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Scientific Writing

Good Scientific Practice

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Contents for Today

1. **Short introduction** 15 Min
2. **Group Task** 45 Min:
   Prepare a short presentation on given guidelines
3. **Present results** 30 Min

About the DFG Code of Conduct (19 Guidelines)

What this course follows:

- The German Research Foundation (**DFG**) publishes the *Guidelines for Safeguarding Good Research Practice (Code of Conduct)* with **19 guidelines**.
- These guidelines set standards for integrity, methods, authorship, and handling misconduct in research.
- We use these guidelines as the backbone of this section.

DFG Code of Conduct (19 Guidelines): https://www.dfg.de/en/basics-topics/basics-and-principles-of-funding/good-scientific-practice/code-of-conduct

How this course is structured

Five Teaching Blocks

We group the 19 guidelines into 5 blocks:

Block 1: Scientific Integrity and Ethics	(1, 2, 10)
Block 2: Responsibility of Institutions and Researchers	(3, 4, 5, 8)
Block 3: Research Design, Documentation and Reproducibility	(7, 9, 11, 12)
Block 4: Publications, Authorship and Openness	(13, 14, 15, 17)
Block 5: Misconduct, Conflicts and Peer Review	(6, 16, 18, 19)

Block 1 Scientific Integrity and Ethics

Overview

Guidelines covered:

- Guideline 1: Commitment to the general principles
- Guideline 2: Professional ethics
- Guideline 10: Legal and ethical frameworks, usage rights

Scientific integrity means honesty, responsibility, and respect for ethical and legal frameworks in all research phases.

Guideline 1: Commitment to the general principles

Explanation:

- Institutions define and communicate rules of good research practice.
- Researchers must ensure their behaviour complies with these standards.
- Principles: work lege artis, honesty, questioning all results, promoting critical discourse.

Example:

A researcher develops a new machine learning algorithm. Instead of only publishing the best-performing model, they also report limitations, failed tests, and openly share the training data and parameters. This enables reproducibility and critical discussion.

Guideline 2: Professional ethics

Explanation:

- Researchers put core values of science into practice and advocate for them.
- Education in good research practice begins early in academic training.
- All researchers update their knowledge of standards and support each other across career stages.

Example:

In a programming course, senior PhD students mentor first-year students on proper citation of code, highlighting why copying open-source code without attribution is misconduct. This promotes a culture of integrity in software research.

Guideline 10: Legal and ethical frameworks, usage rights

Explanation:

- Researchers comply with laws, contracts, and ethics approvals.
- They assess possible consequences and risks of their work (e.g. dual-use).
- Usage rights for data and results should be clarified early.

Example:

A research team trains an AI model using social media data. They obtain proper ethics approval, anonymize personal information, and sign data usage agreements. They also consider risks of misuse, e.g. the model being repurposed for surveillance/monitoring.

Group Activity – Ethical Dilemmas

Group Task 45 Min

- Discuss one ethical or legal dilemma in computer science research.
- Propose a responsible solution.

Plenary Discussion

Questions:

- Which dilemmas did the groups identify?
- What concrete solutions were suggested?

Block 2 Responsibility of Institutions and Researchers

Overview

Guidelines covered:

- Guideline 3: Responsibility of heads of research institutions
- Guideline 4: Responsibility of heads of research units
- Guideline 5: Dimensions of performance and criteria for assessment
- Guideline 8: Responsibilities and roles in the research process

Institutions and leaders must provide clear structures, fair assessment, and transparent responsibilities to foster a culture of integrity in research.

Guideline 3: Responsibility of heads of research institutions

Explanation:

- Ensure framework conditions that safeguard good research practice.
- Provide adequate career development and avoid misuse of power.
- Establish transparent procedures for dealing with misconduct.

Example:

A computer science faculty sets up mandatory data management policies and provides workshops on reproducible software development. This creates structures that support all researchers equally.

Guideline 4: Responsibility of heads of research units

Explanation:

- Heads of groups ensure proper supervision and organization.
- Responsibilities are distributed fairly, avoiding exploitation.
- They foster independence and career development of junior researchers.

Example:

A lab head running a software engineering group sets clear authorship agreements before the project starts and regularly discusses progress to ensure fair recognition of each team member.

Guideline 5: Dimensions of performance and criteria for assessment

Explanation:

- Research performance should be evaluated by quality, not quantity.
- Broader dimensions (e.g. teaching, mentoring, knowledge transfer) count.
- Personal circumstances are considered in assessments.

Example:

When evaluating a researcher, the department values well-documented open-source software contributions and community tutorials as much as traditional publications.

Guideline 8: Responsibilities and roles in the research process

Explanation:

- Roles and responsibilities must be defined clearly at the start of projects.
- Adjust roles dynamically as projects evolve.
- This ensures accountability and fairness.

Example:

In a collaborative project on cybersecurity, one researcher is responsible for data collection, another for algorithm development, and another for evaluation and documentation. This clarity prevents misunderstandings.

Group Activity – Roles and Fair Assessment

Group Task 45 Min

- Develop guidelines for a fictional research team that ensure clear roles and fair recognition.
- Think of an order for these fictional characters and explain why.

Plenary Discussion

Questions:

- Which role distributions and measures did the groups suggest?

Block 3 Research Design, Documentation and Reproducibility

Overview

Guidelines covered:

- Guideline 7: Cross-phase quality assurance
- Guideline 9: Research design
- Guideline 11: Methods and standards
- Guideline 12: Documentation

Plan well, use state-of-the-art methods, and document everything so others can repeat your work.

Guideline 7: Cross-phase quality assurance

Explanation:

- Follow accepted standards at every step.
- When you publish, say how you checked quality.
- If you find errors later, correct or retract.
- Name the source of data, code, and tools; make results repeatable.

Example:

An ML team shares code, data version, random seeds, and the exact environment (e.g., container). After finding a bug in evaluation, they post an erratum and add tests to prevent it again.

Guideline 9: Research design

Explanation:

- Start with a careful review of related work.
- Set clear questions, metrics, and a simple analysis plan.
- Reduce bias (e.g., blinded labels, fixed stopping rules).
- Consider gender/diversity and context in your data and results.

Example:

Before a speech model, the team checks dataset coverage, defines fairness metrics, and preregisters an ablation plan to avoid cherry-picking.

Guideline 11: Methods and standards

Explanation:

- Use sound, appropriate methods; explain new methods clearly.
- Follow community standards (baselines, benchmarks, multiple runs).
- Get missing expertise via training or collaboration.

Example:

A systems paper reports mean & variance over several runs, compares to strong baselines, and releases a Dockerfile plus unit tests to rebuild results.

Guideline 12: Documentation

Explanation:

- Document all steps needed to check the result.
- Include negative or null results; do not cherry-pick.
- Follow field rules; explain any limits in your docs.
- Protect logs and results from changes; cite clearly.

Example:

A data project ships a README, data sheet (provenance, license), versioned configs, and notebooks for preprocessing; non-significant tests go in an appendix.

Group Activity – Research Design, Documentation and Reproducibility

Group Task 45 Min

- Make a **1-page checklist** for Quality Assurance and documentation for a small CS project.
- The checklist should cover handling of data, code, experiments, and recording of negative results.

Plenary Discussion

Questions:

- Which Quality Assurance steps did the groups choose and why?
- How does the checklist help others to repeat the work?

Block 4 Publications, Authorship and Openness

Overview

Guidelines covered:

- Guideline 13: Providing public access to research results
- Guideline 14: Authorship
- Guideline 15: Publication medium
- Guideline 17: Archiving

Share results clearly, give proper credit, choose trustworthy venues, and archive data/code so work can be reused.

Guideline 13: Providing public access to research results

Explanation:

- Decide yourself whether, how, and where to publish.
- Describe results fully; where possible share data, materials, methods, and software.
- Follow FAIR (Findable, Accessible, Interoperable, Reusable)

Example:

Release code and dataset in a trusted repo (e.g., GitHub, Zenodo, DOI) with a clear license, README, and metadata. Publish one solid paper instead of several minimal ones that split the same result.

Guideline 14: Authorship

Explanation:

- Author = genuine, identifiable contribution to content (text, data, or software).
- All authors approve the final version; responsibility is shared.
- No honorary/guest authors; order based on clear criteria; use acknowledgments for non-author help.

Example:

Team roles: dataset curation, model design, experiments, writing. Decide order early (e.g., first = main analysis, last = PI). A colleague who only ran a few plots is acknowledged, not added as author.

Guideline 15: Publication medium

Explanation:

- Select venues carefully (journals, conferences, repositories).
- Check peer-review, ethics/data policies, and editorial board; beware predatory venues.
- Quality of the work does not depend on the medium.

Example:

Before submitting to a new journal, check indexing, review process, APC (Article Processing Charges) transparency, and policies on data/code. For CS, consider a reputable conference and an open repository for artifacts.

Guideline 17: Archiving

Explanation:

- Archive raw data, code, key materials, and (if used) research software for an appropriate period (often $\sim$10 years, field-dependent).
- Ensure access and identifiers (e.g., DOIs); explain if some data cannot be stored.
- Institutions (e.g. GWDG) provide infrastructure to enable archiving.

Example:

Store raw logs, training data version, configs, and container image in a repository with a DOI. Sensitive data: keep encrypted with controlled access; add a data-use agreement and a retention plan.

Group Activity – Publishing, Authorship, Archiving

Group Task 20 Min

- **Authorship:** Evaluate a fictional author list (Professor who provided funding, PhD who built the model, Research Assistant who labeled data, engineer who set up infrastructure). Propose an order and justify it.
- **Archiving:** Draft a 6-point archiving plan (what, where, how long, access, identifiers, licenses) for a small dataset + codebase.
- **Venue check:** Pick a target journal/conference and list 5 checks to avoid predatory venues.

Plenary Discussion

Questions:

- What criteria did you use for authorship order and why?
- How does your archieving plan look like?
- Which checks best detect unreliable publication venues?

Block 5 Misconduct, Conflicts and Peer Review

Overview

Guidelines covered:

- Guideline 6: Ombudspersons
- Guideline 16: Confidentiality and neutrality of reviews
- Guideline 18: Complainants and respondents
- Guideline 19: Procedures for alleged misconduct

Handle conflicts and suspected misconduct fairly: protect people, keep reviews confidential, and follow clear procedures.

Guideline 6: Ombudspersons

Explanation:

- Each institution appoints independent ombudspersons (GAUSS).
- They advise confidentially on good practice and conflicts.
- They can forward cases to the proper committee when needed.

Example:

A PhD fears unfair authorship. They contact the local ombudsperson, who keeps it confidential, mediates a meeting, and, if needed, refers the case to the investigation committee.

Guideline 16: Confidentiality and neutrality of reviews

Explanation:

- Keep manuscripts/proposals strictly confidential; do not reuse content.
- Declare conflicts of interest and recuse when needed.
- Members of panels must follow the same rules.

Example:

A Committee member recognizes a submission from a close collaborator. They declare the conflict and step out. They never use the code ideas seen during review.

Guideline 18: Complainants and respondents

Explanation:

- Protect both sides; apply presumption of innocence.
- Complaints must be in good faith; malicious claims are misconduct.
- Anonymity may be allowed if facts are concrete; careers must not be harmed.

Example:

An anonymous tip alleges fabricated benchmarks. The committee accepts detailed evidence, keeps names confidential, and ensures the accused faces no penalties unless misconduct is proven.

Guideline 19: Procedures for alleged misconduct

Explanation:

- Institutions define what counts as misconduct (e.g., fabrication, falsification, plagiarism).
- Clear, lawful steps: intake, assessment, investigation, hearing, decision, measures.
- Process is timely, fair, and confidential; sanctions match severity.

Example:

A study merges training and test data. After investigation and hearing, the paper is retracted, the lab updates Quality Assurance rules, and the institution issues measures per policy.

Group Activity – Handling Conflicts and Misconduct

Group Task 45 Min

- Draft a **response plan** for a suspected data manipulation case in a CS project.
  - Create a **3-step route to help** (student → ombudsperson → committee)
    - Create a situation

Plenary Discussion

Questions:

- How do your plans protect both the complainant and the respondent?
- What steps ensure a fair procedure?