

This is to certify that

Zhuang Liu

has attended

RaukR 2021. Advanced R Programming for Bioinformatics Summer School.

The course was held in online **June 14-24, 2021** and encompassed **72** hours of lectures, computer practicals and workshops. The following subjects and fields were covered:

- reproducible research (with Christophe Dervieux and Yihui Xie, PhD, RStudio)
- best coding practises
- writing scripts, functions and R packages
- debugging, profiling, optimisation, vectorisation and parallelisation
- object-oriented programming in R
- introduction to *tidyverse*
- R-Python integration
- graphics with *ggplot2*
- basic statistics and machine learning in R
- predictive modelling with *tidymodels* (Max Kuhn, PhD, RStudio)
- iterating well with R and *tidyverse* (Jenny Bryan, PhD, RStudio)
- own project work + project presentation (32 hours)



Examination: Presence and active participation during lectures and computer exercises as well as successful completion of the collaborative project. The course was arranged by the National Bioinformatics Infrastructure Sweden (NBIS), Science For Life Laboratory (SciLifeLab) and Uppsala University, Sweden.

Uppsala, June 24, 2021



Marcin Kierczak, PhD

Associate Professor in Bioinformatics
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Course organiser



Sebastian DiLorenzo

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