

# Computer programming E140

Christian Dudel

September 6, 2023

# What will be covered in this course?

- ▶ Software: R (and RStudio)
- ▶ Mostly basic things in these programs
- ▶ Course will not cover many things
- ▶ Course will not be deep

# Goals

At the end of this course...

- ▶ ...you understand basic concepts of R
- ▶ ...you can do a basic analysis in R

# Prerequisites

- ▶ Basic demographic knowledge (e.g., you know what a 'rate' is)
- ▶ Basic statistical knowledge (e.g., you know what a 'mean' is)
- ▶ First experience using statistical software (Stata, Excel, SAS, SPSS, R, ...)

## Already an expert?

- ▶ Write a function that takes any integer as input and returns TRUE if the integer is a prime number, otherwise it returns FALSE
- ▶ Write a function that takes any integer as input and returns its amicable number if it exists, otherwise it returns FALSE
- ▶ Check one of the many tasks on [rosettacode.org](http://rosettacode.org) solved with R
- ▶ Reproduce or replicate one of the many reproducible/replicable articles available at Demographic Research
- ▶ Work on your own analysis

# Materials

Materials will be available from GitHub, also mirrored on OSF:

- ▶ <https://github.com/christiandudel/EDSD2023>
- ▶ <https://osf.io/vdq4k/>

# Contact

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# Things I work on/I am interested in

- ▶ *Topics*: Labor markets, fertility, health
- ▶ *Concepts*: Stratification, inequality, life courses, aging
- ▶ *Methods*: Longitudinal data analysis, causal inference, identification, survey methodology



## Course schedule

September 6 (Wed), 14:00-16:00 (Basics)

September 7 (Thu), 14:00-16:00 (Descriptive)

September 11 (Mon), 9:30-11:30 (Data viz)

September 12 (Tue), 14:00-16:00 (Data handling)

September 13 (Wed), 14:00-16:00 (Programming 1)

September 25 (Mon), 14:00-16:00 (Programming 2)

September 27 (Wed), 14:00-16:00 (Example)

## Other dates

Staff outing: September 14 (Thu)

Social Demography Research Day: October 13 (Fri), 10:00-15:00

## (Voluntary) exercises

- ▶ For some sessions, there will be voluntary exercises
- ▶ Exercises and solutions are available online (GitHub/OSF)
- ▶ These voluntary exercises have to be distinguished from the (mandatory!) assignment

# Assignment: Overview

- ▶ One mandatory assignment
- ▶ Assignment handed out on September 25
- ▶ Deadline: October 22
- ▶ Assignment will consist of several tasks

# Assignment: Your solutions

- ▶ You submit R code as solutions (via email)
- ▶ R code should be commented, explaining what is happening
- ▶ Code should work without errors

# Assignment: Deadline

- ▶ Deadline assignment: October 22, 12am/midnight/24:00 (CEST/Berlin time)
- ▶ Send your solutions to me ([dudel@demogr.mpg.de](mailto:dudel@demogr.mpg.de))
- ▶ You will get a confirmation (might take a bit, sorry)
- ▶ I might get back to you if I have problems with your file(s)
- ▶ It is your responsibility that your files are working!

# Assignment: Groups

- ▶ You can work in groups
- ▶ Actually, I strongly suggest you work in groups!
- ▶ Please not more than five people per group
- ▶ Please submit your solutions only once per group
- ▶ Make clear who is member of the group when submitting

# Assignment: Grading

- ▶ You can either “pass” or “fail”
- ▶ Your code should...
- ▶ ...work without errors
- ▶ ...be well-documented: Comments!
- ▶ ...should be (somewhat) efficient. If one step can do the work then don't use two or more!



## Assignment: Summary

- ▶ One assignment consisting of coding tasks
- ▶ You submit code as solutions, via email
- ▶ Deadline: October 22
- ▶ You can work in groups
- ▶ Pass/fail

# What is R?

- ▶ R is an open source statistical programming language
- ▶ First release in 1995
- ▶ Used for data analysis and statistical programming

# Why use R?

- ▶ Free, open source
- ▶ Can easily be extended
- ▶ More than 20,000 packages available
- ▶ Many methods are already implemented in R
- ▶ Commonly used in both science and industry
- ▶ Many R-related materials: Books, journals, conferences, forums, tutorials. . .

# Why use RStudio?

- ▶ R is the programming language
- ▶ RStudio is a tool to use R more efficiently (IDE)
- ▶ Features:
  - ▶ Syntax highlighting, code folding
  - ▶ Project management (e.g., GitHub)
  - ▶ Markdown support
  - ▶ ...

# Disclaimer

- ▶ R is not the only statistical software and it is fine if you prefer something else
- ▶ RStudio is not the only IDE/editor for R (ESS, RKWward, Tinn-R, ...)
- ▶ R can be used in many different ways
- ▶ Example: base R vs tidyverse vs data.table vs specialized packages
- ▶ I do things in certain ways, and this course will follow that
- ▶ This does not mean that the solutions from this course are the only or the best way to do things

# What do you need to get started?

- ▶ R: <https://cloud.r-project.org/>
- ▶ R-Studio: <https://www.rstudio.com/>