Principles of Scientific Computing

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Welcome

Principles of Scientific Computing (psc) collects practical guidance on writing, organizing, sharing, and maintaining code for research projects. It is the computing companion to *Principles of Scientific Writing*.

The guidance applies to any research project, whether it is a lab analysis, a course, or a software package. Most examples use R, but the principles carry over to other languages.

What's here

- **Writing code**: coding style, Python code style, coding practices, data masking, and working with big data.
- **Projects**: code repositories, reproducible environments, and code publication.
- **Collaboration**: Git and GitHub, collaborative software development, and continuous integration.
- **Tools**: the Unix command line and Quarto.
- **Resources**: learning resources for R, Git, Python, Julia, and open science.

Each page is also available as RevealJS slides (`-slides.html`), a PDF handout (`-handout.pdf`), and a Word document (`.docx`).

Related guides

- *Principles of Scientific Writing* covers writing about research and statistical analysis.
- *Working with AI* covers AI coding assistants and agent-driven pull requests.
- The UCD-SERG lab manual covers policies and resources specific to the UC Davis Seroepidemiology Research Group, such as computing clusters, onboarding, and communication.

Origin

These chapters began in the UCD-SERG lab manual and moved here, with their history, so that they can serve projects outside that group.

The UCD-SERG lab manual is a fork of the Benjamin-Chung Lab Manual, and many of these chapters keep text from the Benjamin-Chung manual. We are grateful to Jade Benjamin-Chung and that manual's other original contributors, Kunal Mishra, Stephanie Djajadi, Nolan Pokpongkiat, Anna Nguyen, Iris Tong, and Gabby Barratt Heitmann, for writing the manual and sharing it openly.

This site is built from the qwt Quarto website template, whose structure also comes from the UCD-SERG lab manual.

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