



# Responsible Conduct of Research

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## Learning Objectives

1. Be able to explain and use some of the basic RCR terminology.
2. Identify good practices and violations of RCR when presented with hypothetical and real examples.
3. Apply RCR in GEP research, such as genome annotation and reporting.

## How much background do I need to have to analyze a case study?

Anyone can participate in the analysis of a case study. That approach is complementary to this document. Your instructor might give more specific parameters for this course about how much terminology must be learned.

## Introduction

A basic requirement for research in science to function productively and with the support of the public is responsible conduct. Sometimes called research ethics, Responsible Conduct of Research (RCR) is expected from students participating in the Genomics Education Partnership (GEP).

“The responsible conduct of research (RCR) is essential to good science. RCR promotes the aims of scientific inquiry, fosters a research environment that enables scientists to work together toward common goals, and promotes public confidence in scientific knowledge and progress for the public good.<sup>1</sup>”

Most prominent of the granting agencies of the U.S. Federal Government is the National Institutes of Health (NIH) which provides many online materials about RCR. Further, NIH requires recipients of NIH grant funding to abide by NIH standards of RCR and requires Principle Investigators (PIs) to provide training for all participants in the funded research. Other grant-making agencies, professional associations, and journals have similar requirements. Universities and colleges also require that faculty, staff, and students base their behavior on RCR standards.

## Topics in RCR

1. conflict of interest—personal, professional, and financial
2. policies regarding human subjects, live vertebrate animal subjects in research, and safe laboratory practices
3. mentor/mentee responsibilities and relationships
4. collaborative research including collaborations with industry

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<sup>1</sup> [NIH Sourcebook](#)

5. [peer review](#)
6. data acquisition, management, sharing, and ownership
7. research misconduct and policies for handling misconduct

## Authorship

There are few issues in the scientific community that arise and/or are discussed more frequently than authorship. “[Publish or perish](#)” is often used to describe the immense pressure among researchers to publish their findings. Failing to publish can have profound implications for the careers of scientists (academically, socially, and financially) and the careers of the students working in their labs. Therefore, the scientific community holds authorship with the utmost regard and student researchers, such as yourself, should also.

While it is ultimately up to each scientific journal how they choose to define the basis for authorship and contribution, the authorship criteria defined by the [International Committee of Medical Journal Editors \(ICMJE\)](#) is widely accepted. According to ICMJE, their authorship standards ensure that everyone who makes substantive intellectual contributions to a paper receives credit for doing so (i.e., authorship confers credit) and implies responsibility and accountability of all authors for published papers. Thus, all authors of a paper are expected to review and approve the final draft before it’s submitted for publication.

## Research Misconduct

Student annotators must maintain the integrity of the research record. That begins with the “lab notebook” and continues through reading the later drafts of the manuscripts. The Annotation Report has checkboxes for affirming the desire to participate as a potential co-author. Co-authors are responsible for reading the draft manuscript, providing a critique (including checking the details of their reported annotation), and approving the final manuscript. Failure to maintain an accurate “lab notebook” or to report results accurately, and/or failure to carry out the duties of a co-author after expressing a willingness and desire to be a co-author, is scientific misconduct.

The U.S. Federal government defines research misconduct as fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results<sup>2</sup>.

- **Fabrication:** making up data or results and recording or reporting them
- **Falsification:** manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record
- **Plagiarism:** appropriation of another person's ideas, processes, results, or words without giving appropriate credit

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<sup>2</sup> [Federal Research Misconduct Policy](#)

## Checks For Understanding

1. What is the kind of scientific misconduct exemplified in the following: An annotator took notes carefully, including screenshots, but later deleted the screenshots that did not support the resulting coordinates.
  - a. fabrication
  - b. plagiarism
  - c. falsification
  - d. peer review
2. What is the kind of scientific misconduct exemplified in the following: The draft manuscript circulated for a student's approval uses the exact same wording of one sentence as was used by a prior publication by the same organization.
  - a. fabrication
  - b. plagiarism
  - c. falsification
  - d. peer review
3. Many scientific guidelines including principles of responsible research in the life sciences come from the:
  - a. NIH
  - b. GEP
  - c. CIA
  - d. FlyBase
4. Provide one way that each of the following might be hurt by a student's falsification of data.
  - a. The student involved in the research.
  - b. Lab partner students involved in the research project.
  - c. The Principle Investigator (PI) leading the research project.
  - d. The scientific journal that publishes the research paper.
  - e. The general public.
5. A student is one of 500 authors on a research paper, and they are sent a request to review a paper before it's submission. The student finds themselves unable to review the paper by the deadline provided. Which of the following are appropriate responses to the request. *More than one answer may be correct.*
  - a. Request extra time to be able to review the paper.
  - b. Trust the other 499 authors to correct any mistakes and send back the paper without reviewing it.
  - c. Request their name be removed from the authorship of the paper.
  - d. Contact their Principle Investigator (PI) to ask them to review the paper for them.
  - e. Ignore the request to review the paper and assume they will be included in the authorship.