MGSC-310-01

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MGSC310: Statistical Models for Business Analytics (Introduction to Machine Learning)

Argyros School of Business and Economics
Chapman University

Course details

Instructor:	Jonathan Hersh, Ph.D Assistant Professor, Economics and Management Science Argyros School of Business and Economics
Teaching Assistants:	Joshua Anderson (ander428@mail.chapman.edu (mailto:ander428@mail.chapman.edu)) Cady Stringer (cstringer@chapman.edu (mailto:cstringer@chapman.edu)) Sam Webster (swebster@chapman.edu)
Classroom Meetings:	Section 1: Tuesdays and Thursdays 2:30 pm - 3:45 pm Section 2: Tuesdays and Thursdays 4:00 pm - 5:15 pm
Classroom:	Zoom Link (May change to HyFlex classroom)
Office Location:	BK 307G
Instructor Office Hours	Mondays and Wednesdays 1:00 pm - 3:00 pm
TA Office Hours	Mondays 5:00 - 6:30 Tuesdays 5:30 - 7:00 Thursdays 5:30 - 7:00
Email:	hersh@chapman.edu (mailto:hersh@chapman.edu)
Course Webpage:	https://canvas.chapman.edu

Course Descriptions

This is a course on how to apply machine learning and statistical models to business data to learn and communicate actionable information. Firms have more data than they know how to manage, and are facing a shortage of intelligent people who know how to extract useful information from this data. Data is not necessarily knowledge. Knowledge is knowing how to learn from data to choose a course of action that will better meet one's objective.

In this class, we will learn technical skills to build your foundation in analytics and machine learning. If you are not comfortable programming or implementing and communicating statistical models, you will be by the end of the course. We will cover basic statistics and machine learning models, and learn how to implement them in the R programming language.

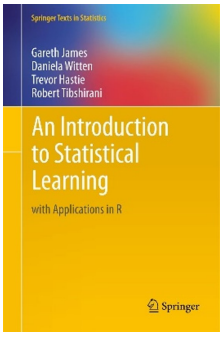
This will be a class where coding is required. If you have no coding experience - not to worry. This class is designed to teach you to code in R and assumes no prior knowledge of R. R is a powerful language, and with user-written extensions called packages, the capabilities are continually expanding. It also has a very active and friendly user community. To make the language more accessible, you may find it useful to install RStudio as a front end GUI (or graphical user interface). **Both R and RStudio are free!**

Course Materials

Textbooks

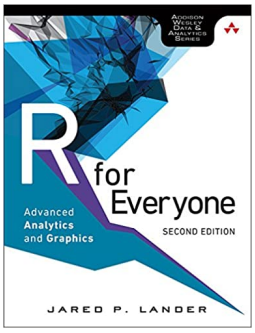
Textbook

James G., Witten D., Hastie T., and Tibshirani, R. (2013). **An introduction to statistical learning**. New York, NY: Springer Science and Business Media. 978-1-4614-7137-0



This is a wonderful and free machine learning text written by giants of the field. It's a classic text, and while mathematically challenging at times, it provides a base of statistical knowledge imperative for implementing any data science project. It is available as a **free download (http://www-bcf.usc.edu/~gareth/ISL/)** .

Lander, J. P. (2017). *R for everyone: Advanced analytics and graphics (*2nd ed.*)*. Pearson Education.



Jared is a wonderful **educator (https://www8.gsb.columbia.edu/cbs-directory/detail/jpl2135)** , statistician, and organizer of the **New York Open Statistical Programming (https://www.nyhackr.org/)** Meetups. This book is less technical than the above, and covers important programming advances in the R language. If you are new to R or programming, this book will be your new friend.

Software

The **R-Programming** environment will be used in this course. It is an open-source solution that is freely available. The **RStudio** front end will be utilized with the R software. Both have implementations that work on Windows, MAC OS, and

Linux operating systems. Please ensure you have these versions installed on your system:

- R 4.0.2:
  - **Window Download** (https://cran.r-project.org/bin/windows/base/)
  - **Mac Download** (https://cran.r-project.org/bin/macosx/)
- Rstudio v.1.3.1073:
  - **Download** (https://www.rstudio.com/products/rstudio/download/#download)
- Miktex (needed to produce pdf output):
  - **Download** (http://miktex.org/download)
- Compiler tools (needed to load certain packages)
  - Windows
    - **RTools** (https://cran.r-project.org/bin/windows/Rtools/)
  - Mac
    - **Xcode and GFortran** (https://github.com/rmacoslib/r-macos-rtools/releases)
- You may also use the free, cloud-based cloud-based **RStudio server** (https://rstudio.cloud/) .

Note: Software issues are **NOT** sufficient excuses for late/unfinished problem sets.

Course Prerequisites

At least one of the followings:

- MGSC 209-Introduction to Business Statistics
- MATH 203-Introduction to Statistics
- PSY 203-Statistics for the Behavioral Sciences
- BUS 603-Business Statistics
- BUS 609-Business Analytics

Course Learning Outcomes

Successful students will be able to:

- Define key **terminology** in model fitting and statistical learning
- Perform basic **data manipulation** in R
- Compute and interpret **descriptive statistics** in R
- Build, analyze, and interpret basic and intermediate **linear regression** models in R
- Build, analyze and interpret **logistic regression**
- Articulate the importance of and implement resampling techniques such as **cross-validation**
- Build, analyze and interpret tree-based methods such as **regression trees** and **random forest**
- Execute and understand simple unsupervised learning techniques such as **Principle component analysis** and **k-means clustering**

Course Format

Class Structure

The course will consist of a mix of lectures and interactive coding exercises that we will do together. You are welcome to use the computers in the lab or bring your own laptop. In most classes, the students will perform technical analyses, in

general, using R software and other tools. The technical analyses combined with instructor support is designed to help the students learn by practicing the application of analytic modeling methods. Students are responsible for reading/viewing all materials assigned for a class period prior to that class period.

Evaluation

Students will be evaluated with regard to their performance on a course project with a presentation and report, an exam, homework, in-class quizzes, and participation. The final course grade will be based on a weighted average of scores on all evaluated work.

Grading Scheme

Evaluation Category	Percentage
Term Project and Presentation	30%
Midterm Exam	30%
Problem Sets	20%
Quizzes	10%
Participation	10%
Total	100%

Course Term Project (30%): **In self-assigned groups of two to three you will choose a real-world setting in which to apply some of the techniques learned in this class.** You may self-select both your groups and the topic of study. However, I may suggest some datasets to work with to get you started. Appropriate topics include, ``What are the characteristics of movies that do well at the box office?''; ``Assessing demand for food trucks based on neighborhood characteristics?''.

There will be two components to this term project 1) a presentation, and 2) a brief report. Additional details on the term project will be provided in a second, separate document presented later in the term.

Midterm Exam (30%): **A single, comprehensive modeling skills exam will account for 30% of your grade. The exam is cumulative in that you may be required to demonstrate all skills learned up to the time of the exam.** In the exam, students will be responsible for an analysis of a management problem requiring modeling to provide insight into the problem. **The exam will be take home, and will be open book, notes, Internet, etc. You may not copy and paste any answers found anywhere online or from other students. Students will need to demonstrate the use of the R software to complete the exam.** Additional information on the exam will be made available prior to the exam.

Problem Sets (20%): To learn how to code, one must spend time coding. To aid in your learning process, we will have six problem sets, where we will apply skills learned in the class. **All problem sets will be submitted via Canvas.** If a particular problem set requires compilation using RMarkdown and a compiled file is not submitted, I will penalize the grade on this problem set by 50%. I will drop the single lowest homework score from your final evaluation. Late submissions will be penalized 20% for each day late.

Students may and are encouraged to work on homework assignments together. Assignments may be submitted in groups of up to two. Assignments that do not represent the student's own work will be awarded a score of 0. This includes copying and pasting other students' code. You are encouraged to learn from each other, however, you must write your own code.

Quizzes (10%): **Weekly quizzes will ensure students are keeping up with the material presented in the class.** These quizzes are meant to be brief and will take approximately 10-15 minutes. Quizzes are due before class on

Thursday. Students will be responsible for providing definitions for terminology, describing concepts, reading computer results, answering basic analysis questions and, perhaps very straightforward computations. These quizzes will generally be in multiple-choice or short answer format. The quizzes will be closed book and notes.

Participation (10%): Participation counts for the remainder of your grade. **To receive full points for participation, you should come to class, be engaged with the material, and participate in online discussions.** Students who are continually distracted by matters outside the classroom, including texting and email, will receive no points for participation. **On many occasions, we will work on exercises together in-class, and you will be required to upload your code, which will factor into your participation grade. Visiting me during office hours at least once during the semester counts for your participation score!**

Exam Date

Midterm Exam: **October 27th** and **October 29th** .

Final Grade

Final course letter grades will be assigned on the following scale:

Final Letter Grade Conversion

A	95-100 %	C	73-76.9 %
A^-	90-94.9 %	C^-	70-72.9 %
B^+	87-89.9 %	D^+	67-69.9 %
B	83-86.9 %	D	63-66.9 %
B^-	80-82.9 %	D^-	60-62.9 %
C^+	77-79.9 %	No Pass	< 60 %

Course Resources:

- **Website:** All materials will be distributed on **Canvas (http://canvas.chapman.edu)** .
- **Office hours:** Trust me that I want to get to know you as an individual and help you achieve your potential. Please come and talk with me! I require that each student meet with me individually during office hours.
- **Announcements:** I will use Canvas for the course announcements.
- **Email:** If I have not replied in 24 hours, please email me again as it might have slipped my notice.
- **Discussions:** Canvas Discussion is a very useful tool to ask questions or have discussions about topics in the class. You can use this workspace to ask me questions about problem sets, to ask students to help you with coding bugs, or to communicate with your group members.
- **TAs:** The teaching assistants are available to answer your coding questions! Visit them in their TA office hours! Email your TAs if you have an urgent question or need help with problem sets. Ask them during the lecture if you have a question I cannot answer!
- **Poll Everywhere:** We will on occasion use Poll Everywhere software. My polls can be reached via **PollEv.com/hersh (https://pollev.com/hersh)** .

Course Policies

- **Attendance.** I realize that

- **Technology in class.** I ask that you use technology thoughtfully in the classroom. Web surfing and emailing are not allowed during lecture time. Technology is wonderful, but the careless use of it can distract others and prevent you from being fully engaged with the material. Please completely silence your phones (vibration mode is not silent), and resist being distracted by texting, or viewing Facebook or other distracting websites during class. If I see that you are using technology for any purposes other than for course material, you will receive no points for class participation on that day.
- **Makeup exam.** If you need a different time/date for the midterm exam, please email me in advance. I am happy to accommodate.
- **Classroom etiquette.** I truly believe that the classroom is a sacred space, even online. We should all strive to respect that space. This course will be hard at times, and that can be frustrating. The civility of peers and your instructor is expected at all times, both in the class and outside of it. Please come speak to me if you feel this is not being met.

Technology Requirements

Canvas is the learning management system used for this course. Please see the technological requirements for Canvas **(https://community.canvaslms.com/docs/DOC-10721-what-are-the-basic-computer-specifications-for-canvas)** in order to make sure you have the best experience possible. Also, please download the Canvas mobile app **(https://www.chapman.edu/campus-services/information-systems/software/canvas/student-training.aspx)** and set your Canvas notifications **(https://community.canvaslms.com/docs/DOC-10910-4144710318)** so you can receive important updates, announcements, and due dates. Information about using the mobile app can be found here: Canvas mobile app guides **(https://community.canvaslms.com/docs/DOC-4048-mobile-guides-canvas-student)** .

Chapman University Academic Integrity Policy

Chapman University is a community of scholars that emphasizes the mutual responsibility of all members to seek knowledge honestly and in good faith. Students are responsible for doing their own work and academic dishonesty of any kind will be subject to sanction by the instructor/administrator and referral to the university Academic Integrity Committee, which may impose additional sanctions including expulsion. Please review the full description of Chapman University's policy on Academic Integrity **(https://www.chapman.edu/academics/academic-integrity/_files/academic-integrity-policy.pdf)** .

Chapman Policy on Students with Disability

In compliance with ADA guidelines, students who have any condition, either permanent or temporary, that might affect their ability to perform in this class are encouraged to contact the Office of Disability Services. If you will need to utilize your approved accommodations in this class, please follow the proper notification procedure for informing your professor(s). This notification process must occur more than a week before any accommodation can be utilized. Please contact Disability Services **(https://www.chapman.edu/students/health-and-safety/disability-services/index.aspx)** at (714) 516–4520 if you have questions regarding this procedure or for information or to make an appointment to discuss and/or request potential accommodations based on documentation of your disability. Once formal approval of your need for accommodation has been granted, you are encouraged to talk with your professor(s) about your accommodation options. The granting of any accommodation will not be retroactive and cannot jeopardize the academic standards or integrity of the course.

Chapman University Equity and Diversity Policy

Chapman University is committed to ensuring equality and valuing diversity. Students and professors are reminded to show respect at all times as outlined in Chapman's Harassment and Discrimination Policy **(https://www.chapman.edu/faculty-staff/human-resources/eoo.aspx)** . Please review the full description of the Harassment and Discrimination Policy. Any violations of this policy should be discussed with the professor, the Dean of Students and/or otherwise reported in accordance with this policy.

Recording Policy

In this class, software will be used to record live class discussions. As a student in this class, your participation in live class discussions will be recorded to assist those who cannot attend the live session, or to serve as a resource for those who would like to review content that was presented. These recordings will be made available only to students who are enrolled in the class, and only during the period in which the course is offered. All recordings will become unavailable to students in the class shortly after the course ends. Students who prefer to participate via audio only will be allowed to disable their video camera so only audio will be captured. Please discuss this option with your instructor.

Safety Protocols for On-Campus Instruction

We are living in interesting times. In response to the current COVID-19 pandemic, Chapman University has developed the CU Safely Back program (CUSBP) and mandatory safety measures (https://news.chapman.edu/coronavirus/). The University's mandatory safety measures may be stricter than local, state or federal guidelines and may be subject to change at any time. Students are expected to adhere to the University's safety measures while attending classes, including when entering and exiting classrooms, laboratories, or other instructional areas. Individual faculty may choose to have requirements for their courses that are stricter than the University's. Safety precautions and procedures may change in response to emerging findings and the recommendations of scientific experts and authorities. Refusal to abide by the University's mandatory safety measures or to the safety requirements specific to this course will result in your being asked to leave the area immediately, and may result in an administrative dismissal from this course.

The COVID-19 pandemic requires all of us to accept the possibility that changes in how this course is taught may be required and that some changes may occur with little or no notice. For example, some or all of the in-person aspects of a course may be shifted to remote instruction. If this occurs, you will be given clear instructions as to how to proceed. The uncertainty of the situation is not ideal for any of us. We must all try to approach this situation with good-will, flexibility, and mutual understanding.

Tentative Schedule

Date	Basic Topic	Topic	Text Reading Due	Assignment
Tue, Sep 1	Intro	Intro/Inference Vs Prediction		
Thu, Sep 3	Intro to R	Installing R, Installing and Loading Packages, Loading Datasets, Data Visualization in ggplot2	R for Everyone, Chp 1-3, 7	
Tue, Sep 8	Intro to R	Basic Data Types, and Advanced Data Structures, Functions, and Loops	R for Everyone, Chp 4-6, 8-9	
Thu, Sep 10	Intro to R	Exploratory Data Analysis and Data Manipulation with Dplyr	R for Everyone, Chp 12 ISLR: Chp 1	Quiz 1
Tue, Sep 15	Bias-Variance	Classification vs Regression, Assessing Model Accuracy, and Bias-Variance Trade-off	ISLR: pages 15-36	Problem Set 1
Thu, Sep 17	Linear Regression	Linear Regression 1:, Coefficient Hypothesis Testing, and Assessing Model Accuracy,	ISLR: pages 59-82	Quiz 2
Tue, Sep 22	Linear Regression	Linear Regression 2: Feature Engineering: Qualitative Predictors (Dummy Variables), Log Transformations, Squared Predictors, Interpreting Coefficients	ISLR: 82-92	

Thu, Sep 24	Linear Regression	Linear Regression 3: Generating Linear Model Predictions, Predicted-True Plots, Residuals, Diagnostics (brief)	R for Everyone: 19.2; 21.1	Quiz 3
Tue, Sep 29	Classification	Classification 1: Why Classification, Logistic Function, Log Odds Ratio, Simple Logistic Model	ISLR: 127-138	Problem Set 2
Thu, Oct 1	Classification	Classification 2: Interpreting Logistic Coefficients, Generating Predicted Probabilities (Scoring), Confusion Matrix, False/True Positives and False/True Negatives	R4E: 20.1	Quiz 4
Tue, Oct 6	Classification	Classification 3: Diagnostics (Sensitivity, Specificity, Recall, Precision), ROC Curve, Upsampling and Downsampling	ISLR: 4.4.3	
Thu, Oct 8	Resampling	Bootstrap, Leave-One-Out Cross-Validation, k-Fold Cross-Validation	ISLR: 175-183, 187-197 R4E: 21.3, 21.4	Quiz 5
Tue, Oct 13	Regularized Models	Problems with Model Overfitting (Low Bias, High Variance), Best Subset Selection, Ridge Regression	ISLR: 203-218	Problem Set 3
Thu, Oct 15	Regularized Models	Lasso Regression, Cross-Validation MSE Plot, Coefpath for Lasso Coefficients, Graphical Interpretation of Lasso,	ISLR: 219-225	Quiz 6
Tue, Oct 20	Regularized Models	ElasticNet	R4e: 22.1	
Thu, Oct 22		Interview TBD		Problem Set 4
Tue, Oct 27	Exam	Exam Day 1		
Thu, Oct 29	Exam	Exam Day 2		
Tue, Nov 3	Tree Methods	Regression Trees, Decision Trees	ISLR: 303-316 R4E: 23.4	
Thu, Nov 5	Tree Methods	Bagging and Boosting	ISLR: 316-319 R4E: 23.5	Quiz 7
Tue, Nov 10	Tree Methods	Random Forests	ISRL: 321-331 R4E: 23.6	Final Project: One Page Outline
Thu, Nov 12		Merging Datasets, Managing Factors, Word Sentiments	R4E: Chp 14	Quiz 8
Tue, Nov 17	Unsupervised	k-Means clustering, Hierarchical clustering	ISLR: 385-399 R4E: Chp 25	Problem Set 5
Thu, Nov 19	Unsupervised	Principal Component Analysis Theory, Conceptual Maps, Principal Component Analysis in R	ISLR: 228-233	Quiz 9 Final Project: Upload Estimated Model

Tue, Nov 24	Thanksgiving Recess (no class)	
Thu, Nov 26	Thanksgiving Recess (no class)	
Tue, Dec 1	Interview TBD	Problem Set 6
Thu, Dec 3	Project Presentations	
Tue, Dec 8	Project Presentations	
Thu, Dec 10	Project Presentations	
Finals Week		Final project due

Course Summary:

Date	Details	
Tue Sep 1, 2020	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87613&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87643&include_contexts=course_25604)	4pm to 5:15pm
	Lab 1: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255104)	due by 11:59pm
Wed Sep 2, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99115&include_contexts=course_25604)	1pm to 3pm
Thu Sep 3, 2020	Class 1: Intro/Inference Vs Prediction	to do: 2pm
	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87614&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87644&include_contexts=course_25604)	4pm to 5:15pm
	Lab 2: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255105)	due by 11:59pm
	Upload Video Intro (https://canvas.chapman.edu/courses/25604/assignments/255182)	due by 11:59pm

Date	Details	
Mon Sep 7, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99116&include_contexts=course_25604)	1pm to 3pm
Tue Sep 8, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99117&include_contexts=course_25604)	1pm to 3pm
	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87615&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87645&include_contexts=course_25604)	4pm to 5:15pm
	Lab 3: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255125)	due by 11:59pm
Wed Sep 9, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99118&include_contexts=course_25604)	1pm to 3pm
Thu Sep 10, 2020	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87616&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87646&include_contexts=course_25604)	4pm to 5:15pm
	Lab 4: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255124)	due by 11:59pm
	Quiz 1 (https://canvas.chapman.edu/courses/25604/assignments/254467)	due by 11:59pm
Mon Sep 14, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99119&include_contexts=course_25604)	1pm to 3pm
Tue Sep 15, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99120&include_contexts=course_25604)	1pm to 3pm
	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87617&include_contexts=course_25604)	2:30pm to 3:45pm

Date	Details	
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87647&include_contexts=course_25604)	4pm to 5:15pm
	Lab 5: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255123)	due by 11:59pm
	Problem Set 1 (R Programming) (https://canvas.chapman.edu/courses/25604/assignments/253660)	due by 11:59pm
Wed Sep 16, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99121&include_contexts=course_25604)	1pm to 3pm
Thu Sep 17, 2020	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87618&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87648&include_contexts=course_25604)	4pm to 5:15pm
	Lab 6: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255122)	due by 11:59pm
	Quiz 2 (https://canvas.chapman.edu/courses/25604/assignments/254470)	due by 11:59pm
Mon Sep 21, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99122&include_contexts=course_25604)	1pm to 3pm
Tue Sep 22, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99123&include_contexts=course_25604)	1pm to 3pm
	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87619&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87649&include_contexts=course_25604)	4pm to 5:15pm
	Lab 7: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255121)	due by 11:59pm
Wed Sep 23, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99124&include_contexts=course_25604)	1pm to 3pm

Date	Details	
Thu Sep 24, 2020	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87620&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87650&include_contexts=course_25604)	4pm to 5:15pm
	Lab 8: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255120)	due by 11:59pm
	Quiz 3 (https://canvas.chapman.edu/courses/25604/assignments/254476)	due by 11:59pm
Mon Sep 28, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99125&include_contexts=course_25604)	1pm to 3pm
Tue Sep 29, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99126&include_contexts=course_25604)	1pm to 3pm
	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87621&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87651&include_contexts=course_25604)	4pm to 5:15pm
	Lab 9: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255119)	due by 11:59pm
	Problem Set 2 (Linear Regression) (https://canvas.chapman.edu/courses/25604/assignments/253675)	due by 11:59pm
Wed Sep 30, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99127&include_contexts=course_25604)	1pm to 3pm
	Meet with Professor During Office Hours (https://canvas.chapman.edu/courses/25604/assignments/255099)	due by 11:59pm
Thu Oct 1, 2020	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87622&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87652&include_contexts=course_25604)	4pm to 5:15pm

Date	Details	
	Lab 10: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255118)	due by 11:59pm
	Quiz 4 (https://canvas.chapman.edu/courses/25604/assignments/254512)	due by 11:59pm
Mon Oct 5, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99128&include_contexts=course_25604)	1pm to 3pm
Tue Oct 6, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99129&include_contexts=course_25604)	1pm to 3pm
	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87623&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87653&include_contexts=course_25604)	4pm to 5:15pm
	Lab 11: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255117)	due by 11:59pm
Wed Oct 7, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99130&include_contexts=course_25604)	1pm to 3pm
Thu Oct 8, 2020	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87624&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87654&include_contexts=course_25604)	4pm to 5:15pm
	Lab 12: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255116)	due by 11:59pm
	Quiz 5 (https://canvas.chapman.edu/courses/25604/assignments/254524)	due by 11:59pm
Mon Oct 12, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99131&include_contexts=course_25604)	1pm to 3pm
Tue Oct 13, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99132&include_contexts=course_25604)	1pm to 3pm

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	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87625&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87655&include_contexts=course_25604)	4pm to 5:15pm
	Lab 13: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255115)	due by 11:59pm
	Problem Set 3 (Classification) (https://canvas.chapman.edu/courses/25604/assignments/253677)	due by 11:59pm
Wed Oct 14, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99133&include_contexts=course_25604)	1pm to 3pm
Thu Oct 15, 2020	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87626&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87656&include_contexts=course_25604)	4pm to 5:15pm
	Lab 14: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255114)	due by 11:59pm
	Meet with TAs During TA Office Hours (https://canvas.chapman.edu/courses/25604/assignments/255101)	due by 11:59pm
	Quiz 6 (https://canvas.chapman.edu/courses/25604/assignments/254536)	due by 11:59pm
Mon Oct 19, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99134&include_contexts=course_25604)	1pm to 3pm
Tue Oct 20, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99135&include_contexts=course_25604)	1pm to 3pm
	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87627&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87657&include_contexts=course_25604)	4pm to 5:15pm

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	Lab 15: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255113)	due by 11:59pm
Wed Oct 21, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99136&include_contexts=course_25604)	1pm to 3pm
Thu Oct 22, 2020	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87628&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87658&include_contexts=course_25604)	4pm to 5:15pm
	Lab 16: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255112)	due by 11:59pm
	Problem Set 4 (Lasso, Ridge and ElasticNet) (https://canvas.chapman.edu/courses/25604/assignments/253679)	due by 11:59pm
Mon Oct 26, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99137&include_contexts=course_25604)	1pm to 3pm
Tue Oct 27, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99138&include_contexts=course_25604)	1pm to 3pm
	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87629&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87659&include_contexts=course_25604)	4pm to 5:15pm
Wed Oct 28, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99139&include_contexts=course_25604)	1pm to 3pm
Thu Oct 29, 2020	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87630&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87660&include_contexts=course_25604)	4pm to 5:15pm

Date	Details	
	Take-Home Midterm Exam (https://canvas.chapman.edu/courses/25604/assignments/253784)	due by 11:59pm
Mon Nov 2, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99140&include_contexts=course_25604)	1pm to 3pm
Tue Nov 3, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99141&include_contexts=course_25604)	1pm to 3pm
	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87631&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87661&include_contexts=course_25604)	4pm to 5:15pm
	Lab 17: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255111)	due by 11:59pm
Wed Nov 4, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99142&include_contexts=course_25604)	1pm to 3pm
Thu Nov 5, 2020	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87632&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87662&include_contexts=course_25604)	4pm to 5:15pm
	Lab 18: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255110)	due by 11:59pm
	Quiz 7 (https://canvas.chapman.edu/courses/25604/assignments/254537)	due by 11:59pm
Mon Nov 9, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99143&include_contexts=course_25604)	1pm to 3pm
Tue Nov 10, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99144&include_contexts=course_25604)	1pm to 3pm

Date	Details	
	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87633&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87663&include_contexts=course_25604)	4pm to 5:15pm
	Lab 19: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255109)	due by 11:59pm
	Outline of Final Project (https://canvas.chapman.edu/courses/25604/assignments/254601)	due by 11:59pm
Wed Nov 11, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99145&include_contexts=course_25604)	1pm to 3pm
Thu Nov 12, 2020	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87634&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87664&include_contexts=course_25604)	4pm to 5:15pm
	Lab 20: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255108)	due by 11:59pm
	Quiz 8 (https://canvas.chapman.edu/courses/25604/assignments/254538)	due by 11:59pm
Mon Nov 16, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99146&include_contexts=course_25604)	1pm to 3pm
Tue Nov 17, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99147&include_contexts=course_25604)	1pm to 3pm
	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87635&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87665&include_contexts=course_25604)	4pm to 5:15pm
	Lab 21: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255107)	due by 11:59pm

Date	Details	
	Problem Set 5 (Tree Methods) (https://canvas.chapman.edu/courses/25604/assignments/253680)	due by 11:59pm
Wed Nov 18, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99148&include_contexts=course_25604)	1pm to 3pm
Thu Nov 19, 2020	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87636&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87666&include_contexts=course_25604)	4pm to 5:15pm
	Final Project: Upload Estimated Model (https://canvas.chapman.edu/courses/25604/assignments/254610)	due by 11:59pm
	Lab 22: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255138)	due by 11:59pm
	Quiz 9 (https://canvas.chapman.edu/courses/25604/assignments/254539)	due by 11:59pm
Mon Nov 23, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99149&include_contexts=course_25604)	1pm to 3pm
Tue Nov 24, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99150&include_contexts=course_25604)	1pm to 3pm
	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87637&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87667&include_contexts=course_25604)	4pm to 5:15pm
Wed Nov 25, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99151&include_contexts=course_25604)	1pm to 3pm
Thu Nov 26, 2020	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87638&include_contexts=course_25604)	2:30pm to 3:45pm

Date	Details	
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87668&include_contexts=course_25604)	4pm to 5:15pm
Mon Nov 30, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99152&include_contexts=course_25604)	1pm to 3pm
Tue Dec 1, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99153&include_contexts=course_25604)	1pm to 3pm
	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87639&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87669&include_contexts=course_25604)	4pm to 5:15pm
	Lab 23: In-Class Participation (https://canvas.chapman.edu/courses/25604/assignments/255137)	due by 11:59pm
	Problem Set 6 (Unsupervised Learning) (https://canvas.chapman.edu/courses/25604/assignments/253682)	due by 11:59pm
Wed Dec 2, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99154&include_contexts=course_25604)	1pm to 3pm
Thu Dec 3, 2020	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87640&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87670&include_contexts=course_25604)	4pm to 5:15pm
Mon Dec 7, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99155&include_contexts=course_25604)	1pm to 3pm
Tue Dec 8, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99156&include_contexts=course_25604)	1pm to 3pm
	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87641&include_contexts=course_25604)	2:30pm to 3:45pm

Date	Details	
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87671&include_contexts=course_25604)	4pm to 5:15pm
	Final Project Presentations (https://canvas.chapman.edu/courses/25604/assignments/254612)	due by 11:59pm
Wed Dec 9, 2020	MGSC 310 Instructor Office Hours (https://canvas.chapman.edu/calendar?event_id=99157&include_contexts=course_25604)	1pm to 3pm
Thu Dec 10, 2020	MGSC 310 - Section 1 (2:30 - 3:45) (https://canvas.chapman.edu/calendar?event_id=87642&include_contexts=course_25604)	2:30pm to 3:45pm
	MGSC 310 - Section 2 (4:00 - 5:15) (https://canvas.chapman.edu/calendar?event_id=87672&include_contexts=course_25604)	4pm to 5:15pm
Fri Dec 18, 2020	Final Project: Final Submissions (https://canvas.chapman.edu/courses/25604/assignments/254615)	due by 11:59pm