



15.570 Fall 2018  
**Digital Marketing & Social Media Analytics**  
**Professor Sinan Aral**  
T / TH: 1-2:30pm Room: E62-276  
2:30-4pm Room: E62-276

Instructor	<b>Professor Sinan Aral</b>
Classroom	E62-276
Class times	Tuesdays and Thursdays, Section A: 1-230pm / Section B: 230-4pm
TAs	Section A: Dave Holtz <a href="mailto:dholtz@mit.edu">dholtz@mit.edu</a> Section B: Michael Zhao <a href="mailto:mfzhao@mit.edu">mfzhao@mit.edu</a>
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**Topics Covered:** Search Marketing, Social Network Marketing, Social Media Analytics, User Generated Content Management and Marketing, Mobile Advertising and Commerce, CRM Strategy in the Age of Big Data and Digital Advertising, Earned vs Paid Media, Predictive Modeling for Ad Targeting, Viral Product Design, the Multichannel Experience, Randomized Experimentation, AB Testing and Causal Inference in Marketing Strategy.

### **Summary and Objectives**

New digital technologies have fundamentally reshaped marketing theory and practice in the last decade alone. Technology has changed the modes of communication through which firms engage with consumers. Moore's law has made the storage and analysis of consumer data scalable, creating opportunities for fine-grained behavioral analytics. New monitoring tools have fostered precise and personalized customer relationship management practices. The rise of mobile phones and tablets has enabled location based messaging and reciprocal communication. The ubiquity of video content has promulgated rich, native advertising programs. The global emergence of social networking has enabled network-based predictive modeling and new forms of targeting and referral strategies based on the preferences of consumers' peers. And finally, new social media have brought all of this onto the public stage, with word of mouth conversations driving brand awareness and brand loyalty, and user generated content on review and ratings sites making or breaking demand for products or services.

15.570 will provide a detailed, applied perspective on the theory and practice of Digital Marketing and Social Media Analytics in the 21st century. We will cover topics like Search Marketing, Social Network Marketing, Social Media Analytics, Inbound Marketing, User Generated Content Management and Marketing, Mobile Advertising and Commerce, CRM Strategy in the Age of Big Data and Digital Advertising from the display ad ecosystem to ad retargeting. We will cover concepts such as the difference between earned and paid media, predictive modeling for ad targeting and customer relationship management, measuring and managing product virality, viral product design, native advertising, and engaging the multichannel experience. Throughout the course we will specifically stress the theory and

practice of randomized experimentation, AB testing and the importance of causal inference for marketing strategy. The course will combine lectures, case studies and guest speakers with relevant industry experience that speak directly to the topics at hand.

Upon completion of this course you should have a fundamental understanding of:

- Digital Advertising Ecosystem and Attribution and Pricing Models for Digital Advertising;
- An understanding of the fundamentals of Web and App Analytics and KPIs for Web traffic and commerce;
- Search Engine Marketing; Search Engine Advertising; Ad Auctions and Strategies for optimizing Search Engine Advertising;
- Social Network Marketing, Social Network Targeting; Predictive Analytics using Social Network Data, Peer-to-Peer Marketing and Personalized Social Advertising;
- Targeting and Segmentation, specifically: Demographic Targeting and Segmentation, Behavioral Targeting and Segmentation, Social Targeting and Segmentation;
- Twitter Analytics and Applied Twitter Analytics (e.g. Social TV and Social News);
- Social Listening: Analysis of User Generated Content, Reviews, Ratings and their effects on consumer demand; and
- Mobile Commerce and Analytics.

Students are expected to be properly prepared for the class and to have thoroughly read the assigned readings and cases. Students are expected to participate actively in class discussion.

### Course requirements

Details about the assignments, projects and deliverables as well as the data that we will use to examine them will be forthcoming throughout the semester. However, the following provides a sketch of the four main requirements of this course. These four requirements describe completely the deliverables and activities students will be evaluated on:

#### 1. Class Participation:

It goes without saying that a vibrant class discussion is **essential** to the learning outcomes of the class. Being properly prepared for class and participating in the class is a requirement. We will be keeping track of everyone's contributions and will **reward productive participation**. Note: we mean productive participation, not just participation. A productive comment is one that guides the class to learn more, dig deeper, understand more comprehensively etc. Just talking is at times even counterproductive. So, focus on productive participation, not just participation.

#### 2. Discussion Questions:

Each week, you will typically be assigned pre-class work a week in advance of the session. Your responses, designed to have you reflect on the readings, **should not exceed one page**. This is not designed to create a lot of work, but rather to encourage you to read and reflect on the readings **before** class. You will be asked to submit answers to discussion questions pertaining to the reading via Canvas **before 11:59pm the night before class**. 6 of the 11 class sessions will have Discussion Questions assigned. You will be asked to submit **5 out of 6 assignments** during the semester. Two of those session assignments - **Sessions 7 and 11, corresponding to case readings - are required of all students and**

**are not optional.** You will then be able to choose 3 of the remaining 4 sessions in which discussion questions are assigned. The schedule below lists weeks in which Discussion Questions are assigned (DQ) and weeks in which required Discussion Questions are assigned (RDQ).

3. **Individual Project (“Jumping the Shark”):**

The **Individual Project** builds directly off of the session on Social Network Marketing and Viral Product Design. The individual project is designed to give students an understanding of viral dynamics and the dynamic processes of new user acquisition, viral sharing, viral product design, community carrying capacity etc. The project involves analyzing a simulated dataset of viral user acquisition, adjusting and tuning the parameters, establishing the key factors that govern viral growth processes, describing sustainable strategies for viral growth under several assumptions and recommendations to improve the viral model itself. A model and dataset of user acquisition will be provided and each student will be asked a series of questions that explore the data and the model.

4. **Group Project (“A Holistic Digital Marketing Strategy for High Note, Inc.: Marketing to Freemium Communities”):**

The **Group Project** involves an in depth analysis of Digital Marketing Strategy at High Note, a real online music streaming community whose name has been changed to preserve the privacy of its consumers. You will form a **project team of either 2 or 3 people** in the early weeks of the class (**team assignments are due by 11/8**). During the semester you will familiarize yourselves with the case materials and the data, yes the data! We have **9 months of real customer data from the firm, totaling over 100K observations**. The data details a) demographic, b) behavioral and c) social network characteristics of users.

The purpose of the project is to get real, firsthand experience with data driven marketing strategy. In particular, you will be tasked with creating a **Digital Marketing Strategy aimed at Monetizing the Service -- i.e. a strategy for increasing the number of paying subscribers without changing the price**. One might think about many different approaches, from generating new premium customers to converting current subscribers to the paid premium service. Your goal will be to make a series of recommendations to the CMO of the company detailing how you think she should devise her marketing strategy toward this end. The catch is that **your recommendations will need to be backed up by evidence** -- evidence from analysis of the company’s data as well as any evidence from publicly available data you want to collect about online music streaming, freemium models and the various digital marketing strategies that she may want to implement (strategies we learned about in class, e.g. Search Advertising, Mobile Advertising, Social Network Marketing, Display Advertising etc).

There will be deliverables for the project:

- a) **Team Formation Plan (Due 11/8 – 5% of the Grade):** (1 Paragraph) will describe how you formed a balanced team of 2-3 members with complementary skills that will represent the management team of the project. The plan will list the names of your team members and describe why each person was recruited into the project based on the relevance of their skills and experience (2-4 sentences).
- b) **Project Plan (Due 12/6 - 30% of the Grade):** The **Project Plan** (~ 1-2 pages) will detail what your team plans to do to investigate the various marketing strategies that you might recommend. The

plan will describe questions you are asking of the data, research you are doing or will do, analyses you are conducting or will conduct, etc toward preparing a final report. Roles and responsibilities of different team members should be outlined and a rough timeline of activities should be presented.

- c) **Final Report (Due 12/14 - 65% of the Grade):** The **Final Report** (~ 6-8 pages) will detail your recommendations to the High Note CMO. It should consist of an **Executive Summary** (~ 2 pages), which details the recommendations that you are making and a high-level justification for those recommendation; as well as an **Appendix** (~ 4-6 pages) which shows your work and justifies the recommendations made in the Executive Summary with evidence (e.g. analyses of consumer data, outside data). Justifications might include regression analysis and predictive models of premium subscription behavior built using the consumer data (e.g. a) demographic, b) behavioral and c) social network characteristics of users); reports of high level summaries of the means and standard deviations in the data; correlation analysis linking a) demographic, b) behavioral and c) social network characteristics of users to premium subscription behavior; evidence from statistics about various digital marketing strategies we learned about in class (e.g. Search Advertising, Mobile Advertising, Social Network Marketing, Display Advertising etc).

### **Grading**

Individual Pre-Class Assignments: **20%**  
Individual Assignment: **20%**

Participation in Class Discussion: **20%**  
Group Project: **40%**

## Class Schedule

	<i>Date</i>	<i>Session</i>	<i>Assignment Due</i>	<i>Guest/ Case</i>
1	10/30	<i>Introduction to Digital Marketing</i>		
2	11/1	<i>Display Advertising &amp; Attribution</i>	DQ	
3	11/6	<i>Search Advertising</i>	DQ	
4	11/8	<i>Web Analytics &amp; Experimentation</i>	DQ / HN: Teams	
5	11/13	<i>Social Network Analytics &amp; Marketing</i>		
6	11/15	<i>Social Listening: Ratings, Reviews, &amp; Demand</i>		
	11/16	<i>Optional Recitation I: 1-2PM Intro to R</i>		Location TBD
	11/20&22	<i>Thanksgiving - NO CLASS</i>		
7	11/27	<i>Data Mining &amp; Digital CRM Strategy / Group Project: "Marketing to Freemium"</i>	RDQ	Harrah's Case
8	11/29	<i>Mobile Commerce &amp; Analytics</i>	Jumping the Shark	
9	12/4	<i>Data Driven Advertising</i>	DQ	Claudia Perlich
10	12/6	<i>The Rise of Video Analytics</i>	HN: Project Plan	Alex Collmer
	12/7	<i>Optional Recitation II: 1-2PM Applied Statistical Models</i>		Location TBD
11	12/11	<i>A Holistic Digital &amp; Social Strategy</i>	RDQ	Sephora Case
	12/14	<i>Group Project: "High Note" Due</i>	HN: Final Report	

## **Reading List**

*Most reading materials can be found on Canvas. Those materials not on Canvas (including the High Note Group Project Materials) will be available in the Study.net course pack.*

### **Session 0: Group Project Materials**

1. Group Project Materials: “Do Your Online Friends Make You Pay? A Randomized Field Experiment in an Online Music Social Network”
2. Group Project Materials: “Content or Community? A Digital Business Strategy for Content Providers in the Social Age”
3. Group Project Materials: “High Note’s Freemium Conundrum (Case)” Ravi Bapna & Lee C. Thomas; University of Minnesota Case # SOBACO-2014-01-2.
4. Group Project Materials: “High Note Data Dictionary” (CSV/Excel File)
5. Group Project Materials: “High Note Data” (CSV/Excel File)

### **Session 1: Introduction to Digital Marketing (10/30):**

6. “The Future of Advertising” Danielle Sacks (2010); Fast Company; November.
7. “Branding in the Digital Age: You’re Spending Your Money in All the Wrong Places” David Edelman (2010); Harvard Business Review; December.

### **Session 2: Display Advertising & Attribution (11/1):**

8. “Advertising Analytics 2.0” Wes Nichols (2013); Harvard Business Review; March.
9. “Digital Attribution Comes of Age” Forrester Thought Leadership Paper (2012); June.

### **Session 3: Search Advertising (11/6):**

10. “Paid Search Advertising Background Note” Rajkumar Venkatesan & Shea Gibbs (2014); Darden Business Publishing; UVA; May 27.
11. “Paid Search: The Innovation that Changed the Web” Des Laffey (2007); Business Horizons

### **Session 4: Web Analytics & Experimentation (11/8):**

12. “Segmentation in Web Analytics” Jacques Warren (2012); AT Internet White Paper.
  13. “Science without Experiments” Jim Manzi (2012); Uncontrolled; Basic Books.
  14. “The Experimental Revolution in Business” Jim Manzi (2012); Uncontrolled; Basic Books.
- Optional Reading:
15. “Web Analytics Definitions v.4.0” Jason Burby, Angie Brown & WAA Standards Committee; WAA.

### **Session 5: Social Network Analytics & Marketing (11/13):**

16. “What Would Ashton Do - And Does it Matter?” Sinan Aral (2013); Harvard Business Review; May.
17. “Identifying Influential and Susceptible Members of Social Networks.” Sinan Aral & Dylan Walker (2012) Science, July 20: 337-341.

18. “*Dear Klout, This is How You Measure Influence.*” Gregory Ferenstein (2012), *Tech Crunch*, 6/21.

Optional Reading:

19. “*Creating Social Contagion through Viral Product Design: A Randomized Trial of Peer Influence in Networks.*” Aral, S. & Walker, D. (2011) *Management Science*, 57(9); September: 1623-1639.

20. “*Distinguishing Influence Based Contagion from Homophily Driven Diffusion in Dynamic Networks,*” Aral, S., Muchnik, L., & Sundararajan, A. (2009) *Proceedings of the National Academy of Sciences (PNAS)*, Dec. 22, 106(51): 21544-21549.

**Session 6: Social Listening: Ratings, Reviews & Demand (11/15):**

21. “*The Problem with Online Ratings*” Sinan Aral (2013) *Sloan Management Review*, 55(2).

22. “*What Marketers Misunderstand About Online Reviews*” Itamar Simonson and Emanuel Rosen (2014); *Harvard Business Review*; January-February

Optional Reading:

23. “*Social Influence Bias: A Randomized Experiment.*” Muchnik, L., Aral, S., & Taylor, S. (2013) *Science*, 341(6146): 647-651.

**Session 7: Data Mining & Digital CRM Strategy (11/27):**

24. “*Competing on Analytics*” Thomas Davenport; *Harvard Business Review*; January 2006.

25. Case: “*Harrar’s Entertainment Inc.*” HBS Case # 9-502-011.

**Session 8: Mobile Commerce & Analytics (11/29):**

26. “*How to Market to Generation M(obile)*” Farena Sultan & Andrew J. Rohm (2008); *Sloan Management Review*; 49(4): 35-41.

**Session 9: Data Driven Advertising (Claudia Perlich, Two Sigma) (12/4):**

27. “*How an Analytics Mindset Changes Marketing Culture*” Adele Sweetwood; *Harvard Business Review*; October 2016.

28. “*Data Mining: On the Trail to Marketing Gold*” Shawn Thelen, Sandra Mottner and Barry Berman; *Business Horizons*; Vol. 47; No. 6; November-December 2004; HBS Publishing BH 150.

**Session 10: The Rise of Video Analytics (Alex Collmer, VidMob) (12/6):**

29. TBD

30. TBD

**Session 11: A Holistic Digital & Social Strategy (12/11)**

31. Case: “*Sephora Direct: Investing in Social Media, Video and Mobile*” HBS Case # 9-511-137.

## Guest Speakers



### **CLAUDIA PERLICH**

**SVP of Data Science at Two Sigma, Advisor to Dstillery**

Claudia Perlich is a Senior Data Scientist at Two Sigma in New York City. Prior to her role at Two Sigma, she was the Chief Scientist at Dstillery where she designed, developed, analyzed, and optimized machine learning that drives digital advertising. An active industry speaker and frequent contributor to industry publications, Claudia enjoys serving as a guide in world of data, In 2013, she was named the winner of the Advertising Research Foundation's (ARF) Grand Innovation Award and was selected as member of the Crain's NY annual 40 Under 40 list. Additionally, she has been published in over 30 scientific journals and holds multiple patents in machine learning. She has won many data mining competitions, including the prestigious KDD Cup three times for her work on movie ratings in 2007, breast cancer detection in 2008, and churn and propensity predictions for telecom customers in 2009, as well as the KDD best paper award for data leakage in 2011 and bid optimization in 2012. She started her career in Data Science at the IBM T.J. Watson Research Center, concentrating on research in data analytics and machine learning for complex real-world domains and applications. She received her PhD in Information Systems from the NYU Stern School of Business, and holds a Master of Computer Science from Colorado University. Claudia takes active interest in the making of the next generation of data scientists and is teaching "Data Mining for Business Intelligence" in the NYU Stern MBA program.



## **ALEX COLLMER**

Founder & CEO, VidMob

Alex Collmer is the CEO and Founder of VidMob, the world's largest video creation platform with a network of over 5,000 professional creators who produce the full spectrum of video content. As the Web transitions to a video-driven medium, marketers and publishers need to increase the volume and enhance the quality of their video communications. The VidMob platform enables clients to collaborate with expert video creators to efficiently develop a suite of video assets optimized for every digital channel. Named an official marketing partner of Facebook, Instagram, Snap and Yext, and declared by Apple to be one of the Best Apps of 2016, VidMob has become the go-to resource for high-quality video creation at scale. An engineer by background, Mr. Collmer has made a career living at the intersection of technology, design, and consumer entertainment. Prior to starting VidMob, Mr. Collmer was the co-founder and CEO of Autumn Games, a premier publisher of video game franchises. Under his leadership, Autumn Games developed successful global franchises with partners such as Jimmie Johnson, the 7-time NASCAR champion, Def Jam, the leading urban culture brand, as well as the award-winning fighting game franchise, Skullgirls. Previously, Mr. Collmer was a founder and board member of the New York Video School, an online film school focused on empowering people all over the world to become “video literate” ([www.nyvs.com](http://www.nyvs.com)). Mr. Collmer received a B.S. from Cornell University's School of Engineering and was a certified E.I.T. in the field of structural engineering in the state of New York. Mr. Collmer has sat on the board of multiple technology and media companies, and has spoken at numerous universities and conferences on entrepreneurship and media. In his spare time, he coaches little league soccer and baseball.