

ECO 520: Business Analytics Tools II

Winter 2025 Syllabus

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Lectures: Lectures will be in-person at 14 E Jackson, Room 602, Loop Campus, **between 6-9pm on Tuesdays**. The recording will be posted on D2L.

Discussion/Quick Comms: We will use Slack for quick communications and assignment discussions. The name of our Slack workspace is **ECO520 -Winter 2025-202**. Please join the workspace, by using your DePaul email, via this link [here](#).

I **strongly** encourage live attendance to lectures or immediately watching any missed lectures via the recordings (which will be posted on D2L).

Course Description and Objectives

This course builds on the techniques introduced in ECO 519 (or equivalent). We will begin with a review of the fundamental concepts such as the distinction between a sample and a population, summary statistics, confidence intervals, hypothesis testing, simple and multiple regression analysis. The course will increasingly cover more advanced topics such as logistic regression, clustering, random forests, reinforcement learning and more advanced statistical techniques to describe the data and make data driven decisions. Throughout the course we will adopt a data scientist's perspective to tackle a wide variety of interesting problems.

The purpose of this course is to equip you with a solid analytics foundation that you can build on in your future roles as data analysts/scientists, economists, statisticians, and other. The goal is to teach you “how to fish” in the land of data analytics, as opposed to memorization of concepts.

Software of Choice

In this class we will use R as our statistical software of choice. R is an open-source software that has a lot of widespread use in data analytics. The idea is to add R to your toolkit and spend minimal time on figuring out how to perform an analysis and more time to discuss model building and the intuition behind the results.

Pace of Course

The topics in this class will follow a systematic progression from simple to complex: we will start with small data sets and learn the basics of data loading and manipulations (aka data wrangling) in R, calculating summary statistics, identifying basic correlations, and estimating simple linear

regression models to help answer some interesting questions. We will gradually build towards more advanced techniques in R, such as multiple regression, logistic regression, clustering, random forests, and others. Therefore, it is very important to stay on top of the material as each week will build on the previous week's concepts and techniques.

Prerequisites

This course builds on the material from ECO 519: Business Analytics Tools (formerly GSB 420): while we will do a quick review of the ECO 519 material during the first week of class, the general expectation will be a working knowledge of the basic statistical concepts.

Assessment

- Assignments: 100%

Grading A = 93-100, A- = 90-92, B+ = 87-89, B = 83-86, B- = 80-82, C+ = 77-79,
C = 73-76, C- = 70-72, D+ = 67-69, D = 60-66, F = <60

Required Text

- None

Recommended Texts

- *Regression Modelling Strategies: With Applications to Linear Models, Logistic Regression, and Survival Analysis*, Harrell, FE. New York, NY: Springer, 2001
- *Applied Analytics through Case Studies Using SAS and R: Implementing Predictive Models and Machine Learning Techniques*, Author: Deepti Gupta, ISBN: 9781484235249, Publisher: Apress (We will use many examples from this book)

(Tentative) Course Outline

Week 1, January 7

- Review of course requirements
- Review of statistical concepts from ECO 519
- Introduction to R

Week 2, January 14

- Simple and multiple linear regression
- Interpreting R regression output
- Statistical significance

Week 3, January 21

- Multiple regression – continued
- Introduction to logistic regression

Week 4, January 28

- Logistic regression – continued
- Interpreting R logistic regression output

Week 5, February 4

- Clustering analysis
- R exercises and examples

Week 6, February 11

- Introduction to Decision Trees and Random Forests
- R exercises and examples

Week 7, February 18

- Decision Trees and Random Forests – continued
- Introduction to Reinforcement Learning
- R exercises and examples

Week 8, February 25

- ~~~~~NO CLASS~~~~~

Week 9, March 4

- Reinforcement Learning – continued
- Introduction to Time Series Analysis

Week 10, March 11

- Time Series Analysis – continued
- R exercises and example
- Closing remarks