading System

At the end of the semester a student's weighted points will be totaled, and two grading schemes will be considered.

1. The traditional 90-80-70-60 **percentage** distribution will be calculated. For example, any student with a final class percentage of 90% or better of the total course points will receive an A, any student with a final class score between 80% and 90% will receive a B, and so on.
2. The student's class **percentile rank** will be calculated with grades determined as shown in the table below that follows Krannert's guidelines for upper-level undergraduate core classes.

Grade	Percentile needed
A+	100 th
A	75 th
A-	70 th
B+	65 th
B	40 th
B-	35 th
C+	30 th
C	10 th
C- and below	Instructor's judgment will be used for the cut offs for grades below a C-.

****Final course grade decision rule:** Students will receive the **better** of the two grades.**

Coursework elements will be weighted as follows to evaluate student performance:

Participation & Attendance	13%
Yellowdig Discussion Forums	7%
Homework Assignments	35%
Quizzes	15%
Midterm Exam	15%
Final Exam	15%

In the event of a major campus emergency, course requirements, deadlines, and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. Updated information will be provided through Brightspace and email.

Class Attendance and Participation

Class attendance is expected and will be recorded by the instructor most lecture days. A total of **two (2)** classes can be missed at the student's discretion without affecting the overall participation score. These absences can be due to sickness, job interviews, conflicting extracurricular responsibilities, or any other reason.

In the unfortunate event of a passing in the family, contact the Office of the Dean of Students immediately. Under the Grief Absence Policy of Students (GAPS), students are excused for funeral leave and given the opportunity to earn equivalent credit on course assessments, but the Office of the Dean of Students must be contacted by the student to begin the process. The Office of the Dean of Students determines the appropriate amount of excused time and informs all the student's faculty.

Ultimately, students are responsible for all required coursework and bear full responsibility for any academic consequences that may result due to absence. Only absences excused by the official Purdue policy on class attendance will be considered. Please review the official Purdue policy for more information: <https://catalog.purdue.edu/index.php>

Homework Assignments

Students will apply the concepts, theory, and methods learned in the course to a variety of problems. Students will formulate, solve, and analyze models with the help of Microsoft Excel, add-ins, and other software applications. **Homework assignments must be prepared individually.**

1. Homework assignments will be posted approximately one week prior to their due date.
2. All assignments should be prepared individually and in a professional manner. Unorganized or illegible assignments will receive a penalty or even not graded.
3. When completed, assignments will be submitted online through Brightspace, which will be set to allow multiple upload attempts. If submitted more than once, only the last submission will be graded.
4. Due dates are specified in the Class Calendar section and any changes will be communicated through Brightspace. The instructor reserves the right to not accept late assignments.
5. Homework solutions will be posted on Brightspace shortly after the submission deadline.
6. The lowest homework grade will be dropped. This policy exists to account for a job interview, illness, or other situation that might prevent you from completing an assignment. **It is not intended to be a “freebie”** and it is strongly recommended that you do not purposefully skip an assignment.

*Students may discuss the homework problems with classmates, but **do not copy another student’s work**. Duplicate or very similar assignments are considered cheating. See the Course Integrity section for more information on the consequences of cheating.*

In-Class Quizzes

Two in-class quizzes will be given during the semester and those dates are listed in the class calendar.

1. The quiz will be based on the material covered in the previous two homework assignments as well as any discussed material in lecture.
2. Quizzes will be **closed** book and course notes. Each student will be allowed a **single, handwritten** (not typed) one-sided sheet of 8.5” x 11” paper of notes for each quiz. Auxiliary tables and formulas will only be included by the instructor if required.
3. No make-up quizzes will be given unless deemed necessary and must be agreed upon by the instructor **in advance**.
4. The quiz solution will be posted on Brightspace.

Examinations

A midterm and final examination will be administered in-person as scheduled in the course outline. If gathering in person for an exam is deemed unsafe by the University or the professor, then an alternate online exam through Brightspace will be given.

1. The midterm exam will cover the course material for the first half of the course (chapters 1-5 in the textbook).
2. The final exam will cover the course material for the second half of the course (chapters 6-10) in the textbook).

3. No make-up exams will be given unless required by University policies. Students eligible for a make-up exam or who need extra time must contact the instructor at least one week prior to the exam date.
4. Further details including seating arrangements will be provided closer to the exams.

Grade Challenges

Any challenge to a grade in Brightspace must be made **within seven (7) calendar days** of its posting. Grade challenges may be done via email that include your name and course starting time as well as the specific points and problems to be reconsidered. A meeting during office hours may also be required depending on the situation. After the seven (7) day period, all grades are final.

Yellowdig

Instead of the traditional weekly discussion forum approach to student engagement in an online environment, this semester we will use Yellowdig (<https://yellowdig.com>), a course-long, customizable, student-driven social platform that encourages participation. For each two week block in Yellowdig a target number of points is expected, and students can accrue points in several ways that include creating a new thread or responding to one. As a rule, a response should introduce a new idea, thought, or personal experience that contributes to the discussion.

Students are encouraged to share appropriate news stories that pertain to relevant course material. Quantitative decision making greatly influences corporate, government, and societal initiatives and the theories and problems discussed in the course can easily be identified in the real-world. For more information, watch the videos in the Yellowdig module in Brightspace.

Netiquette

Students are encouraged to comment, question, and critique ideas, however, be mindful that sarcasm and humor can be easily misconstrued in online interactions. Please read the following Netiquette rules:

- Give other students the opportunity to join in the discussion.
- Present ideas appropriately and do not purposefully antagonize.
- Be cautious in using Internet language. For example, do not capitalize all letters since this suggests shouting.
- Avoid using vernacular and/or slang language. This could possibly lead to misinterpretation.
- Keep an “open-mind” and be willing to express even your minority opinion.
- Think and edit before you share (e.g., post or email).
- Ask for feedback.

Instructor's Hours

I will be available and respond to student questions and discussion posts directed at me generally within 48 hours during the work week. Student inquiries made during the weekend may experience a delayed response time. Questions about the course content, assignments, or lectures should be asked in the appropriate the discussion board and not Yellowdig or email. Students are encouraged to answer the questions their peers ask on the Q&A forum. Email should only be used for personal questions. When emailing me, please place the course and section number in the subject line of the email (e.g., MGMT 306, Section 4). This will help me tremendously in responding to emails quicker.

Class Calendar

All chapter readings and due dates are subject to change with all alterations to be announced on Brightspace.

Exam Schedule:

Exam	Date	Location
Midterm Exam	Monday, February 27, 6:30pm – 7:30pm	LILY 1105
Final Exam	TBD	TBD

No Class:

- March 9 (in lieu of Midterm Exam)
- March 14 (Spring Break)
- March 16 (Spring Break)

Week	Date	Class	Topic/Activity	Reading	Due
<u>Week 1</u>	Jan. 10	1	Course Introduction, Syllabus Review, Introduction Linear Programming Model	Chpt. 1	
	Jan. 12	2	Linear Programming Model Continued	Chpt. 1	
<u>Week 2</u>	Jan. 17	3	Graphical Solution Method	Chpt. 2	
	Jan. 19	4	Computer Solutions of Linear Programming Problems	Chpt. 2	
	Sun, Jan. 22				HW1
<u>Week 3</u>	Jan. 24	5	Solving LPs with Excel	Chpt. 3	
	Jan. 26	6	Ratio Constraints and More Solver Examples	Chpt. 3	
	Sun, Jan. 29				HW2, YD1
<u>Week 4</u>	Jan. 31	7	Linear Programming Sensitivity Analysis	Chpt. 4	
	Feb. 2	8	Linear Programming Applications: Product-Mix, Marketing Research	Chpt. 4	
	Sat, Feb. 4		<i>NCAAM: Purdue @ Indiana, 4:00pm</i>		
Feb. 1 – Feb. 2	Krannert School of Management Virtual Career Fair SMEF Career Fair: https://krannertsmeff.com/				
<u>Week 5</u>	Feb. 7	9	Linear Programming Applications: Multi-period Production-and-Inventory Management	Chpt. 4	Quiz 1
	Feb. 9	10	Additional Linear Programming Applications	Chpt. 4	
	Sun, Feb. 12				HW3, YD2
<u>Week 6</u>	Feb. 14	11	Nonlinear Optimization Models, Solution and Applications, Pricing Models	Chpt. 5	

	Feb. 16	12	Nonlinear Optimization Models: Portfolio Optimization Model	Chpt. 5	
	Sun, Feb. 19				HW4
<u>Week 7</u>	Feb. 21	13	Review for Midterm Exam		
	Feb. 23	14	Review for Midterm Exam		
	Sat, Feb. 25		<i>NCAAM: Indiana @ Purdue, 7:30pm</i>		
	Sun, Feb. 26				YD3
<u>Week 8</u>	Mon, Feb 27		Midterm Exam, LILY 1105 from 6:30pm – 7:30pm		Midterm Exam
	Feb. 28	15	Optimization Model with Integer Variables: Basic Concepts, Capital Budgeting Model	Chpt. 6	
	Mar. 2	16	Optimization Model with Integer Variables: Fixed-Cost Model	Chpt. 6	
	Sun, Mar. 5				HW5
<u>Week 9</u>	Mar. 7	17	Additional ILP models and examples	Chpt. 6	
	Mar. 9		No class in lieu of Midterm Exam		
	Sun, Mar. 12				YD4
<u>Week 10</u>	Mar. 14		Spring Break – no class		
	Mar. 16		Spring Break – no class		
<u>Week 11</u>	Mar. 21	18	Introduction to Simulation	Chpt. 7	
	Mar. 23	19	Monte Carlo Simulation: Simulation Modeling with Excel Tools	Chpt. 7	
	Sun, Mar. 26				YD5
<u>Week 12</u>	Mar. 28	20	Monte Carlo Simulation: Simulation Modeling with @RISK	Chpt. 7	
	Mar. 30	21	Simulation Modeling and Applications	Chpt. 7	
	Sun, Apr. 2				HW6
<u>Week 13</u>	Apr. 4	22	Project Management: Critical Path Method, Application in Software Development Project, Project Evaluation and Review Technique (PERT)	Chpt. 8	
	Apr. 6	23	Project Management: Applications of PERT, Time-cost Trade-offs	Chpt. 8	Quiz 2
	Sun, Apr. 9				HW7, YD6
<u>Week 14</u>	Apr. 11	24	Decision Analysis: Pay-off Table, Optimistic and Pessimistic Approaches	Chpt. 9	
	Apr. 13	25	Decision Analysis: Min-max Regret Approach, EV Approach, EV Perfect Information, Decision Trees	Chpt. 9	
	Sun, Apr. 16				

<u>Week 15</u>	Apr. 18	26	Multi-criteria Decision Models: Efficient Frontier, Efficient Solutions for Investment	Chpt. 10	
	Apr. 20	27	Multi-criteria Decision Models: Additional Examples and Solutions	Chpt. 10	
	Sun, Apr. 23				HW8, YD7
<u>Week 16</u>	Apr. 25	28	Quiet Period: Review for Final Exam		
	Apr. 27	29	Quiet Period: Review for Final Exam		
Final Exam Week	Final Exam TBD				Final Exam