

Instructor's Summary for *Murach's R for Data Analysis*

Welcome to the instructor's materials for *Murach's R for Data Analysis*. Their purpose is to help any college instructor or corporate trainer run an effective course based on the book. This summary introduces you to these materials and helps you get started using them.

At the least, we recommend that you read the topics under *What's included in the instructor's materials* because they not only describe the components but also our underlying instructional philosophy. Then, the section entitled *How to get started with our materials* guides you in getting the materials on your system and gives you charts that summarize the components at a glance.

But first, this document presents some thoughts about the structure of this book that you should be aware of. This structure is important because it gives you some flexibility in using this book for your course.

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About the structure of the book

To present the data analysis skills that your students need in a manageable progression, *Murach's R for Data Analysis* is divided into five sections.

Section 1: Get started fast

Section 1 begins by presenting the parts of the R programming language that your students should understand before getting started with data analysis. Then, it shows your students how to use the tidyverse package to perform a simple analysis of some real-world data.

Section 2: Essential skills for data analysis

Section 2 focuses on descriptive analysis, presenting the skills that guarantee your students will be successful on the job. It starts by showing how to create the basic types of plots that your students will need for data analysis. Next, it shows where and how to get data. Then, it walks students through the process of cleaning the data and preparing it for analysis. At that point, the students are ready to analyze the data and learn more advanced visualization skills.

Section 3: Three case studies

Section 3 presents three complete analyses that show your students how the skills in the first two sections can be applied to real-world data sets from the fields of political, environmental, and sports analysis. As we see it, your students can't master on-the-job skills by working only with pre-prepared sample data sets, so these in-depth analyses make sure that your students master the professional skills they need.

Section 4: An introduction to data modeling

Section 4 introduces your students to predictive analysis. More specifically, this section shows your students how to use linear regression models to predict continuous numeric values and how to use classification models to predict categorical values.

Section 5: Presentation skills

Section 5 shows your students how to present an analysis. To do that, they can use R Markdown to convert their analysis into an HTML document, PDF file, or PowerPoint slideshow. This is an important skill because the value of an analysis comes from being able to present the insights gained from it to a target audience.

About the modularity of the book

For many courses, *Murach's R for Data Analysis* presents more concepts and skills than there is time for. So please keep in mind that our book has a modular design, which means you don't have to teach all the chapters in sequence, and you have some leeway in deciding which ones to cover in your course. With that in mind, we offer these thoughts on how you can use our book:

- When your students complete section 1, you've already taught an excellent introduction to the tools for data analysis with R.

- You can teach the chapters in section 2 in whatever sequence you prefer, though they work best if you teach them in sequence.
- After you finish sections 1 and 2, you can teach sections 3, 4, and 5 in any sequence.
- You can cover the chapters in section 3 in any sequence.

So, if your students are completely new to data analysis, you can focus on sections 1 and 2, teaching them at a pace that won't leave anyone behind. But if they're able to move more quickly through those sections, you have some options about what to cover from sections 3, 4, and 5.

Beyond that, students often tell us that they keep our books for reference on the job later on. So don't worry if you don't have time to teach all the chapters...your students will still get their money's worth out of our book!

What's included in the student download

To help your students get the most from our book, our retail website at www.murach.com lets them download all the files that they need (1) to review the examples and case studies presented in the book and (2) to do the exercises presented at the end of each chapter. Appendixes A and B show your students how to download and set up these materials on their own Windows or macOS systems.

Book examples

The download includes R scripts that contain the examples that are presented in chapters 1-15. These scripts are stored in a folder named *examples*. Once your students have downloaded these scripts, they can run them to see the results, experiment with the code to learn more about how it works, and copy and paste that code into their own scripts.

Exercise starts

Each chapter in the book ends with exercises to help your students master the skills covered in the chapter. But unlike other exercises you've seen, these are designed to give your students the most practice in the least time. That's why your students will start some of the exercises from scripts that contain some of the routine code that the exercise requires. That way, your students can focus on the new skills that they're learning. These exercise starts are stored starting in a top-level folder named *exercises*.

The chapter exercises also differ from the norm in that they don't focus on trivial busywork. Instead, they guide students through the process of building scripts with a variety of data to tie all their newly learned skills together. In other words, instead of dealing with one toy dataset, your students will be practicing with the kind of data they'll encounter in the real world. In fact, if your students can successfully complete all of the book exercises, they will be well on their way to a professional level of competence.

Exercise solutions

To help students get over any learning obstacles when they're working on their own, the download also provides the solutions to the exercises in a top-level folder named *solutions*. That way, students can check the solutions to see how something is done whenever they're wasting time on what is likely to be a trivial coding mistake.

We think that providing the solutions is the right approach didactically because it helps students learn faster and better. We realize, however, that this makes it difficult for an instructor to use the book exercises to test their students. That's why the instructor's materials include projects and case study assignments that can be used for testing purposes. The next section describes these problem sets in more detail.

What's included in the instructor's materials

The instructor's materials are designed to make it easier for you to teach a course based on the text, to ensure that your students gain the data analysis skills they'll need on the job, and to evaluate their progress. So besides the materials in the student download, we provide instructional objectives, test banks, projects, case study assignments, and PowerPoint slides.

Book examples, case studies, exercise starts, and exercise solutions

These are the same materials that your students can download from our retail website. We've included them in the instructor's materials so you can demonstrate and review the book examples, case studies, and exercise solutions in class without having to download them yourself.

Objectives

We believe that instructional objectives should be the start of any educational methodology, so we provide a set of objectives for each chapter in the book. We created these objectives based on the principles presented by Robert F. Mager in his classic book, *Preparing Instructional Objectives*. As a result, our objectives describe the skills that your students should have when they complete a chapter, and you should be able to test whether they have those skills.

If you review the objectives, you'll see that the first objectives for each chapter are what we refer to as *applied objectives*. These ask the students to apply what they've learned as they develop their R scripts. These of course are the critical objectives of a data analysis course, and they are best tested by having the students develop the projects or case study problems that we provide.

After the applied objectives for each chapter, you'll find what we refer to as *knowledge objectives*. These objectives define skills like identifying, describing, and explaining the required concepts, terms, and procedures. These objectives determine whether your students are able to talk intelligently about the topics that are presented. And these objectives can be tested by the test banks that we provide.

To help you get the most from the instructional objectives, we include them at the start of the PowerPoint slides for each chapter. As we see it, if you can convince your students that they only need to have the skills that are described by the objectives, their study becomes more focused and efficient.

Test banks

To test comprehension, you can use the test banks that we've created. There's one for each chapter in the book. We developed these test banks in ExamView, and we provide them in multiple formats, including those that can be used in various LMSs including Canvas and Blackboard.

Each test bank provides questions that are designed to test the skills described by the objectives for that chapter, and each test question is designed to test the skill described by one objective. This keeps the promise to the students that they will only be expected to have the skills that are described by the objectives.

In our test banks, we use only multiple-choice test questions because they're easy to score. More importantly, they have the highest validity when it comes to assessing a student's knowledge and skills. By contrast, matching and true/false questions have low validity, so we don't use them.

Projects and solutions

To give your students practice and to test whether they can analyze data effectively, the instructor's materials include over 15 chapter-based projects. We've provided the specifications in a Word document so you can modify them if you want to, as well as in a PDF document that you can distribute to your students as is. We've also provided all the data files that are required, as well as R scripts with a model solution for each project. To familiarize your students with different kinds of data, there are several projects for many of the chapters. This helps to prepare your students for the real world.

Case study assignments and solutions

To provide a more extensive way to test the data analysis skills of your students, the instructor's materials also include 3 case study assignments. Here again, we've provided the specifications in both Word and PDF documents, along with the data files and solutions.

PowerPoint slides

In our data analysis book, the figures (or illustrations) on the righthand pages present all of the critical information, including function summaries, code examples, screen captures, and so on. Then, our PowerPoint slides are based on these figures. As a result, the slides make it easy for you to review any skills that your students are having trouble with or to answer any questions that they raise. In addition, the slides for each chapter start with the instructional objectives so you can review them in class to make sure that your students know what skills they'll be focusing on.

How to get started with our materials

As soon as they become available, you can request the instructor's materials for our book at our instructor website (www.murachforinstructors.com) and download them from your account page there. The download is a zip file. Then, you can install the materials on your computer as described below.

Once the installation is done, you can thoroughly review all of the materials. In particular, you'll want to run some of the exercise solutions, project solutions, and case study solutions to see the level of competence that our book develops. You'll also want to click through some of the PowerPoint slides to see how they can help you review and reinforce the information that's presented in the book.

How to use the zip file

1. Download the zip file of instructor's materials from your Murach account page.
2. Unzip the zip file into your Documents folder. This will create a file structure that starts with:

```
/Documents/r_analysis
```

To help you find what you're looking for, the entire file structure for the instructor's materials is shown on the next page.

The student download folders and files

r_analysis/student_download	Contents
data	The data for some of the examples and exercises.
examples	The examples presented in each chapter.
exercises	The starting points for the exercises at the end of each chapter.
solutions	The solutions for the exercises.

The instructor folders and files

r_analysis/instructors	Contents
Objectives.docx	The instructional objectives for all chapters.
case_study_assignments/ Case studies.docx Case studies.pdf	The specifications for 3 case study problems that can be assigned on a section-by-section or final-project basis. Available as Word and PDF files.
<i>case_study_name/</i>	A folder for each case study problem with its data files and solutions.
projects/ Projects.docx Projects.pdf	The specifications for chapter projects. Available as Word and PDF files.
<i>project_name/</i>	A folder for each project with its data files and solutions.
slides	One PowerPoint file for each chapter.
test_banks	One test bank for each chapter in various formats that can be imported into most LMSs.

Any comments?

If you have any comments about our book or its instructor's materials, we would be delighted to hear from you. If you discover any errors in our materials, we would appreciate hearing about them. And if you want to let us know that you're going to adopt our book for your course, that would make our day.

Just email us at the addresses below. But whether or not we hear from you, we want to thank you for your interest in our book.

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