**Section 6.4: Resampling Methods**

**Duration:** 1 hour 45 mins

**Concepts:**

* The validation set approach
* Leave-one-out cross-validation
* K-fold cross-validation
* The bootstrap

**Textbook section:** An Introduction to Statistical Learning, Chapter 5

| **Materials and Resources** | **Learning Goals** |
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| * Computers for students with R Studio * Resampling Methods Slides * Resampling Methods Exercises R Markdown file | * Learn how to use cross-validation and the bootstrap to find the best model. |

| **Duration** | **Lesson Section** | **Learning Objectives** |
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| 8 mins | Go through the validation set approach of the slides. | * The validation set approach * Drawbacks to this approach |
| 15 mins | Go through “The Validation Set Approach” section in the R Markdown file as a class. | * Use the validation set approach for a linear model |
| 5 mins | Go through the leave-one-out cross-validation section of the slides. | * Leave-one-out CV * How is it better than the set approach |
| 20 mins | Go through the leave-one-out cross-validation section in the R Markdown file as a class. | * Use `cvglm()` to perform LOOCV for a linear model. * Use `cvglm()` to choose the best degree of polynomial to fit to the data |
| 8 mins | Go through the k-fold cross-validation section of the slides. | * K-fold CV * LOOCV vs k-fold CV |
| 15 mins | Go through the k-fold cross-validation section in the R Markdown file as a class. | * Use `cv.glm()` to choose the best degree of polynomial to fit to the data using k-fold CV |
| 8 mins | Go through the bootstrap section of the slides. | * The bootstrap |
| 15 mins | Go through the bootstrap section in the R Markdown file as a class. | * Use `boot()` to find the SE of the mean of a data set * Use `boot()` to find the SE of parameters from `lm()` |