

WEEK

01

02

03

04

05

06

07

08

09

10

11



▶▶ FINAL EXAM ◀◀  
Thursday of Week 11 through  
Thursday of Week 12

■ Knowledge-Building:  
Analytics Models

■ Knowledge-Building:  
Cross-Cutting Concepts

■ Experience-Building

MODULE 1: INTRODUCTION

- L 1.1: Introduction to analytics modeling
- L 1.2: Introduction to the course
- L 1.3: What is modeling?

MODULE 2: CLASSIFICATION

- L 2.1: Introduction to classification
- L 2.2: Choosing a classifier
- HOMEWORK 1.1: (examples)
- L 2.3: Data definitions
- L 2.4: Support vector machines (SVM)
- L 2.5: SVM: What the name means
- L 2.6: Advanced SVM
- L 2.7: Scaling and standardization
- L 2.8: K-nearest neighbor classification
- HOMEWORK 1.2: (data set,analysis)

MODULE 3: VALIDATION

- L 3.1: Introduction to validation
- L 3.2: Validation and test data sets
- L 3.3: Splitting data
- L 3.4: Cross-validation
- HOMEWORK 1.3: (data set, analysis)

MODULE 7: EXPONENTIAL SMOOTHING

- L 7.1: Introduction to exponential smoothing
- HOMEWORK 3.1: (examples)
- L 7.2: Trends and cyclic effects
- L 7.3: Exponential smoothing: what the name means
- L 7.5: ARIMA
- L 7.6: GARCH
- HOMEWORK 3.2: (data set, analysis)

MODULE 8: BASIC REGRESSION

- L 8.1: Introduction to regression
- HOMEWORK 3.3: (examples)
- L 8.2: Estimating model quality with maximum likelihood and information criteria
- L 8.3: Using regression
- L 8.4: Causation vs. correlation
- L 8.5: Transformations and interactions
- L 8.6: Regression output
- HOMEWORK 3.4: (data set, analysis)

MODULE 11: VARIABLE SELECTION

- L 11.1: Introduction to variable selection
- L 11.2: Models for variable selection
- L 11.3: Choosing a variable selection model
- HOMEWORK 5.1: (data set, analysis)

MODULE 12: DESIGN OF EXPERIENCE

- L 12.1: Introduction to Design of Experiments
- HOMEWORK 5.2: (examples)
- L 12.2: A/B Testing
- L 12.3: Factorial designs
- L 12.4: Multi-armed bandits
- HOMEWORK 5.3: (data set, analysis)

MODULE 13: PROBABILITY-BASED MODELS

- L 13.1: Introduction ro advanced probability distributions
- L 13.2: Bernoulli, binomial, and geometric distributions
- L 13.3: Poisson, exponential, and Weibull distributions
- L 13.4: Q-Q plots
- HOMEWORK 5.4: (examples)

- L 15.5: Optimization for statistical models
- L 15.6: Classification of optimization models
- L 15.7: Stochastic optimization
- L 15.8: Basics of optimization algorithms

MODULE 16: ADVANCED MODELS

- L 16.1: Non-parametric methods
- L 16.2: Bayesian modeling
- L 16.3: Communities in graphs
- L 16.4: Neural networks and deep learning
- L 16.5: Competitive models
- L 16.5a: Competitive model demo

- COURSE PROJECT ASSIGNED
- MIDTERM EXAM

MODULE 19: RETAILER CASE

- L 19.1: Introduction to retailer case
- HOMEWORK 9.1: (case)
- L 19.2: Testing the hypotheses
- L 19.3: Using a new data source
- L 19.4: Making recommendations

MODULE 21: COURSE SUMMARY

- L 21.1: Many analysts, one dataset
- L 21.2: Course summary
- COURSE PROJECT DUE (Peer-graded)

MODULE 4: CLUSTERING

- L 4.1: Introduction to clustering
- HOMEWORK 2.1: (examples)
- L 4.2: Distance norms
- L 4.3: K-means clustering
- L 4.4: Practical details for k-means
- L 4.5: Clustering for prediction
- HOMEWORK 2.2: (data set, analysis)
- L 4.6: Supervised vs. unsupervised learning

MODULE 5: BASIC DATA PREPARATION

- L 5.1: Introduction to data preparation
- L 5.2: Outlier detection
- L 5.3: Dealing with outliers
- HOMEWORK 2.3: (data set, analysis)

MODULE 6: CHANGE DETECTION

- L 6.1: Introduction to change detection
- HOMEWORK 2.4: (examples)
- L 6.2: CUSUM for change detection
- HOMEWORK 2.5: (data set, analysis)
- L 6.3: Change-detection homework followup

MODULE 9: ADVANCED DATA PREPARATION

- L 9.1: Box-Cox transformations
- L 9.2: De-trending
- L 9.3: Introduction to Principal Component Analysis
- L 9.4: Using pricipal component analysis
- L 9.5: Eigenvalues and eigenvectors
- HOMEWORK 4.1: (data set, analysis)

MODULE 10: ADVANCED REGRESSION

- L 10.1: Introduction to CART
- L 10.2: Branching
- L 10.3: Random forests
- HOMEWORK 4.2: (data set, analysis)
- L 10.4: Logistic regression
- HOMEWORK 4.3: (examples)
- L 10.5: Confusion matrices
- L 10.6: Situationally-driven comparison
- HOMEWORK 4.4: (data set, analysis)
- L 10.7: Advanced topics in regression

- MIDTERM EXAM

- L 13.5: Queuing
- L 13.6: Simulation basics
- L 13.7: Prescriptive simulation
- L 13.8: Markov chains
- HOMEWORK 6.1: (data set, analysis)

MODULE 14: MISSING DATA

- L 14.1: Introduction to missing data
- L 14.2: Methods that don't require imputation
- L 14.3: Imputation methods

MODULE 15: OPTIMIZATION

- L 15.1: Introduction to optimization
- L 15.2: Elements of optimization models
- L 15.3: Modeling is an art: two examples
- L 15.4: Modeling with binary variables

MODULE 17: CASE FORMAT

- L 17.1: A format for discussion

MODULE 18: POWER COMPANY CASE

- L 18.1: Introduction to power company case
- HOMEWORK 8.1: (case)
- L 18.2: Models for customer identification
- L 18.3: Models for cost estimation
- L 18.4: Models for shutoff selection

MODULE 20: MONETIZATION CASE

- L 20.1: Introduction ro monetization case
- HOMEWORK 10.1: (case)
- L 20.2: Sample models
- L 20.3: Matching across data sets