Social Media and Web Analytics

Dept of Marketing @ Tilburg University

Block 4 (Spring), 2025

Course Code: 300459-M-6
ECTS Credits: 6 ECTS
E-mail: tisem.social.media@gmail.com
Web: tisem-digital-marketing.github.io/2025-smwa/
Learning Mode: In Person
Language: English
Dates: April 7 - May 30, 2025

Last Updated: 31 March, 2025

Motivation

Across the globe, consumers spend over 6 hours per day on the internet, spending over $US7.5 trillion annually on digital commerce sites and spending roughly 1/3 of their time on social media websites.[1] The goal of this course is to develop an analytics toolkit to analyze the data coming from digital markets and social media to deliver managerially relevant business recommendations. The course content will be unashamedly analytics heavy - utilizing modern statistical and mathematical modelling techniques. Our approach will be to introduce these techniques in a practical manner, with a focus on deep concepts and intuition but there will be mathematical formulae when needed. By the conclusion of the class you will be able to deliver data-driven answers to the following questions (among many others):

- Is my online marketing effective? How can I make it even better?
- Should I respond to consumer reviews on social media? If so, which ones?
- Does what is written on social media sites influence demand for my product?
- Are there fake reviews on my website/platform? How can I detect them?

The course is split into three substantive modules:

[1] See Statista and Pew Research, 2019, Social Media Fact Sheet.

1. **Reseach Design for Causality**: provides the basic framework for thinking about the design and analysis of empirical research in digital markets and social media
2. **Casual Inference**: provides the statistical toolkit to analyze data and interpret findings from field experiments and observational data
3. **Text Analytics**: provides the statistical toolkit to analyze text using statistical and numerical techniques

During these modules we will focus on learning and then leveraging an analytics toolkit as well as extracting insights from recent academic literature. This course provides students with the background needed to begin working in a marketing analytics position within a corporation, a consulting firm, or a marketing research firm. By the end of the course, you will be able to walk into any company and help make data-driven marketing decisions.

Course Objectives

This course has seven closely intertwined objectives. After the completion of the course you will be able to:

1. Explain and evaluate the challenges and opportunities social media and digital markets present marketers
2. Provide intuitive explanations of statistical concepts from the areas of linear regression, causal inference and natural language processing
3. Implement statistical analysis to analyze social media and digital market data using tools from linear regression, causal inference and natural language processing
4. Interpret their own and other's statistical analysis of social media and digital market's data
5. Prescribe Managerial and Marketing strategies to improve business performance based on analytical findings.
6. Appraise and critique the assumptions behind statistical analysis of digital marketing data in a given setting and propose alternative methodologies to improve existing analysis

Learning objectives for specific classes will be provided within the Course Notes.

Target Audience

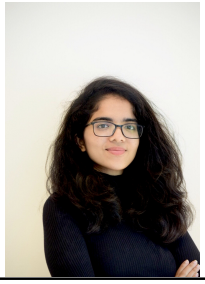
This course is designed for students in the Master of Marketing Analytics in order to (i) improve their quantitative and analytical skills, and (ii) gain an understanding of recent developments in our understanding of social media and online marketing.

In particular, we expect the typical student to have the following characteristics:

- Strong interest in understanding how digital markets, social media and social networks affect consumer behaviour and the actions of marketers.
- Strong interest in learning and applying statistical analysis and data science techniques to social media data, although with limited existing background.
- Strong interest in using quantitative results to develop management or marketing insights.
- Interest in learning how to write computer code and acquire "best practice" methods.
- Interest in learning new quantitative modelling techniques.
- Ability to work collaboratively.

Instructors

Name:	Lachlan Deer
Contact:	via Slack or tisem.social.media@gmail.com
Role in Course:	Lectures
Profile:	Personal Webpage
Office Hours:	Monday, 2pm - 2:45pm, Online or K 711
Office Hour Format:	Hybrid, 15 min slots
Booking Link:	Click Here



Name:	Roshini Sudhaharan
Contact:	via Slack or tisem.social.media@gmail.com
Role in Course:	Lab Sections
Profile:	Personal Webpage
Office Hours:	Wednesday, 2pm-3pm, Online or K726
Office Hour Format:	Hybrid, 15 min slots
Booking Link:	https://calendly.com/r-sudhaharan/smwa-office-hours

Instructor Office Hours

We are here to help you through the course & want you meet your expectations and personal learning goals. To that end, the instructors have scheduled consultation hours each week for you to meet us and discuss aspects of the lecture material, lab sessions and assignments that you are struggling with. Please make a booking using the links provided above. If you cannot make the scheduled office hours, talk to us and propose three times to meet and we will try and make it work.

Notes for scheduling:

- After you book a time slot, a calendar invite will be sent to your email automatically. You *must* accept this invite. Approx. 1 hour before our scheduled meeting a reminder with a Zoom link will be emailed to you.

- If you plan to meet in person, you can ignore the Zoom link and head to our offices. Please notify us that you intend to meet in person using the 'Additional Information' section of the Booking Tool.

We expect you to come to your schedule slot prepared and having clear questions in mind that you want to ask. If either of us feel you have come unprepared, we reserve the right to end the appointment and ask you to come back at a future time when you are more prepared.

Office Hours are subject to "fair and equitable use".

Additional Support

If you need support outside of this course, please refer to the following website: https://www.tilburguniversity.edu/students/tutoring

Position in the (wider) Program

Social Media and Web Analytics is meant to offer Marketing Analytics students an overview of the tools and techniques most frequently used when analysing social media and web data. These tools are widely adopted across firms (traditional and modern), providing students an opportunity to develop their quantitative skills in digital marketing should they wish to work as a marketing analyst. The course also provides examples of scientific research conducted within the subject domain, helping students build up a state of the art knowledge of the area which can be used in a professional career and/or in future academic study (e.g enrolling in a PhD program).

Prerequisites

To do well in this course it is suggested that you have passed the course Introduction to Marketing Research.

In addition, students will benefit from having completed other marketing courses (such as Customer Analytics and Price and Revenue Analytics) and other classes at TiSEM that deal with data and computing (i.e. the 'skills classes'). These are, however, not required.

The class builds upon a basic knowledge of statistics (eg. regression analysis) and statistical coding (descriptive statistics, data visualization and estimating a regression model). Refresher material for this content is provided as part of the course preparatory material, and salient aspects will be reviewed in computing/analytics lectures.

Pedagogy

The course will involve lectures, tutorials (called Lab Sections), hands-on assignments and an exam. We will strive to balance practical aspects of the material with a theoretical understanding of the concepts and frameworks involved. Each week we will have Lectures, Lab Sections and a Lab Assignment that work together to sequentially build up one's understanding around each topic. In addition there are group projects where students work together to demonstrate their understanding as applied to specific problems. A final exam allows students to showcase their individual expertise acquired over the duration of the course.

Lectures.

Each week there will be 2×90 minute lectures. Lectures will discuss the readings and provide a unified voice/perspective over the course content. They will mix theory, coding and academic applications of the content under discussion. Students are encouraged to "code along" live during the code portions of each lecture. The coding parts of each lecture are "semi-structured", with a starting point, key concepts and an end goal in mind. How we get from start to finish will play out based on the interaction and questions that arise (as well as code errors!) as we work through the problem at hand. Furthermore, students are assumed to have read the academic papers in advance of the lecture so that they can participate in the discussions during class. Lab Sections in the subsequent week build on this material.

Lab Sections.

Weekly Lab Sections (90 minutes) start in the second week. You are strongly encouraged to prepare before class and bring your questions! The Lab Section instructor has been advised that the majority of the talking in these classes should be from the students, not the instructor. Participation and attendance in Lab Sections is mandatory, and in the event of multiple absences the instructors will be in touch to discuss your attendance.

Assessment.

Further details in the course assessment can be found in the Assessment section of this syllabus.

Group Work.

There is one (1) instance of group work in this class that count towards the assessment, along with formative tasks each week in Lab Sections solved as a group. The instructors firmly believe in the merits of group work for enhancing learning and building a professional mindset. Groups are randomly assigned in this course. This mirrors aspects of working "on the job" where teams come from diverse backgrounds and it's not always possible to work with

friends. Group work also involves explaining and re-explaining concepts among team members, which is a good way to re-enforce one's own understanding of a concept.

Course Schedule

The following is a tentative course schedule. Check back regularly for updates.

Course Week	Lecture 1	Lecture 2	Lab Assignment	Due Dates
1	Course Intro	Design of Empirical Research	-	
2	Causation & Experimentation	Causation & Experimentation	Intro to Regression	
3	*No Class*	A/B Testing: Basics	Identification & Experimentation	
4	A/B Testing: Next Steps	A/B Testing: Next Steps	A/B Testing	
5	Difference in Differences	Other Methods for Causal Inference	Public Holiday	
6	Intro to Text Analytics	Sentiment Analysis	Difference in Differences	Group Assignment 1
7	*No Class*	Topic Models	Sentiment Analysis	
8	TBA	TBA	Topic Models	

Class Dates, Times and Locations.

Due to public holidays and general TiSEM scheduling issues, class times are not always the same each week. Frequently check the Rooster Timetable tool to get the class dates, times and locations each week.

Weekly Readings.

For each lecture there will be 2-3 readings that introduce methods and illustrate their use digital markets or social media. Your are expected to read the material **before** coming to class. For Lab Sections, there will typically be one assigned reading that forms the basis of a group discussion. There may be additional lecture notes or book chapters assigned to aid your understanding of some statistical/numerical techniques and assist you when working through the Lab Assignments. A list of readings for each class is on the course website.

Assessment

There are two pieces of graded assessment due throughout the course:

Graded Assessment	Weight (%)	Min. Pass Grade	Resit?
Group Assignment	20	-	No
Final Exam	60	5.5	Yes, 1 x in July
To pass the course: Final Course Grade (weighted average) $\geq$ **5.5.**			

In addition there are weekly, ungraded "Lab Assignments" to help you develop your knowledge around the course content.

Course Repeaters: Students who failed to complete the 2024 course can roll over their grade from the Group Assignment 1. No other grades can be rolled over, and final grades will be computed using the 2025 weights. *You must contact the instructors via email before Friday April 11 at 17:00 if you want this rule applied to you*.

Group Technical Assignments (20 percent)

There will be 1 group assignments worth 20%. To pass the assignment, each group member needs to have made a substantial contribution to the project. The finished reports (& code where appropriate) must be submitted via GitHub no later than midnight of the due date (i.e. before 23:59 on the due date).

Group assignments **must** be done in groups. Students will be **randomly assigned** to groups before each assignment is released. Each group will consist of 4 students and may include students who are not part of your Lab Section.

At the conclusion of the assignment a "Self and Peer Assessment" (SPA) form will be distributed to each group member. **Each group members grade may be adjusted in response to your peer's evaluation of your contribution to the assignment.** Details will be discussed in class closer to the assignment due date.

Further information on technical assignments will be distributed closer to their issue.

Final Exam (80 percent)

The final exam will be a closed book exam written with pen/pencil and paper and will be two (2) hours in duration. Questions in the exam will come from all aspects of the course material: lectures, assignments and required readings. The written exam may include questions around computer / statistical code, so be prepared to provide answers that require you to write short code snippets or explain what a piece of code is doing.

The exam will be split into three components as follows:

- PART A: Multiple Choice Questions (30%),
- PART B: Short answer questions (70%), and

More details on the exam will be provided in due course.

Lab Assignments (Ungraded)

Each week there is an ungraded Lab Assignment for you to work on and develop your analytical and coding skills. They will involve a mix of coding, conceptual questions around the methods and marketing concepts, and prescribing marketing implications of empirical results. We expect you to work on these assignments using `R`. The assignments are designed to be "self-guided" and are split into multiple sub-questions that help you progress through a larger problem sequentially. Expect to dedicate substantial time to each lab assignment, approx. 4 hours per week outside of class time. This time is well spent as you're acquiring a skill set to help you through the Group Assignments and on the Final Exam. You are encouraged to work on these assignments together with your peers.

Selected answers to the Lab Assignments will be posted on the course website with a one-week lag, i.e. Week 1's answers will be provided at the end of Week 2 of the course. We will also part of each Lab Section to talk over specific parts of the assignments. What we cover in this part of the Lab Section will be decided by both student requests and the instructor's own decision making.

Grading Policies

Regrade Policy for Group Assignments

If you believe an error has been made in grading your assignments, you may request a regrade. The request must be in writing, must explain the exact concern, and must occur within 7 calendar days of when the graded materials were returned or when the final course grade is posted. We reserve the right to re-grade the entire contents of any submitted assignment. This means that your grade may go up or down, depending on what is found during the re-grade.

Regrade Policy for Final Exam

After the exam grades are released, students will have the option to view their final exams under the supervision of TiSEM staff. If a student thinks there is an error in the grading, they should note the error and email the instructors within 48 hours of viewing the exam outlining what the errors are believed to be. Instructors will then regrade the **whole** exam and you will

be informed of any change to your grade. Your grade may increase or decrease depending on the outcome of the regrading procedure.

Sign up forms will be made available by the instructors after the exams are graded and you will be notified by email. Deadlines for signing up will apply, and may be short notice due to scheduling constraints by the TiSEM administration. No exceptions are made for students that miss the sign-up deadline for exam viewing.

Late Submission

Group Assignments must be submitted before the deadline. Late submissions will be penalized by 25 percent per calendar day. This penalty applies to an entire group.

Study Load

Planning your workload over the semester (even tentatively) can help to alleviate stress and pressure around deadlines and exams. The table below presents an estimated split of how your study time should be allocated in this class. We hope this helps you allocate time more efficiently within this class, and when juggling multiple classes.

Activity	No. Sessions	Estimated Workload per Session (Hours)	Estimated Workload (Hours)
(A) Graded Assessments			
Group Technical Assignment	1	17.5	17.5
Exam Preparation	1	40	40
Graded Assessment Total			*57.5*
(B) Class Time			
Lectures	15	2	30
Lab Sections	7	2	14
Class Time Total			*44*
(C) Self Study			
Lab Assignments	7	4	28
Reading / Note taking	15	2.5	37.5
Self Study Total			*65.5*
Total Study Time (A) + (B) + (C)			**168 (6 ECTS)**

Class Technology

Access to Materials and Assessment

Course website

All course materials will be distributed on the course website. Check there regularly for updates.

Canvas

Canvas will only be used for releasing grades, and allocation of students to groups for assessment pieces. No course material will be posted on Canvas.

GitHub Classroom

We are going distribute Graded Assignments and Lab Assignments through GitHub Classroom. You will receive an email invitation to the course organization with instructions in due time, but for now it suffices to say that this is how we'll submit assignments and provide feedback, etc.

Computing

This course is an analytics course, and as such we aim to use, understand and develop computational routines that help managers and marketers make better decisions. Large portions of the course will be *'hands-on'* and we will be using the statistical software `R` to demonstrate and apply methods and concepts in class.

All of the software requirements for this course are open-source and/or free. Installation instructions to install R and RStudio are available on the course website. Each week we may use additional R packages in our analysis, these will be noted in the course material.

R & RStudio.

You will be required to install `R` and `RStudio` to complete the Labs and group assignments. Installation instructions are available in the Installation Guide (they differ slightly by operating system):

After installing R and RStudio we suggest you get acquainted with the interface and basic data analysis commands before the first class. To facilitate the introduction, we've suggested some DataCamp modules for you to work through. These materials should serve to review your existing knowledge from previous classes in your degree program. The suggested mod-

ules can be found here. Instructors will assume you are comfortable with this material by the computing lecture in Week 3.

Improving Reproducibility of our Analysis with Git and GitHub.

In addition to helping you gain analytics skills using `R`, we want to help you improve the reproducibility of your computational analysis - i.e. we want you to document your code and the changes you make to it. To help achieve this goal we will use a version control software called `Git` and we will post our codes on a repository called `GitHub`.

- To install Git and create a Github account, follow the instructions in the Installation Guide.
- Also register for an education discount to get unlimited private repositories here.[2]

As part of your preparation for the class, look over the DataCamp modules on "Version Control with Git" that we have highlighted on the course webpage. These modules should serve to review key concepts from previous classes. Please look over the material *before* the first computing lecture.

Course Communication

The main channel for discussion with the instructors and with your peers will take place on the Slack messaging platform.

- Sign up to our Slack chat by creating an account with your @tilburguniversity.edu email address
- Log in once you have created an account.

Contact us via email if you cannot sign up or log in.

Slack vs Email.

The instructors prefer that your first point of contact with us and your peers is on Slack. For general queries, public messages are preferred since your classmates can gain from the information. If you need to reach out to the instructors directly, Slack has direct messages which we encourage you to use.

If absolutely necessary, the course email address is tisem.social.media@gmail.com. Do not send emails to the instructor personal accounts - they will not be answered. Please write all emails in English so that nothing is "lost in translation".

[2] GitHub recently announced unlimited free private repos for everyone. However, you are limited to three collaborators per private repo, so the education discount still makes sense.

We aim to reply to Slack and emails within 48 hours from Monday to Friday, but there might be a slight delay of you write to us late on Friday evening.

Rules of the Game

We have clear expectations of how we should all interact in class and in meetings. They are summarized by the "8 Be's" below:

Be Active

Learning via passive listening is an ineffective learning technique. Come to discussion classes prepared to ask questions, and to answer questions posed by me and others in class. This will lead to a much more enjoyable learning experience for us all. We would much rather have an engaging discussion on topics where we share mutual interest and cover less material than have Discussion Sections become a monologue.

Be "Hands-on"

The class is designed to be 'hands-on' in the sense that you will be expected to complete a substantial amount of coding exercises. We strongly believe the only way to learn programming is to do programming. Try to complete each 'Lab Session' and be prepared to ask and answer questions about it during Discussion Sections. Codes that solve exercises will be posted *after* Discussion Sections.

Be Prepared

We expect you to dedicate an average of 20 hours per week of study time to this course. Use this time to look over required readings, re-examine course notes and codes and work on your assignments. Looking over required readings means that our discussions will have more substance, and (ideally) be more insightful.

Quick tip: If you find yourself not understanding part of the course content or not able to find bugs in your code, take a break and come back to it in an hour or so. Come talk to us if it remains unclear.

Be Professional

We expect you to treat us and your class members collegially. In addition, we have a set of Social Rules and a Code of Conduct that provides further details of acceptable and unacceptable behavior.

When writing an email, being professional also means using a meaningful subject line, identifying yourself (i.e. Regards, Lachlan at the end of the email), and keeping the message focused.

We strongly encourage you to provide feedback about both format and content during the course. We will provide survey links to collect this feedback at regular intervals. Be professional when filling these out.

Be Informal (but not too informal!)

Do not address us with "Mr.", "Dr.", or "Prof.". Please use our first name's (i.e. Lachlan and Roshini). More formality than that makes me feel uncomfortable.

Also you can add us on LinkedIn or Twitter - where we maintain professional accounts.

Be International

This course is taught in English. You are obliged to speak English whenever there are international students present and all Slack messages on public channels must be in English. If in doubt, you need to communicate in English. As someone who has studied in countries where I do not speak the native language - be assured it is *very much appreciated.*

Be Healthy (Physically & Mentally)

Physical and Mental health are important, and definitely more important than your coursework. Material posted online, the readings and talking with your classmates about what you missed is more than enough if you miss one or two classes.

On the mental health side, we know how challenging graduate study can be, especially when paired with one's 'non-study life.' *We strongly encourage you to prioritize mental health over* ***everything*** *else.* If you feel like you need to talk to someone, a good starting point might be Tilburg's Education Coordinators or the student psychologists at the University. You can reach out to us as instructors and we're happy to help, but are not professionals.

Be Fair & Honorable

In group assignments we expect all group members to actively and evenly contribute. If you are struggling with parts of a group assignment you are working on, talk to your group members and to us rather than withdrawing from conversations with your colleagues.

Being fair & honorable also means that you should not plagiarize other's work. We stick closely with the School's Fraud and plagiarism policies which are outlined here.

Readings

We will combine material from online text books and recent academic papers.

You will not need to purchase anything.

Readings will be posted on the course website.

The Tilburg University Code of Conduct

Tilburg University has a Code of Conduct that all employees and students of Tilburg University are expected to follow. Please read the Code of Conduct from Tilburg University.

Social Media and Web Analytics' own Code of Conduct, Social Rules and 8 Be's are designed to encompass principles within this code, but where differences may occur are super-seeded by Tilburg's own Code of Conduct.

Academic Integrity @ Tilburg U

Cheating, plagiarism, and/or doing work for another person who will receive academic credit are all impermissible. This includes the use of unauthorized books, notebooks, or other sources in order to secure or give help for an assignment or the presentation of unacknowledged material as if it were the student's own work. Having unauthorized notes at your exam, cribbing from a fellow student, manipulating results and copying text from others without references are examples of fraud. Once fraud is suspected, the Examination Board will be informed accordingly. Please refer to the website for more information.

FAQs

R looks cool, but I'm more familiar with Python/Julia/MatLab/SPSS/etc. Can I use that instead?

Short answer: No.

Longer answer: I like and use a lot of those languages too, but our lecture notes and assignment templates are designed around an `R` code base. Plus, I really do think that `R` makes the most sense for quantitative marketing students looking to develop their data science skills. It already has all of the statistics and econometrics support, and is amazingly adaptable as a "glue" language to other programming languages and APIs. Learning multiple languages is never a bad idea in the long run, and I'd encourage you to invest your time outside of this class in at least one other language if your career plans involve jobs with heavy analytics.

I already have a BitBucket/GitLab/etc. account. Do I still have to use GitHub?

I'm running this course through GitHub Classroom, so yes we need you to use GitHub for this course.

On that note, do you have any advice for running a course on GitHub Classroom?

I mostly followed this excellent tutorial by Jacob Fiksel. (Hat Tip to Grant McDermott at U Oregon for recommending this!)

This course looks interesting! Can I use/adapt your lecture notes for a similar course that I'm teaching at XYZ?

Sure. I've benefited greatly from other people making their teaching materials publicly available (and have tried my best to acknowledge them directly in the relevant sections of this course). I'm more than happy to pay it forward. I only ask two small favours. 1) Please let me know (email/Twitter) if you do use material from this course, or have found it useful in other ways. 2) A minor acknowledgment somewhere in your own syllabus or notes would be much appreciated.

Acknowledgments

Lachlan wishes to thank Shrabastee Banerjee, Anick Bosmans, Gijs van Bussel, Hannes Datta and Hendrik de With for their comments on various versions of this syllabus, and (where applicable) for making their own syllabi available. I have occasionally borrowed from each of them quite liberally. I also want to thank students from the 2021, 2022, 2023 and 2024 editions of this class, for their questions and comments which have improved the clarity of various sections of text. Any errors, omissions and slips in the clarity of text remain my own.