

## Syllabus: Regression and Time Series Analysis

This course is designed for students who have taken Data Society's Introduction to R and Visualization course or have a good knowledge of R programming. This 3 ½ hour course teaches students how to apply advanced regression and time series models to accurately predict business trends and demand.

By the end of this course, students will be able to:

1. Identify the most important predictive variables in a model
2. Quantify qualitative variables and incorporate them in a predictive model
3. Build predictive models to anticipate trends and demand

Assessment:

1. **Concept reviews:** these are comprised of short five question quizzes that cover the most important concepts and ideas in each lesson. They encourage holistic understanding and are multi-faceted question types (i.e. drag and drop, fill-in-the-blanks, matching, etc).
2. **Exercises:** these are additional videos that cover the coding functions in the instructional video in more depth. They are project-based and include coding templates for students to strengthen their skills outside of the course.

Materials provided:

1. Accompanying PDFs to use as reference materials
2. R code templates from the instructional videos and exercises
3. Data sets used in the instructional videos and exercises

## Course Outline

1. **Setting up linear regression:** 34 min
  - a) Overview of data science
  - b) What is regression?
  - c) Building linear regression
  - d) Assessing your model's accuracy
  
2. **Measuring model errors:** 38 min
  - a) Calculating variance and standard deviation
  - b) Identifying outliers
  - c) Calculating covariance and correlation
  - d) Testing a model's significance
  
3. **Modeling multiple variables:** 31 min
  - a) Building a multivariate model
  - b) Plotting a multivariate regression
  - c) Identifying multicollinearity
  - d) Datafying categorical variables
  
4. **Adjusting your model:** 38 min
  - a) Validating your model
  - b) Testing for heteroscedasticity
  - c) Identifying important variables
  - d) Building nonlinear regression models
  
5. **Adding seasonality to your model:** 36 min
  - a) Transforming variables
  - b) Identifying seasonality
  - c) Calculating seasonality
  - d) Minimizing seasonality errors
  
6. **Refining your model:** 30 min
  - a) Calculating seasonality components
  - b) Predicting customer demand
  - c) Using the LOESS method
  - d) Additional considerations and tips

*Total instructional time:*

*3 hrs, 27 min*