Learning Skills Quick Guide

Intorduction to R Programming

Lorraine Gaudio

2025-08-12

Main Course Learning Objectives

A student successfully completing this course will be able to:

1. Navigate the R statistical language and programming environment
2. Identify R Studio functions and programming concepts.
3. Discover the packages and code needed to conduct fundamental mathematical and statistical analysis in R
4. Write code in R to solve sample problems
5. Explain the importance of an open-access software environment for accessibility, transparency, and reproducible social science.

Additional Learning Objectives

The rapid proliferation of artificial intelligence (AI) across all aspects of life is posing challenges to education systems aimed at preparing students. Given the transformative potential of AI for human societies, it is crucial to equip students with the values, knowledge and skills needed to navigate the future with AI. AI has an impact on student learning. This course is designed to give you the skills and foundation to be successful in an R statistics course, yet AI is highly proficient at producing code. As a researcher, you will not only need to precisely create new knowledge but also be able to explain it. Additionally, using generative AI to produce R code for you will not facilitate your learning. Yet at the same time, using generative AI to explore R code will also accelerate your learning. This course will help students strengthen their epistemic values while also targeting the development of several **AI competencies**, including:

1. **Human-centered mindset**: The dynamics of humans controlling AI versus AI controlling humans.
2. **AI techniques and applications**: Whether or not to use a specific AI system to achieve a justified aim. Before using AI, ask:

- Should AI be used in a particular situation?
- Which AI tool to select for a given purpose or task?
- What are the boundaries, goals, and constraints of a problem?

3. **Ethics of AI**: Transparency of use and guidelines for utilizing AI within rules and regulations, and privacy risks of certain AI systems.

The epistemic values of this course are associated with intellectual virtues or "**learning skills**."

Skill	Meaning	Example
Curiosity	Asking new, relevant questions and investigating them beyond what's assigned.	"While completing Q3, I wondered if the trend would look different by gender. I created an extra plot splitting the data by 'gender' to see."
Autonomy	Taking initiative and making choices about your learning path, rather than waiting for exact instructions.	"Instead of using the dataset in the example, I found a similar one from [source] so I could practice the same function on fresh data."
Thoroughness	Clearly documenting your steps and reasoning so someone else can follow your process.	"I tried two different ways to calculate the mean: 'mean()' and 'summarise()'. I noted both in my code with comments and explained why I chose to keep the 'summarise()' method."
Open-mindedness	Considering and testing alternative methods or perspectives, even if you already have a working answer.	"After getting the result with 'lm()', I also tested a robust regression with 'rlm()' to see if outliers were affecting my slope."
Courage	Speaking up with ideas or questions, especially when you're unsure, and sharing your work for feedback.	"In class, I asked my partner to check my code because I wasn't sure if my use of 'mutate()' was efficient. Their suggestion helped me simplify it."
Tenacity	Persisting through difficulties, revising code, and knowing when to seek help after genuine effort.	"It took me three tries to debug the error in Q5. I checked my syntax, then my variable names, and finally Googled the error message before finding the typo."
Transparency	Disclosing methods, materials, assumptions, values, and interests.	"I used boisestate.ai to figure out the error "Error in 'mutate()': object 'x' not found" in my code. It was due to a missing package, which I installed. I noted this in my code comments."