

MKTG 2520/7520: Marketing Analytics (.5 cu)

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<i>Office Hours</i>	By appointment and 3:30 pm on Thursdays. I am available most days in-person, by phone, or by video conference. Book appointments on Cal.com: https://cal.com/ProfessorE		
<i>Textbook</i>	<i>Data Science for Business</i> , Foster & Provost (available free through Canvas > Penn Library) <i>Books below only if you are trying to learn/improve your coding-based analytics skills (all optional):</i> <ol style="list-style-type: none">1. <i>Python for Data Science</i>, available free at https://wesmckinney.com/book/ as a web book2. <i>Python Data Science Handbook</i>: https://jakevdp.github.io/PythonDataScienceHandbook/3. <i>R for Marketing Research and Analytics</i> by Chapman and Feit (CF on syllabus) → Only necessary if you are trying to improve your R skills.		
<i>Technology Requirements</i>	Excel: Excel latest version. All MS Office products are available <u>free</u> on TUPortal. The link on the left is Microsoft Downloads. JMP statistical software: free download from Canvas site; see Canvas for additional detail. Zoom: You must have a working webcam and microphone. If desired, R, Python, or other statistical software: These are optional. If you wish to use them, it would behoove you to install them and at least be familiar with the environment before class.		
<i>Prerequisites</i>	MKTG 7520: MKTG 611 and STAT 613. Knowledge of an advanced statistical package like JMP, R, Python, Stata, SAS, etc. would be helpful. MKTG 2520: MKTG 1010 or MKTG 1018 OR STAT 1010 OR STAT 1018		
<i>Admin</i>	If you feel that you may need an accommodation based on the impact of a disability, you must have an official accommodation from Disability Services. Within the first two weeks of class, contact me privately to discuss your specific needs. Penn's Office of Disability Services is part of The Weingarten Center (contact via phone(!): 215-573-9235). Because it is critical to coordinate accommodations, please contact Weingarten as soon as possible.		
<i>Questions</i>	All questions about the assignments, exams, and lecture content should be posted on Ed Discussion, rather than emailing the professor or the TAs. If you have a question, chances are others do too, and we can help everyone by addressing questions online. For the fastest reply to any other questions, please use Ed Discussion to send a "Private" message to the whole teaching staff, which will send your message to the professor and all the TAs.		

Course Objectives

Companies are currently spending millions of dollars on data-gathering initiatives, but few are successfully capitalizing on all this data to generate revenue and increase profit. Converting data into increased business performance requires the ability to extract insights from data through analytics. This course uses marketing as the domain to cover the three pillars of analytics: descriptive, predictive and prescriptive.

- **Descriptive Analytics** examines different types of data and how they can be visualized, ultimately helping you communicate your findings and strengthen your team's or organization's decision making.
- **Predictive Analytics** explores the use of data for forecasting. You will learn to utilize various tools, including regression analysis, to estimate relationships among variables and predict future behavior.
- **Prescriptive Analytics** takes you through the final step — formulating concrete recommendations. These recommendations can be directed toward a variety of marketing actions, including pricing and social-platform outreach.

You will be exposed to several methods linear regression, logistic regression, machine learning methods (e.g., neural networks and random forests). We will learn how to employ these methods for such managerial decisions as demand forecasting, pricing, and valuing customers.

Overall, you will develop a data analytics mindset, learn new tools, and understand how to convert numbers into actionable insights.

Course Materials and Approach

My overall philosophy is there is no better way of developing an understanding of marketing analytics than “learning by doing”. In the course we will use a variety of readings and exercises. Lecture notes and any additional handouts will be made available through Canvas. The assigned reading will complement the class videos.

Comparison with Data and Analysis for Marketing Decisions (MKTG 7120)

MKTG 852 will differ from MKTG 712 in the breadth and depth of coverage in three main areas (1) data collection, (2) predictive data analysis, and (3) stated choice experimentation / conjoint analysis.

- **Data collection:** MKTG 712 devotes a significant amount of time to primary data collection (surveys, focus groups) including sessions on basic hypothesis testing (given the broader audience of MKTG 712). In contrast, MKTG 852 focuses on quantitative analysis after data is collected, especially detailed customer-level transaction data and marketing mix data that the firm already has access to. Thus, MKTG 712 provides students with a broad perspective on the many venues for data collection using traditional marketing research methods; whereas MKTG 7520 focuses on data analysis, especially of transaction data.
- **Data Analysis:** MKTG 712 covers descriptive multivariate methods like clustering and factor analysis. It focuses little on predicting outcomes. In contrast, MKTG 7520 goes much deeper into predictive analytics, specifically using machine learning models (e.g., random forests, neural networks).
- **Stated choice experimentation / Conjoint analysis:** MKTG 712 covers conjoint analysis from the perspective of a manager using the results. MKTG 7520, in contrast, covers these methods in a lot more depth, from the perspective of an analyst.

Assessment

Your final grade will be based on class participation (case preparation and general contribution), written assignments, and a final examination. The evaluation is as follows:

1. Class Participation 10%
2. Group Assignments 40%
3. Final Examination (individual) 50%

Participation

To earn full points for participation, you must do two things:

1. Stay up-to-date with the class by coming to class. If you cannot come to class in-person, you should watch the recording. You may miss up to 2 classes for any reason with no penalty. After that, missing class will affect your grade.
2. Engage with the class on the discussion board. By engage, I mean both asking *and thoughtfully answering* other students' questions. You do not need to be 100% correct in your responses, but you should make an effort to help.

Obviously, participating in class itself also counts toward participation.

Important: to receive any participation points, you must show up to at least 50% of the classes and post publicly on the Discussion Board at least once. If you do not meet both of these criteria, you will receive a 0 for your course participation grade.

Group Assignments

Assignments will be posted on Canvas. There will be three assignments that will focus on applying the ideas and methods learned in class. You may use whatever tool you like to do these assignments (including Excel, JMP, R, or Python). However, if you use something other than Excel or JMP, we cannot provide support.

The assignments will be completed in randomly assigned groups (this is the most fair way to do it). Groups can be found on Canvas > People.

Final Examination (individual)

The exam is comprehensive. Open notes.

Policies & Administration

Academic Integrity

Every student is expected to exercise integrity in all academic undertakings. By submitting work for academic credit, you are affirming that that the work is your own, and that you have abided by the explicit and implicit instructions regarding allowable sources of assistance in its preparation. You are responsible for adhering both to the principles *and to the spirit* of Penn's Code of Academic Integrity (full text available here: [Academic Integrity](#)). The essence of academic integrity can be summarized in one sentence:

Any activity that has the effect or intent of interfering with the fair evaluation of a student's performance is prohibited.

Thus, any activity that is designed to give a false impression of your contribution to graded work, or to assist another in doing so, violates the code. Potential violations of the University's Code of Integrity will be fully investigated (*n.b.*, penalties range from failing the assignment to expulsion).

Electronic Device Policy

The Wharton School discourages the use of Electronic Devices in class, unless specifically permitted. Please see the [electronics in the classroom policy](#). I adhere to that general policy. Consequently, please make sure any electronics (e.g., phone, laptop, or tablet) are shut off and put away, unless explicitly instructed otherwise. Tablets are acceptable for note taking with the pencil or stylus.

Final Course Letter Grades

Letter grades will be assigned at the end of the course using the standard MBA curve.¹ You can read more about the policy here: <https://mba-inside.wharton.upenn.edu/wharton-mbaacademic-policies/> The UG and MBA sections are graded separately. The percentages in the table below represent the mapping between the total weighted percentile score and a letter grade. Grades may be curved at the instructor's discretion. You may be asked to provide feedback about the relative contribution of your teammates to group work. Deviations from equal contribution to group assignments can substantially affect your grade (both positively and negatively), in proportion to the deviation (including bumping up/down near a grade boundary, +/- a half letter grade, +/- full letter grade, etc.).

100 – 93	A	92 – 90	A–	89 – 87	B+
86 – 83	B	82 – 80	B–	79 – 77	C+
76 – 73	C	72 – 70	C–	69 – 67	D+
66 – 63	D	62 – 60	D–	59 – 0	F

Regrades

All regrade requests must be submitted in writing. You must cogently explain why you believe that your answer was incorrectly graded. NB: The entire assignment submitted for regrade will be reexamined, not just selected parts. This means that it is possible to end up with a lower grade than you began with, if greater scrutiny reveals additional errors, omissions, or less effective analysis than was originally thought.

¹ *Note:* an A+ will be awarded only at the discretion of the instructor. In the past, A+ has been given for achieving a high total score (>97%) combined with actively attending and participating in class.

Schedule of Class Meetings

Class #	Class Title	Date	Readings
1	New Marketing Data and Better Science	12-Mar-24	<p>JMP Exploratory Data Analysis Course: https://www.jmp.com/en_us/online-statistics-course/exploratory-data-analysis.html [Required: Web] → General link above, all other sections accessible from that link. Free, but requires registration</p> <p>JMP Exploratory Data Analysis Course, Module 2.3: Exploring Continuous Data: Enhanced Tools [Required: Web] JMP Exploratory Data Analysis Course, Module 2.3: Exploring Missing Data [Required: Web] JMP Exploratory Data Analysis Course, Module 2.3: Tree Maps and Mosaic Plots [Required: Web] JMP Exploratory Data Analysis Course, Module 2.3: Introduction to EDA [Required: Web] JMP Exploratory Data Analysis Course, Module 2.3: Bubble Plots and Heat Maps [Required: Web] JMP Exploratory Data Analysis Course, Module 2.3: Exploratory Data Analysis for Problem Solving [Required: Web]</p> <p>How to display data the right way in presentations, Duarte Blog: https://www.duarte.com/display-data-in-presentations/ [Required: Web]</p>
2	Advanced Regression 1	14-Mar-24	<p>JMP Exploratory Data Analysis Course, Module 4.3: Revisiting Statistical vs. Practical Significance [Required: Web] JMP Exploratory Data Analysis Course, Module 5.3 Multiple Linear Regression: Up to Fitting a Model with Categorical Predictors & Practice [Required: Web] JMP Exploratory Data Analysis Course, Module 4 -- Review from Section “Introduction” through “Constructing Confidence Intervals” [Optional: Web] JMP Exploratory Data Analysis Course, Module 4.2: Foundations in Statistical Testing - Review any needed sections [Optional: Web] JMP Exploratory Data Analysis Course, Module 5.1 Correlation - Review if needed (12 min + practice) [Optional: Web] JMP Exploratory Data Analysis Course, Module 5.2 Simple Linear Regression up to Interpreting Results- Review if needed (30 min) [Optional: Web]</p>
3	Advanced Regression 2	19-Mar-24	<p>JMP Exploratory Data Analysis Course, Module 5.3 Multiple Linear Regression: Categorical Predictors & Practice to End of module [Required: Web]</p>
4	Classifiers: Logistic Regression 1	21-Mar-24	<p>How to interpret odds ratios: https://stats.oarc.ucla.edu/stata/faq/how-do-i-interpret-odds-ratios-in-logistic-regression/ [Required: Web]</p>
5	Classifiers: Logistic Regression 2	26-Mar-24	None
6	Evaluating and Implementing Models	28-Mar-24	<p>Foster & Provost: Chapter 7. Decision Analytic Thinking I: What Is a Good Model? [Required: Canvas Penn Library] Foster & Provost: Chapter 8. Visualizing Model Performance [Required: Canvas Penn Library]</p>

Class #	Class Title	Date	Readings
7	Experiments: Knowledge by Design	2-Apr-24	Obama's \$60 million dollar experiment: https://www.optimizely.com/insights/blog/how-obama-raised-60-million-by-running-a-simple-experiment/ [Required: Web] Run Field Experiments to Make Sense of Your Big Data (HBR) [Required: Canvas Study.net] HBR: Marketers Underuse Ad Experiments, and That's a Mistake: https://hbr.org/2020/10/marketers-underuse-ad-experiments-thats-a-big-mistake [Required: Web] HBR: When A/B Testing Doesn't Tell the Whole Story: https://hbr.org/2021/06/research-when-a-b-testing-doesnt-tell-you-the-whole-story [Required: Web]
8	Quantitative and Strategic Pricing	4-Apr-24	Conjointly.com: What is Conjoint Analysis?: https://conjointly.com/guides/what-is-conjoint-analysis/ [Required: Web]
9	Quantitative and Strategic Pricing 2	9-Apr-24	Conjointly.com: Typology of Conjoint: https://conjointly.com/guides/classification-of-conjoint-analysis/ [Optional: Web]
10	Machine Learning 1	11-Apr-24	Introduction to Machine Learning: A Tree Model: http://www.r2d3.us/visual-intro-to-machine-learning-part-1/ [Required: Web] Foster & Provost: Chapter 4. Fitting a Model to Data [Optional: Canvas Penn Library]
11	Machine Learning 2	16-Apr-24	Same as ML1 -- consider reading Foster & Provost Ch. 4 (still optional) [Optional: Canvas Penn Library]
12	Wrap-up	18-Apr-24	Possible. TBD [Required: Canvas]
13	Final Exam	21-Apr-24	*** Assignment: Final Exam ***