Training at the Center for Reproducible Science (CRS)

Presentation at the Journées du Réseau National de la Recherche Reproductible
Eva Furrer, University of Zurich
March 26, 2024

Slides at https://osf.io/drthk
What is the CRS?

The CRS was founded in 2018 as a Center of Competence of the University of Zurich (UZH):

Centers of Competence are interdisciplinary cross-faculty scholarly networks in which researchers and research groups of the University of Zurich coordinate their work according to strategic objectives.

Funding for centers of competence is only available for a start-up period.
UZH centers of competence

Most competence centers focus on a specific scientific field and approach it in an interdisciplinary perspective.

CRS, in contrast, has a transversal focus across all fields and aims to exploit synergies in a methodological perspective.

⇒ Finding funding is more difficult

Complete list of centers
Mission of CRS

Improve overall reproducibility and quality of empirical research

- Good research practice courses
- Workshops
- Lectures

Promote original research in reproducibility and methodology

- Methodology related to reproducibility
- Replication studies
- Meta-research

Training by CRS

Improve overall reproducibility and quality of empirical research

- Good research practice courses
- Workshops
- Lectures

How to provide training for the entire university?
Faculties of UZH

Not formally part of CRS: Faculty of Theology and the Study of Religion
Partners at UZH for disseminating training

- Open Science Services of the Library
- School for Transdisciplinary Studies
- Graduate Campus and Graduate Schools of Faculties
- Office for Animal Welfare and 3R
- Enabling students to address transversal issues and challenges
- Focusing on early career researchers through training and support
- Providing services around Open Access publications and Open Data management
- Implementing ethical principles and Swiss guidelines for experiments on animals
Graduate Campus and Graduate Schools
Good Research Practice

Two day course across all disciplines through \textbf{Graduate Campus}:

- once per semester for about 20 participants
- mix of lecture-like talks and hands-on sessions
- preparation: read a paper, fill in a survey
- one small homework (currently on meta data)
- 1 ECTS
Participants

UZH Graduate Campus advertises among PhD students and Postdocs of all faculties.

Since 2019-2022 we had registrations from:

<table>
<thead>
<tr>
<th>Discipline</th>
<th>PhD students</th>
<th>Postdoc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veterinary medicine</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Medical sciences</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>Biology and Biomedicine</td>
<td>28</td>
<td>12</td>
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<tr>
<td>Natural Sciences</td>
<td>10</td>
<td>4</td>
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<tr>
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<tr>
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<tr>
<td>Law</td>
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</tr>
</tbody>
</table>
Program Day 1

- Reproducible and transparent research
- Open science principles: quick introduction
- Best practice in planning and design of studies
- Effective statistical practice: discussion of Kaas et al. (2016)
- Study protocols and registration
- Statistical analysis plans and data management plans
- How good metadata improves your research outputs
- Reproducibility clinic Q & A
Program Day 2

- Reproducibility and replicability
- Discussion: Data definition and metadata checklist
- A taste of git
- Dynamic Reporting in R (part I)
- Dynamic Reporting in R (part II)
- Reporting guidelines
- From theory to practice: a clinical case study
- Reproducibility clinic Q & A
Ten simple rules for good research practice

Planning
1. Specify your research question
2. Write and register a study protocol
3. Justify your sample size
4. Write a data management plan
5. Reduce bias

Execution
6. Avoid questionable research practices
7. Be cautious with interpretations of statistical significance
8. Make your research open

Reporting
9. Report all findings
10. Follow reporting guidelines

https://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.1010139
From Design to Paper: Make Your Research Fully Reproducible

Three day course for the Graduate School of Faculty of Arts and Social Sciences. Additional themes compared to GRP

- Open Science in qualitative research
- Intensive workshops on version control and R markdown
- Containerization
- Publication bias in Social Sciences

- More individual work, 2 ECTS
More training for Graduate Schools and Programs

- The limits and biases of published literature: From questionable research practices to publication bias, *PhD program in psychology*
- Keep calm and plan well, *Summer school EPFL*
- Reproducibility and Scientific Integrity, *SSPH+, IKMZ*
- Simple Rules for Good Research Practice, *Biomed PhD Day, USI Lugano*
- Open Science: Transparent and Reproducible, *UZH Open Science summer school*

[Link to dates and material]
School for Transdisciplinary Studies
5 Steps to Good Data Science Practice in R

Master and bachelor students of all disciplines

- who work at least in part empirically.
- who have gained first experience with research
- who are active users of the scientific literature
- who had an introduction to statistics
- who have good computer knowledge is expected including experience in R (e.g. be comfortable in manipulating data and objects and know how to use existing functions and packages).

Within the School of Transdisciplinary Studies
www.sts.uzh.ch
Learning goals: 5 Steps to Good Data Science Practice in R

Participants who successfully passed the module

- know how to use a version control system such as Gitlab and have practiced using it for the duration of the module
- are able to write functions in R and use unit tests as well as other advanced R programming techniques
- understand how to avoid questionable research practices
- know key principles of good statistical practice and are able to apply them

Flipped learning course with online preparation and 2 hour on-site practice every other Tuesday, 1 ECTS
Office for Animal Welfare and 3R
Mandatory continuous education for animal researchers

Parts of full-day modules:

- What does that mean "doing research well"?
- What is publication bias? What is fiddle?
- Reproducibility and Replication

Link to dates and material
More training for animal researchers

- Animal experimentation and alternative methods in biomedical research: two lectures for master students in biology and biomedicine
- Reproducibility - where to start? VetSuisse information event
- Presentations at Swiss Laboratory Animal Science Association meeting

Project within SwissRN: Establishing preregistration among animal researchers in Switzerland

Planned: Reproducibility Hackathon and Prize in collaboration with the Swiss 3R competence center
CAMARADES Zurich

CAMARADES: The Collaborative Approach to Meta Analysis and Review of Animal Data from Experimental Studies

Started 2004 in Edinburgh, in Zurich since 2023
Open Science Services of the University Library
Training related to Open Research Data

- Publishing personal and sensitive data: anonymization in R
- Lunch and learn series: p-values, replication, meta data, FAIR data
- Presentations on reproducibility and similar topics at Open Access Days
- Teaching tools for UZH teaching staff: Open Science, Gitlab, Containerization, see https://teachingtools.uzh.ch/
How to utilize the continuous integration functionalities of Gitlab to automatically check homework submitted to Gitlab?

This tool was written by Eva Furrer and Reto Gerber.

Git is a version control system for text-based files such as files containing programming code, providing a fail-safe backup (if used with a remote copy). The University of Zurich provides a Gitlab instance through https://gitlab.uzh.ch (more prominent but commercial instances of a Git system are Github and Bitbucket).
More offers and material
Group training in research groups

Reproducibility Lab Pitch

Reproducibility Lab pitches are workshops held by members of the CRS. They cover methodological topics regarding reproducibility and good research practice tailored towards the specific situation of the lab.

Former CRS postdoc Simon Schwab established statistical lab pitches with the → biostatistics consulting team for clinics at USZ or institutes of the Faculty of Medicine. Examples of such workshops can be found → here.

The CRS promotes Reproducibility Lab Pitches in a wider context and is looking for collaborators with pertinent expertise. Please → contact us if you are interested.

CRS Primers

- Analysis of replication studies
- File naming conventions
- Principles of Data Visualizations
- Digital Collaboration
- Observational Studies in Clinical Research
- Systematic Reviews
- Cross-Over Trials
- Dynamic Reporting
Outreach
UZH Reproducibility Day
February 9, 2023

10:00 – 12:00  KOL-F-101
Keynote by President of the National Research Council at SNSF
Prof. Dr. Matthias Egger
Welcome address by Vice President Research
Prof. Dr. Elisabeth Stark
Introduction by Director of the CRS
Prof. Dr. Leonhard Held

14:00 – 16:30  KOL-F-101 / 109 / 123
Hands-on workshops on
- Sample size planning
- Dynamic reporting
- Containerization
- Design of replication studies
- Preregistration
- Open data

16:30 Apéro

Registration required for workshops and apéro. For more information and registration see www.reprozurich.org

Organized by CRS www.crs.uzh.ch
12:00 Uhr

Gute Forschung erkennen
Dr. Rachel Heyard, PD Dr. Dr. Benjamin Victor Ineichen, UZH

- 2021: Covid-19 vaccines – from laboratory to regulatory approval
- 2019: More facts, less fiction
Thank you very much!

Visit our website: www.crs.uzh.ch

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