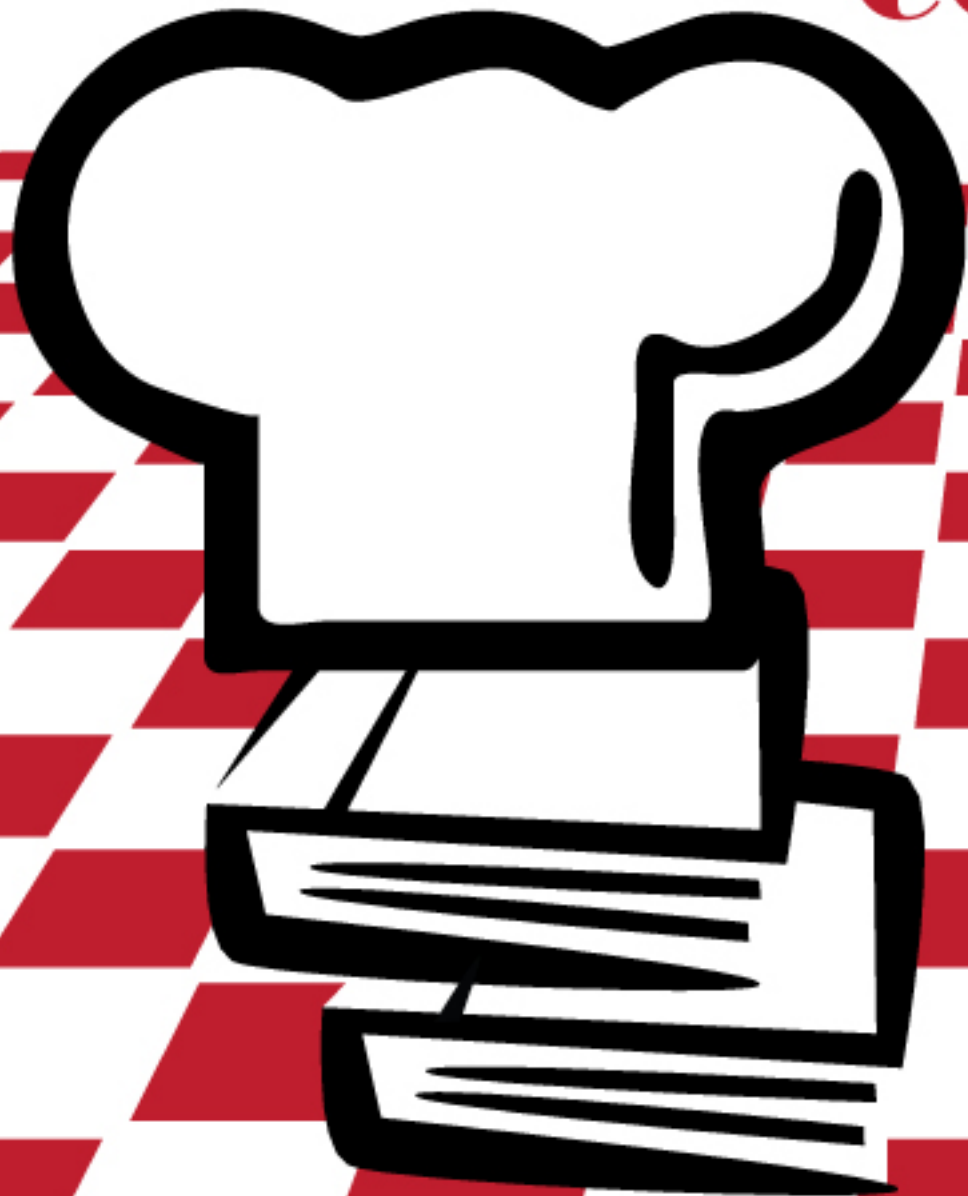


THE
DATA LITERACY
COOKBOOK

edited by Kelly Getz and Meryl Brodsky



The Data Literacy Cookbook

edited by Kelly Getz and Meryl Brodsky

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Software Carpentry AI Dente

Rendering Tech Training for Online Artisans

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NUTRITION INFORMATION

Librarians have become increasingly involved in supporting the research shift to the use of high-performance computing and big data technologies and the drive toward open science. This support involves teaching data literacy, offering research data services, and creating workshops for learning and growth at their institutions. The development of library data services has led to librarians' increasing involvement in The Carpentries, which began with Software Carpentry, a reproducible open science software training program founded in 1995. Since the growth of Software Carpentry, Data Carpentry, a training program that teaches data literacy, was founded in 2014, and Library Carpentry, an adaptation of these lessons for librarians to learn these skills, was founded in 2015.¹ The Carpentries became a joint organization of Data and Software Carpentries in 2018, and Library Carpentry was added as a third official lesson program later that year.²

This recipe was created at an institution that has taught Carpentries workshops since 2016. However, this recipe describes an alternate model for virtual learning developed in 2020 during the COVID-19 pandemic, when the Carpentries training moved online for the

first time. Combining expertise in online instruction with the tenets of the Carpentries Instructor Training, which melds educational psychology and instructional design, this recipe can be recreated or adapted at your institution for teaching data and software skills to students, faculty, and staff in a virtual environment.

TARGET AUDIENCE AND NUMBER SERVED

Serves 5–40. Participants should be limited based upon the number of available helpers, with an approximate ratio of approximately 6 participants to every helper.

LEARNING OUTCOMES

Upon completion, participants will be able to

- describe the structure and components of the language being used
- navigate between directories
- structure and restructure variables
- use and write functions
- subset (i.e., a method for accessing elements from an object based upon a certain condition) tables to answer research questions
- download and keep libraries and software packages up-to-date within a programming environment

- seek and gain assistance with programming questions online

COOKING TIME

Varies: 4–6 hours a day for 2–4 days or over one or two weekends

DIETARY GUIDELINES

The Carpentries trainings allow users to (1) incorporate open-source big data analytics languages in their research, (2) incorporate methods of automating processes to make their research more efficient, and (3) identify the library as a place for seeking support and further assistance when working with their software or data. The Carpentries tie into the frames Information Creation as a Process and Research as Inquiry from ACRL's *Framework for Information Literacy for Higher Education*.

INGREDIENTS

- A virtual meetings platform, preferably a multifunctional tool such as Microsoft Teams, which allows for a meeting space with a chat function in addition to the ability to share files, provide notes, and engage in separate conversations and meetings outside of the main meeting.
- Workshop web page according to The Carpentries' template, which provides

details about the date and time, instructors and helpers, instructions for installation, and the training schedule.

- GitHub repository with the files and the lessons provided as a readable markdown file for following along with the instructor.
- Registration form for collecting important demographic information that will assist assessment.
- E-mail templates for (1) confirmation of registration, (2) reminder for installing software, and (3) day-before communication of schedule and important information.
- Welcome message to participants at the start of each day that provides links to the schedule, lessons, and files.

PREPARATION

Early preparation involves selecting the instructors and which lessons they will teach and recruiting or updating volunteer helpers. Confirm everyone's roles and availability for the dates you have selected. Next, create and update the workshop website with correct dates and registration information, and send out marketing and communications e-mails, messages, and social media posts letting your intended participant population know about the upcoming event. One to two weeks before the workshop, test the conferencing platform with instructors and volunteer helpers. Make sure to also e-mail participants reminders about what they need to do before arriving at the workshop so accessibility issues may be addressed before-

hand. The instructor must prepare to teach at a reasonable (not too slow and not too fast) pace and should practice during this time. Last, the team should finalize the curriculum and make sure to insert breaks into the workshop schedule so learners can rest or ask questions.

INSTRUCTIONS

Participants should download software prior to the workshop. A best practice is to attend an installation troubleshooting session ahead of time (one to two days) to deal with any problems. During the workshop sessions, the instructor teaches using a modified version of the openly licensed Carpentries lessons that teach about a system, its purpose, why it is useful, and its basic layout and operations. The instructor should follow the set curriculum while the participants follow along, creating kinesthetic memory by typing and running the code themselves. Participants are given challenges along the way to situate their learning by testing their application of taught activities in new scenarios. These lessons are scaffolded, with the curriculum and challenges building on what was previously taught.

The virtual workshops should be taught by experienced instructors with a high helper-to-participant ratio in order to assist people in a virtual environment. In addition, because conversations can be taxing and distracting in a virtual environment, general questions should be asked during in-meeting chat, while tech support questions should be placed in the Teams channel (or a break-

out room). As lessons proceed through programming instructions and challenges, participants who need assistance can attend a breakout room with a helper, sharing screens and talking through problems so that they can remain engaged and on track. It is important learners feel comfortable asking for help as soon as they have a problem, because the lessons move along quickly, and the faster one receives assistance, the faster one can return to the workshop. Throughout training, the facilitators (teachers and helpers) are able to build trust and rapport, teach and support learning effectively, and as a result, participants are able to apply newly learned skills and build a relationship with their library's research data services team (who may be helpers or instructors in this workshop) for future help with their research projects.

REVIEWS/ASSESSMENT STRATEGY

The Carpentries require use of their survey instrument for assessment of activities, which allows for ease of assessment across institutions, timelines, and other variables. This instrument is helpful for assessment of preparation, the instructor's ability to teach the concepts well, and other potential opportunities for improvement.

ALLERGY WARNING

Regardless of modality, participants often arrive without having required software installed prior to the workshop. To prevent time and error issues due to delayed installation, it is recommended that facilitators do the following:

1. Add in the sign-up form a place for participants to make the commitment to install software at least 24 hours prior to the workshop.
2. Provide a 30-minute online meeting just before the workshop begins where participants can join with installation questions, needs, or problems.
3. (optional) Set up virtual computers with required software and make these available as a last resort for participants who are running into major software or hardware problems during the workshop.

CHEF'S NOTES

Depending on the interest at your institution, registration may fill up very quickly. Typically, our registration is full within hours of announcing its availability to students, particularly in the colleges of engineering, business, and science. Therefore, adding a small cost to registration or making registration available just days before the workshop can cut down on no-shows who fill up registration but do not attend, taking the places of those who would have been interested.

ADDITIONAL RESOURCES

- Carpentries. "About Us." <https://carpentries.org/about/>.
- Software Carpentry. "Our Workshops." <https://software-carpentry.org/workshops/>.

NOTES

1. Rayna Harris and Tracy Teal, "Joint Future for Software Carpentry and Data Carpentry," *Software Carpentry* (blog), September 2, 2017, <https://software-carpentry.org/blog/2017/09/merger.html>.
2. Tracy Teal and Chris Erdmann, "Library Carpentry Is Now Officially a Lesson Program!" *Carpentries* (blog), November 2, 2018, <https://carpentries.org/blog/2018/11/welcoming-library-carpentry/>.