

## 293 – Marketing Analytics

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Fall 2019 (tentative) Syllabus

### Course Description

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#### *“What’s the counterfactual?”*

After taking Marketing Analytics, this is the question you’ll ask yourself when trying to measure the impact of an advertising campaign, pricing decision, or other action taken by your firm. When attempting to measure the impact of a marketing action X (e.g., ad campaign) on an outcome Y (e.g., sales), the temptation is often to compare today to yesterday. We ask “Were our sales with the new ad campaign higher than our sales used to be with the old ad campaign?” But this is never the right question to ask, as many things change over time. For example, perhaps demand for our product is seasonal, or perhaps a competitor has entered the market since we began the new campaign. The right question to ask is “Were our sales with the new ad campaign higher than they would have been if we continued the old ad campaign, all else equal?”

The difference between the scenario we observe (today’s sales with the new campaign) and the one we do not (today’s sales with the old campaign—a counterfactual scenario) is the true impact of the new campaign on our sales. This course trains you to think in terms of counterfactuals, to run analyses in ways that better estimate the impact of past actions taken by a firm on consumer behavior, and to use corresponding insights to inform future action. In so doing, the course surveys different types of datasets and models that you are likely to encounter in the analytics space, within the context of several different areas of marketing.

At the end of the day, no one marketing analytics course can provide experience with all analytical tools each student will use at their next job, as each person’s work environment will differ. What a course *can* do is train each student how to *think* about marketing problems and data, to facilitate rapid emersion in their post-graduation analytics environment, and provide a foundation for making smart, data-driven decisions.

### Requirements

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Prerequisites:	Stats Core (203A) or equivalent; Marketing Core (204) and 203B encouraged
Software:	Microsoft Excel (required); R + R Studio (for extra credit portion of assignments)
Required Text:	<u>Mastering ’Metrics</u> by Angrist & Pischke
Optional Texts:	<u>An R Companion to Applied Regression</u> by Fox and Weisberg <u>Statistics for Management and Economics</u> by Gerald & Keller (203A text)

### Difficulty Level

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Note that this is not an introductory course – it is an **intermediate-to-advanced** course that presumes solid familiarity with statistics and some experience working with data.<sup>1</sup> In the past, there have been no exams and mostly group assignments. This year there will be two individual assignments and two quizzes early on. This change was made to ensure everyone has the fundamentals down before we move on to advanced topics. This means there more work will be expected in the first four weeks than in the past. That said, I expect myself to work as hard as you – I regularly meet remotely with part-time students (via Hangouts) in the evening and on weekends to provide assistance, and I am hiring a grader this year to ensure I have more time to have such meetings, and to create pre-class primers for you to read. I am also re-organizing the front-end of the course to spend more time covering regression basics, to make sure no one gets left behind.

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<sup>1</sup> Having a strong understanding of linear regression by the end of session two is necessary. This is easier if you have already taken 203B. If you don’t have much experience with linear regression prior to the course, the required reading will be critical.

**Course Topics & Assignments**

Module	Topics	Required Reading
Linear Regression Basics	1 Regression Basics	
	Methodology: Coefficient interpretation, model building Application: <a href="#">Pricing &amp; Advertising</a>	MM Ch. 2 G&K Ch. 16-17
	2 Applied Regression 1: Heterogeneity	
	Methodology: Interaction and control variables Application: <a href="#">Social media analytics</a>	Session Primer (Canvas)
Correlation versus Causation	3 Causality and Experimentation	
	Methodology: Correlation versus causation, experiments Application: <a href="#">Online A/B testing</a>	MM Intro, Ch. 1 Canvas Articles
	4 Applied Regression 2: Causality	
	Methodology: Difference-in-differences Application: Various (focused more on methodology)	MM Ch. 5 & 6
Heterogeneity & Targeting	5 Applied Regression 3: Selection	
	Methodology: Selection bias, Difference-in-differences Application: <a href="#">Customer satisfaction, online reviews</a>	Canvas Articles
	6 Discrete choice models	
	Methodology: Logistic regression, logit choice model Application: <a href="#">Database marketing</a>	Session Primer (Canvas)
Modeling Consumer Dynamics	7 Intertemporal dynamics	
	Methodology: Empirical identification, variable creation Application: <a href="#">Price promotion, reward programs</a>	Session Primer (Canvas)
	8 Dynamic pricing	
	Methodology: Model-building & optimization Application: <a href="#">Ride-sharing &amp; seat-booking platforms</a>	Session Primer (Canvas)
Advanced Topics	9 Advanced topics	
	To Be Determined (possible guest speaker) Possible topics: Consumer search, bidding/auctions	N/A
	10 Final Project Presentations	

Assignment Schedule (all sections)	Due Date
Preliminary project proposal (team assignment)	Class 3 (8 am)
Problem Set 1: Regression basics (individual assignment)	Class 3 (8 am)
Problem Set 2: A/B testing, dif-in-dif, causality (individual assignment)	Class 5 (8 am)
Case 1: Disneyland choice modeling case (team assignment)	Class 7 (8 am)
Case 2: Airline flight seating dynamic pricing case (team assignment)	Class 9 (8 am)
Final Project Presentation (team assignment)	Class 10 (PPT @ 8 am)

## General Teaching Philosophy

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Because the primary objective of this course is to improve your thought process for tackling analytical questions, little emphasis is placed on memorization of substantive learnings; rather, emphasis is placed on developing your ability to think about data. This means I will sometimes ask questions in class and on assignments that I don't expect you to be able to answer on a first pass, because the value of the exercise is not encoding a specific answer to memory, but the experience of trying to think through the problem. The homework assignments are therefore often challenging. However, my philosophy has always been to work as hard as I expect you to work. To that end, I am available for meetings or to answer questions via e-mail. I have had students meet with me every single week (that isn't necessary—I just want to point out I'm willing to do it). The students who have struggled with the course have often been those who did not have the time to get help, or felt uncomfortable asking for help. I'm pointing this out only to provide you with accurate expectations for the course, so that you're not caught off guard.

## Grading

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\*\*\*\*\* **Teams should consist of 2-3 students** \*\*\*\*\*

**Individual Problem Sets (20%):** There will be two problem sets which must be submitted individually. You may work on the individual assignment with others, but must submit your own answers in your own words. Each is worth 10% of your grade, and will have extra credit opportunities pertaining to coding in R.

**Two Quizzes (20%):** There will be quizzes during week 2 (sessions 3/4) and week 3 (sessions 5/6). Each will be worth 10% of your grade, and each will cover the material from the homework due that day.

**Team Cases (30%):** There will be two team case assignments, each worth 15% of your grade.

**Final Project (15%):** Teams will also work on a quarter-long project of the choose-your-own-adventure variety, which will culminate in a 15-minute presentation on the last day of class. See below for details.

**Final Project Proposal (0%):** You must submit a preliminary project proposal, just so I can get a sense of what you want to do and give you the go-ahead to begin. Proposal examples will be posted on Canvas.

**In-class participation and exercises (15%):** Attendance and active participation in class exercises will be worth 15% of your grade. You can miss one meeting without penalty (for part-time students, this means two classes on a given day).

\*\*\*\*\* **There is no final exam** \*\*\*\*\*

## Final Project

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You have two options for your final project.

**Option 1:** Collect data from a firm (maybe one you are affiliated with) and examine a problem of interest to them. The firm must be willing to let you present your results to the class.

**Option 2:** Research a topic in analytics and teach the class what you have learned.

Below are a list of six topics you may be interested in pursuing for option 2.

- Measuring peer influence
- Measuring word of mouth in social media
- Text mining social media
- Freemium products and network effects
- Purchase intention and uncertainty
- Missing data and data fusion

A set of readings for each topic will be available on canvas—you will read these and consolidate into a presentation, so your fellow students can learn about the topic as well. These readings will be difficult—you are NOT expected to perfectly understand the math. Focus on the data and what the data can tell you about the topic of interest; complicated models are ultimately just a way of structuring what the data tells us. You may propose other topics you find interesting if you wish, so long as it is about analytics.

## Relationship of Marketing Analytics to other courses

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There are several courses pertaining to marketing analytics (and business analytics more generally) at the GSM. The faculty make an effort to ensure each is its own unique offering, without much redundancy. Below I briefly identify some (but not all) of the courses someone interested in Marketing Analytics might take, how those courses relate to this course (and each other), and how they differ.

### 0. Primary Statistics Courses

203A – Analysis for Managers (“Stats 1”)

203B – Forecasting and Managerial Research Methods (“Stats 2”)

285 – Times Series Analysis and Forecasting (“Stats 3”)

### 1. Methodologically-Focused Courses

249 – Marketing Research

269 – Business Intelligence Technologies and Data Mining

293 – Marketing Analytics

### 2. Objective-Focused Courses

234 – Pricing

239 – Digital Marketing

243 – Customer Relationship Management

248 – Marketing Strategies

282 – Supply Chain Management

I separate courses other than the primary statistics courses (203A, 203B, 285) into two groups: (1) courses that have a broader approach pertaining to statistical methodology, and (2) courses that teach analytics pertaining to a specific objective (or set of related objectives) in depth. The first set of courses are more general and teach you how to think like a data scientist, while the second set are more likely to be directly related to specific job functions or a specific class of decisions that marketing managers need to make. For example, Pricing is included in the second bucket, as it tackles pricing-related analytics in depth.

The Marketing Analytics course is in bucket (1), and is most closely related to Marketing Research and Business Intelligence Technologies and Data Mining. The three courses cover both statistical methodology and data, with Marketing Research focusing more on the collection and analysis of primary data and BIT&DM focusing more on analysis of secondary data (especially “big data”). Marketing Analytics spends less time on the collection of data than Marketing Research, and less time on statistical methodologies that are useful for big data problems than BIT&DM. Instead, Marketing Analytics focuses on (a) how to recognize what questions a dataset allows you to answer and what it does not, and (b) how to most accurately answer a question of interest with that dataset.

Finally, I think it’s worth noting that irrespective of what my intentions for the courses are, students have in practice often used my course in one of two ways: Either as “Stats 1.5,” taking it before they take 203B if they feel they want more experience with statistical methodology before jumping into the second stats course, or as “Stats 2.5” (or “Stats 4”), taking it after 203B (or after 285) to help them further develop their skill at relating data to statistical models. Either approach is fine. This course will be easier if you have taken 203B first, but 203B will (I assume) be easier if you have taken Marketing Analytics first. Consequently, having taken 203B is recommended but not required for this course.

## Course Policies

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### Anti-free-riding policy

The intention of this policy is to prevent free-riders from taking advantage of their team members. I want to **protect you** from others who might take a spot on your team and never show up, hoping you'll take the path of least resistance and do the work without them. The policy is as follows:

- 1) Teams may fire team members if they are not pulling their weight. Fired team members must work alone on all assignments.
- 2) Teams will be required to grade each member of the team at the end of the year.
- 3) If I determine a student has been free-riding (e.g., if they weren't fired because they worked on the first two team assignments but then bailed on the final project, hoping it was too late to fire them), **they will fail the course.**

**These policies are not aimed at students who may struggle with the material. If you're still a little uncomfortable with statistics, do not let this discourage you.** I am always happy to help you with the assignments, and your classmates are generally happy to help those who make a genuine effort but struggle with the material. I'll do everything I can to help students succeed. This policy is literally only designed to stop the occasional (rare) student who might attempt to take advantage of you, by refusing to help with team assignments and hoping you will do all the work for them.

### Laptop policy

Laptops will be needed for some in-class exercises. However, when not doing those exercises, laptops must be closed. In the past I have had students request to have them open to take notes, but observational data tells me that laptops are more often a distraction than a note-taking device.

## UC Davis and GSM Policies

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### Notice of the Code of Academic Conduct

Students are expected to conform with the code of academic conduct, which can be found here:

<http://sja.ucdavis.edu/files/cac.pdf>

Academic Affairs, as well as the Academic Director of the MBA Program, will be notified of any violations, and will take appropriate action.

### Cross-Attendance Policy

Intention to take a make-up course in a location other than the one in which you are enrolled now follows a specific procedure. A request to attend must be made to your professor, with a justification provided.

If this request is made at least one week in advance of the section you wish to attend, you should CC the Instructional Operations contact for the location and get both their and the professor's permission. The contact for San Ramon is Sergio; for Sacramento it is Dedan. No Instructional Operations contact need be contacted for make-up courses in Davis, only your professor.

If the request is made less than one week in advance of the section you wish to attend, you must also CC the Senior Assistant Dean of Student Affairs, who must give first approval before the professor and Instructional Operations contact can approve.