Syllabus - What you will learn from this course

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WEEK 1

WEEK 1 - OVERVIEW & CONSIDERATIONS FOR STATISTICAL MODELING

We begin this third course of the Statistics with Python specialization with an overview of what is meant by “fitting statistical models to data.” In this first week, we will introduce key model fitting concepts, including the distinction between dependent and independent variables, how to account for study designs when fitting models, assessing the quality of model fit, exploring how different types of variables are handled in statistical modeling, and clearly defining the objectives of fitting models.

3 hours to complete

8 videos (Total 73 min), 6 readings, 1 quiz **SEE LESS**

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8 videos

Welcome to the Course! 3m

Fitting Statistical Models to Data with Python Guidelines 5m

What Do We Mean by Fitting Models to Data? 18m

Types of Variables in Statistical Modeling 13m

Different Study Designs Generate Different Types of Data: Implications for Modeling 9m

Objectives of Model Fitting: Inference vs. Prediction 11m

Plotting Predictions and Prediction Uncertainty 8m

Python Statistics Landscape 2m

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6 readings

Course Syllabus 5m

Meet the Course Team! 10m

Help Us Learn More About You! 10m

About Our Datasets 2m

Mixed effects models: Is it time to go Bayesian by default? 15m

Python Statistics Landscape 1m

1 practice exercise

Week 1 Assessment 15m

WEEK 2

WEEK 2 - FITTING MODELS TO INDEPENDENT DATA

In this second week, we'll introduce you to the basics of two types of regression: linear regression and logistic regression. You'll get the chance to think about how to fit models, how to assess how well those models fit, and to consider how to interpret those models in the context of the data. You'll also learn how to implement those models within Python.

5 hours to complete

6 videos (Total 85 min), 4 readings, 3 quizzes **SEE LESS**

6 videos

Linear Regression Introduction 11m

Linear Regression Inference 15m

Interview: Causation vs Correlation 18m

Logistic Regression Introduction 15m

Logistic Regression Inference 7m

NHANES Case Study Tutorial (Linear and Logistic Regression) 17m

4 readings

Linear Regression Models: Notation, Parameters, Estimation Methods 30m

Try It Out: Continuous Data Scatterplot App 15m

Importance of Data Visualization: The Datasaurus Dozen 10m

Logistic Regression Models: Notation, Parameters, Estimation Methods 30m

3 practice exercises

Linear Regression Quiz 20m

Logistic Regression Quiz 15m

Week 2 Python Assessment 20m

WEEK 3

WEEK 3 - FITTING MODELS TO DEPENDENT DATA

In the third week of this course, we will be building upon the modeling concepts discussed in Week 2. Multilevel and marginal models will be our main topic of discussion, as these models enable researchers to account for dependencies in variables of interest introduced by study designs. We'll be covering why and when we fit these alternative models, likelihood ratio tests, as well as fixed effects and their interpretations.

4 hours to complete

8 videos (Total 121 min), 2 readings, 2 quizzes **SEE LESS**

8 videos

What are Multilevel Models and Why Do We Fit Them? 17m

Multilevel Linear Regression Models 21m

Multilevel Logistic Regression models 14m

Practice with Multilevel Modeling: The Cal Poly App 12m

What are Marginal Models and Why Do We Fit Them? 13m

Marginal Linear Regression Models 19m

Marginal Logistic Regression 11m

NHANES Case Study Tutorial (Marginal and Multilevel Regression) 10m

2 readings

Visualizing Multilevel Models 10m

Likelihood Ratio Tests for Fixed Effects and Variance Components 10m

2 practice exercises

Name That Model 15m

Week 3 Python Assessment 20m

WEEK 4

WEEK 4: Special Topics

In this final week, we introduce special topics that extend the curriculum from previous weeks and courses further. We will cover a broad range of topics such as various types of dependent variables, exploring sampling methods and whether or not to use survey weights when fitting models, and in-depth case studies utilizing Bayesian techniques to derive insights from data. You'll also have the opportunity to apply Bayesian techniques in Python.

3 hours to complete

6 videos (Total 105 min), 4 readings, 1 quiz **SEE LESS**

6 videos

Should We Use Survey Weights When Fitting Models? 13m

Bayesian Approaches to Statistics and Modeling 15m

Bayesian Approaches Case Study: Part I 13m

Bayesian Approaches Case Study: Part II 19m

Bayesian Approaches Case Study - Part III 23m

Bayesian in Python 19m

4 readings

Other Types of Dependent Variables 20m

Optional: A Visual Introduction to Machine Learning 20m

Course Feedback 10m

Keep Learning with Michigan Online 10m

1 practice exercise

Week 4 Python Assessment 20m