

# R for Data Science - Syllabus

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The objective of this course is to introduce the students to effective and modern tools for data analysis, version control, and development of R packages. All the materials for the lessons can be found at the following link: <https://github.com/agila5/R4DS-PhD-Unimib> (work in progress).

## (Tentative) Program

We will cover the following topics.

1. The `tidyverse` and some of its most important packages for data manipulation (such as `dplyr`, `tidyr` and `purrr`) (4h) (Wickham et al. [2019](#), [2023b](#));
2. Debugging techniques provided by R and Rstudio (e.g. `debug()`, `browser()`, `traceback()`, and `try()/tryCatch()`). We will also explore conditions (see `?conditions`) and define a simple manual mechanism to deal with errors and warnings (2h) (Wickham [2019](#));
3. Git and Github: After creating our first github project, we will explore the most important `git` commands (e.g. `clone`, `status`, `push`, `pull`, `merge`, `diff`, ...) either via the shell or an R package (e.g. `usethis`) (2h) (Bryan [2023](#));
4. R packages (2h): We will create our first R package and discuss the most important aspects (e.g. Imports vs Depends vs Suggests or documentation). Finally, I will show you how to upload that R package on github and present the most important tools for collaborative package development (issues, comments, and PR) (2h) (Wickham et al. [2023a](#));
5. TBD (2h).

## (Tentative) Schedule

The lessons will be held in presence at the DEMS seminar room U7-2104 according to the following (preliminary) calendar:

- Friday, March 17th, 16-18;
- Tuesday, March 21st, 14-16;
- Thursday, March 23rd, 14-16;

- Monday, March 27th, 14-16;
- Tuesday, March 28th, 15-17;
- Wednesday, April 5th, 14-16.

Please notice that we are going to have class in a seminar room. Therefore, the students are kindly requested to bring their own laptop to enjoy hands-on coding sessions. Moreover, please try to install **R** and **Rstudio** before the beginning of the lessons. Any version of those two software is ok. If you have any doubt, feel free to contact me ([andrea.gilardi@unimib.it](mailto:andrea.gilardi@unimib.it)).

## Prerequisites

The students are expected to be already familiar with the basics of computer programming (e.g. for-loops, if-clauses, ...) and the R language. If you want to briefly recall the most important topics, I would recommend reading the first few chapters of Micheaux et al. (2013).

## References

- Bryan, Jennifer (2023). *Happy Git and GitHub for the useR*. URL: <https://happygitwithr.com/>.
- Micheaux, P. Lafaye de, Rémy Drouilhet, and Benoit Lique (2013). *The R software*. Springer. URL: <https://link.springer.com/book/10.1007/978-1-4614-9020-3>.
- Wickham, Hadley (2019). *Advanced R*. CRC press. URL: <http://adv-r.had.co.nz/>.
- Wickham, Hadley, Mara Averick, Jennifer Bryan, Winston Chang, Lucy D'Agostino McGowan, Romain François, Garrett Golemund, Alex Hayes, Lionel Henry, Jim Hester, et al. (2019). "Welcome to the Tidyverse". In: *Journal of open source software* 4.43, p. 1686.
- Wickham, Hadley and Jennifer Bryan (2023a). *R packages (2e): organize, test, document, and share your code*. "O'Reilly Media, Inc.". URL: <https://r-pkgs.org/>. Forthcoming.
- Wickham, Hadley and Garrett Golemund (2023b). *R for data science (2e): import, tidy, transform, visualize, and model data*. "O'Reilly Media, Inc.". URL: <https://r4ds.hadley.nz/>. Forthcoming.