



THE ROBERT DAY SCHOOL  
CLAREMONT MCKENNA COLLEGE

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**Economics 160– Accounting Data Analytics  
Spring 2021 Syllabus**

Prof. George Batta

Email: [gbatta@cmc.edu](mailto:gbatta@cmc.edu)

Zoom info for classes and office hours:

**Section 1**

Meeting ID: 897 1928 1629

Password: breakfast

Link: [https://cmc-](https://cmc-its.zoom.us/j/89719281629?pwd=bUIKTUhDZTc4TEo5VmRMMDE0dXN1UT09)

[its.zoom.us/j/89719281629?pwd=bUIKTUhDZTc4TEo5VmRMMDE0dXN1UT09](https://cmc-its.zoom.us/j/89719281629?pwd=bUIKTUhDZTc4TEo5VmRMMDE0dXN1UT09)

**Section 2**

Meeting ID: 842 9419 5202

Password: breakfast

Link: [https://cmc-](https://cmc-its.zoom.us/j/84294195202?pwd=dW9ZZ0xvUVFLc3VibkdPMUxjcmhtdz09)

[its.zoom.us/j/84294195202?pwd=dW9ZZ0xvUVFLc3VibkdPMUxjcmhtdz09](https://cmc-its.zoom.us/j/84294195202?pwd=dW9ZZ0xvUVFLc3VibkdPMUxjcmhtdz09)

**Office Hours:** TTh 2:00-2:30p.m., 3:30-4:30p.m., and by appointment.

Meeting ID: 519 755 6999

Password: breakfast

Link: [https://cmc-](https://cmc-its.zoom.us/j/5197556999?pwd=Y2ZJNXVVclZaKzNOTFR0QWQ5OU0vQT09)

[its.zoom.us/j/5197556999?pwd=Y2ZJNXVVclZaKzNOTFR0QWQ5OU0vQT09](https://cmc-its.zoom.us/j/5197556999?pwd=Y2ZJNXVVclZaKzNOTFR0QWQ5OU0vQT09)

Course	Class Time	Final Exam
Econ 160 (sec. 1)	TTh 11:00a.m.-12:15p.m.	None
Econ 160 (sec. 2)	TTh 12:45p.m.-2:00p.m.	None

**Quantitative and Computing Lab (QCL) Course Mentor**

Patrick Chen | [pchen21@students.claremontmckenna.edu](mailto:pchen21@students.claremontmckenna.edu)

“Walk-in” link: Please look for Zoom link in an email from the QCL.

One-on-one scheduling link: <https://cmc.mywconline.net/>

**Required Material**

- Wickham, H., and Grolemund, G. *R for Data Science*. Sebastopol, CA: O’Reilly Media, 2016. Available at the Huntley Bookstore or your favorite online retailer. You can also find a free online version here: <https://r4ds.had.co.nz/>

- James, G., Witten, D., Hastie, T., Tibshirani, R. *An Introduction to Statistical Learning, with Applications in R*. New York, NY: Springer Science + Business Media, 1st ed. 2013, Corr. 7th printing 2017 edition
  - Available at the Huntley Bookstore or your favorite online retailer. You can also find a free online version here: <https://statlearning.com/>
  - We'll only cover chapters 2, 4, and 5 in this text.
- Base R Cheat Sheet: <https://github.com/rstudio/cheatsheets/blob/master/base-r.pdf>
- Data Wrangling Cheat Sheet: <https://github.com/rstudio/cheatsheets/blob/master/data-transformation.pdf>
- EY Case studies
- Additional required reading, consisting of (free) academic papers, will be uploaded to Sakai later in the semester.

### **Catalog Description**

This course will introduce students to the use of analytics tools for deriving insights from accounting data and for more effectively performing audits. Companies produce a wealth of data on customers and company performance, and the next generation of accountants needs to be equipped with tools for organizing and analyzing the data to improve company performance and audit its financial accounts. We will explore the topics of data retrieval, cleanup, preprocessing, and validation, before getting into data visualization, internal and external audit analytics, and predictive modeling/machine learning.

### **Prerequisites**

Economics 86 - Accounting for Decision-Making  
Economics 120 – Statistics (or equivalent)

### **Learning Objectives**

- Understand and apply the analytics mindset to real-world accounting problems.
- Explore the use of analytics techniques in several areas of accounting, including ratio analysis, cost accounting, internal audit, and financial accounting.
- Become familiar with R, RStudio, and RMarkdown, for use in data science.
- Become acquainted with data cleaning, transformation, querying, exploration, visualization, programming basics, and data communication.
- Understand the difference between causal inference and prediction models, and the tools required for both.
- Understand basic principles of statistical learning, and apply them to the problem of corporate bankruptcy prediction.

### **Grading Criteria**

Homeworks (6, each worth 4%)

24%

Participation (including small group presentations)	13.5%
Midterm 1	15%
Midterm 2	20%
Project	27.5%

### **Case studies**

The main lessons of the course will be conveyed via case studies encompassing four areas of accounting: financial ratio analysis, cost accounting, internal audit, and financial accounting. Cases will extend over four class sessions and will follow this (typical) pattern:

Day 1 – Case introduction, small group question brainstorming, loading dataset into our analysis tool, and initial data analysis.

Day 2 – Lab session, with in-class questions to answer.

Day 3 – Lab session, with in-class questions to answer.

Day 4 – Homework due/ Lab session, with in-class questions to answer, discussion of homework problems, and (typically) group presentations.

### **Participation**

Participation will mainly be assessed on Day 4 of each case module, in which you will (typically) present answers to case questions.

### **Attendance**

I won't be taking attendance, but many of the sessions will involve working through R-based problems, so it's a good idea to attend. Moreover, when we get to the "building a statistical model" part of the course, it will be very important to attend the Zoom sessions. We'll be using these to talk about gathering and shaping data to make it ready for analysis.

### **Homework**

Homeworks are due on the dates listed. You will typically upload your homework to your Sakai dropbox. You may work in groups of **up to 3 students** on the assignments. Your homeworks will typically be submitted as .Rmd files.

### **Exams**

Exams will be held on the dates listed in the class schedule.

### **Project**

By Sunday, May 9<sup>th</sup>, 2021 (the first Sunday after the last day of class), at 11:59p.m. PDT, you will turn in your write-up of your corporate bankruptcy prediction model, along with the associated .Rmd file. You will work with up to two (2) other students on the project.

### **Academic Integrity**

I encourage you to read CMC's Statement of Academic Integrity in the online catalogue: <http://catalog.claremontmckenna.edu/content.php?catoid=4&navoid=94>

### **Grading Disputes**

If you believe that there is an error in the scoring of a test, you must submit a **written** request for re-grading within one week from the time that the test is returned. The request must include a copy of the disputed portion of the test, accompanied by a written explanation of why you believe re-grading is appropriate. You should suggest how many points should be awarded.

### **Statement of Reasonable Accommodations**

Your experience in this class is important to me. If you have already established accommodations with Disability Services at CMC, please communicate your approved accommodations to me at your earliest convenience so we can discuss your needs in this course. You can start this conversation by forwarding me your accommodation letter. If you have not yet established accommodations through Disability Services, but have a temporary health condition or permanent disability (conditions include but are not limited to: mental health, attention-related, learning, vision, hearing, physical or health), you are encouraged to contact Assistant Dean for Disability Services & Academic Success, Kari Rood, at [disabilityservices@cmc.edu](mailto:disabilityservices@cmc.edu) to ask questions and/or begin the process. General information and the Request for Accommodations form can be found at the CMC DOS Disability Service's [website](#). Please note that arrangements must be made with advance notice in order to access the reasonable accommodations. You are able to request accommodations from CMC Disability Services at any point in the semester. Be mindful that this process may take some time to complete and accommodations are not retroactive. It is important to Claremont McKenna College to create inclusive and accessible learning environments consistent with federal and state law. If you are not a CMC student, please connect with the Disability Services Coordinator on your campus regarding a similar process.

Class	Date	Data Analysis Topics	Accounting Topic	Case and/or Dataset	Readings	Homework due?
1	26-Jan	Course overview				
2	28-Jan	Data transformation and visualization	Financial Ratio Analysis	Dupont	Read Dupont case study; WG: Secs. 4, 6	
3	2-Feb	Data transformation and visualization	Financial Ratio Analysis	Dupont	WG: Sec. 5.1-5.2	
4	4-Feb	Data transformation and visualization	Financial Ratio Analysis	Dupont	WG: Sec. 5.3-5.5	
5	9-Feb	Data transformation and visualization	Financial Ratio Analysis	Dupont	WG: Sec. 3.1-3.5	
6	11-Feb	Data transformation and visualization	Financial Ratio Analysis	Dupont	WG: Sec. 3.6-3.8	Yes
7	16-Feb	Relational data and exploratory data analysis	Cost Accounting	IntegrateCo	Read IntegrateCo case study; WG: Sec. 13.1-13.4.5	
8	18-Feb	Relational data and exploratory data analysis	Cost Accounting	IntegrateCo	WG: Sec. 7.1-7.4	
9	23-Feb	Relational data and exploratory data analysis	Cost Accounting	IntegrateCo	WG: Sec. 7.5-7.8	
10	25-Feb	Relational data and exploratory data analysis	Cost Accounting	IntegrateCo		Yes (from 2/23)
11	2-Mar	<b>In-class midterm</b>				
12	4-Mar	Data cleaning and querying	Internal Audit	P-card	Read P-card case study; WG: Sec. 14.1-14.3.2	
<b>Spring Break</b>						
13	16-Mar	Data cleaning and querying	Internal Audit	P-card	WG: Sec. 16.1-16.3.2, 19.1-19.4	
14	18-Mar	Data cleaning and querying	Internal Audit	P-card	WG: Sec. 15	

15	23-Mar	Data cleaning and querying	Internal Audit	P-card		Yes
16	25-Mar	Iterators and data communication	Financial Accounting	Bank investment portfolios	Read Bank Investment Portfolios case study; WG: Sec. 21.1-21.3	
17	30-Mar	Iterators and data communication	Financial Accounting	Bank investment portfolios	WG: Sec. 21.4-21.5, 28.1-28.3	
18	1-Apr	Iterators and data communication	Financial Accounting	Bank investment portfolios	WG: Sec. 28.4-28.6	
19	6-Apr	Iterators and data communication	Financial Accounting	Bank investment portfolios		Yes
20	8-Apr	Intro to statistical learning			Athey (2018); JWHT, Ch. 2, pp.15-29	
21	13-Apr	<b>Evening midterm (outside of normal class times)</b>				
22	15-Apr	Intro to statistical learning			JWHT, Ch. 2, pp. 29-42	
23	20-Apr	Basic linear models		Data from WG, Ch. 18	WG: Sec. 23	
24	22-Apr	Logistic regression			JWHT, Ch. 4, pp. 127-137	Yes
25	27-Apr	Logistic regression and resampling methods			JWHT, Ch. 5: pp.175-178	

26	29-Apr	Resampling methods & Building a statistical model	Corporate bankruptcy prediction	Bankruptcy dataset	JWHT, Ch. 5: pp.178-186	
27	4-May	Building a statistical model	Corporate bankruptcy prediction	Bankruptcy dataset		Yes
28	6-May	Building a statistical model	Corporate bankruptcy prediction	Bankruptcy dataset	<b>Project due: May 9, 11:59p.m. PDT</b>	