

# Business Analytics with Data for Non-Coders

BEPP 8970-001

*January 8 – 11/12, 2024, location Philadelphia Campus<sup>1</sup>*

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Professor Kent Smetters

Email: [smetters@wharton.upenn.edu](mailto:smetters@wharton.upenn.edu)

**Course overview.** This 0.5 CU course merges the instruction offered in Managerial Economics 6110 and 6120 (“MGEC”) with data to flesh out related concepts with practical business applications. The purpose of the course is to close the gap between the theory of business analytics and its actual practice, i.e., how you can really use it in your practice.

More than ever, there is a need for business leaders to become more data literate:

“Business leaders at every level need to become data literate and be able to understand data and analytical concepts that may have previously seemed out of reach, including statistical methods, machine learning, and data manipulation. With this spread of data literacy comes the powerful ability to make educated business decisions that rely on the smart use of data, rather than on an individual’s opinions. In the past, these tasks were extremely complex and would be handed off to engineers. With the tools that exist today, business leaders are able to dive into their own analytics and uncover powerful insights.” (Microsoft)

Normally, this type of comprehensive problem solving would require using coding languages like Python or R. However, the instructor for this course has developed a plugin no-code toolbox for Microsoft Excel that allows for end-to-end analytics, making data analytics accessible to a much wider audience. This software plugin will be provided for free to you.

You will learn how to conduct in-depth business analytics based on sensible economics reasoning. As the main project, you will build an end-to-end business workflow. The problem and data can come from a current employer, from your own startup idea, or, if needed, from the instructor to represent a hypothetical setting. In the tradition of MGEC, the course will also motivate future electives to refine components of your analysis. Ultimately, you will walk away from the course with a fuller understanding of how different business and economics concepts “fit together” to answer big, relevant questions. The hands-on experience does not require in-depth software coding, and your new skillset is repeatable for your future projects.

**Readings.** Readings from a draft video book being created by the instructor, selected articles, and textbook already used in Managerial Economics 6110 and 6120. Pre-readings will be made available one week before the course begins.

**Prerequisites.** Managerial Economics 6110 and 6120. Non-Wharton students should contact the instructor.

**Course format.** This is an experimental 0.5cu course, initial taught in compressed format as part of Wharton Opportunity Week. Attendance is mandatory.

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<sup>1</sup> An afternoon lecture will be provided on Thursday, Jan 11, for WEMBA students who must leave that evening.

**Assignments and grading.** Group project due two week after the Opportunity Week concludes (30%), class participation and peer-group grading (20%), and an individual project due within a month after Opportunity Week (50%).

- Group project: See separate guidance. **Due: Monday, Jan 22 at Midnight EST.**
- Individual project: See separate guidance. **Due Monday, February 12, midnight EST.**

**Note to Apple OS users.** Like Oracle Crystal Ball used in some Wharton courses, the no-code toolbox for Microsoft Excel developed by the instructor requires the use of Microsoft Windows and Excel. (The restriction is due to some limitations imposed by Microsoft Add-In technology versus the standard VSTO, which is being solved by Microsoft over time.) However, several Windows emulators appear to work fine, including VMWare Fusion (free) and Parallel Windows. Wharton is also setting up online virtual machines set-up for remote connection.

## **Class Schedule**

### **Day 1 (Monday, Jan 8)**

- *Morning Lecture (3 hours): **Reading data. Gathering data through a business economics lens. Strong start of Day 2 materials.***
- *Topics: Data is everywhere. But “big data” is not magic and is often worse than the best data. The best data is relevant and representative.*
- *Readings: See posted slides*
- *Use Cases: Downloading data from Yahoo!, FRED, Github, WHO, Census and more. Over 90 million data series available.*
- *Afternoon: group learning, office hours. Your group should repeat and discuss the data reading and wrangling exercises done in Day 1 and Day 2 to reinforce the learning. See separate Group tracking spreadsheet for more specific information.*

### **Day 2 (Tuesday, Jan 9)**

- *Morning Lecture (3 hours): **Wrangling and Summarizing Data through a business economics lens.***
- *Topics: Wrangling, cleaning, merging, and selecting data is often a big chore of data analytics. We show how to do it a way that is easier, repeatable and robust. Make sure that you are prepping data through a business lens that avoids confirmation bias and standard mistakes like incorrect use of dropping missing data or interpolation.*
- *Readings: See posted slides*
- *Use Cases: Merging economics and stock market data; WHO Panel Life Expectancy with hot encoding, groupby interpolation, building dynamic tables, and more*
- *Afternoon: group learning, office hours. Your group should repeat and discuss the data reading and wrangling exercises done in Day 1 and Day 2 to reinforce the learning. See separate Group tracking spreadsheet for more specific information.*

### **Day 2 boxed lunch provided by instructor**

- Will review group and individual project requirements in detail

### Day 3 (Wednesday, Jan 10)

- *Morning Lecture (3 hours): **Analyzing Data through a business economics lens***
- *Topics: Solving specific business problems using simulation, optimization and forecasting.*
- *Readings: See posted slides*
- *Use Cases: Simulation of Hospital Demand; Simulating Robustness of a Portfolio; Profit maximization with supply restrictions; third-degree price discrimination; forecasting economic variables; forecasting categorical product ratings (e.g., Wine quality); forecasting health outcomes (e.g., heart attack); (optional) minimizing transport costs; (optional) fixed income investments.*
- *Afternoon (1 - 3 hours as needed): office hours, group learning*

### Day 3 boxed lunch provided by instructor

- Will review group and individual project requirements in detail

### Day 4 (Thursday, Jan 11)

- *Morning Lecture (3 hours): **More Applications, Part I***
- *Topics: Problems include estimating supply curves from cost minimization, estimating demand, price discrimination, competition and solving extensive-form games.*
- *Readings: See posted slides*
- *Use Cases: Fitting a production function for your data based on many inputs and infer a cost function based on total quantity; fitting a simple demand function to your data; solving a more complex profit maximization problem by (StoreID, ProductID) based on scanner data; solving the best price combinations for product bundles; solving for your industry competition outcome with simultaneous moves and with first-mover advantage; solving tree-based games with multiple players acting strategically; (optional, if time permits) additional pricing models including bulk pricing, price skimming, two-part tariff; (optional, if time permits) solving the CEO compensation problem that includes cash, stock and stock options, subject to outside options.*
- *Afternoon (1 - 3 hours as needed): office hours, group learning. **Note: For WEMBA students who must leave campus, a separate session of Day 5 material will be given.***

### Day 5 (Friday, Jan 12)

- **(For WEMBA students, see Note for Day 4).**
- *Morning Lecture (3 hours): **More Applications, Part II***
- *Topics: Continuation of Day 4.*
- *Afternoon (1 - 3 hours as needed): office hours, group learning*