



**ST. MARY'S COLLEGE OF MARYLAND POLICY AND PROCEDURES
RESPONSIBLE CONDUCT OF RESEARCH TRAINING PLAN**

Effective Date: December 7, 2016

Rev. August 4, 2025

Introduction

Science is a fundamental process that we use to gain knowledge about the world around us. Utmost integrity is both required and critical because science is built upon a foundation of trust and honesty. Data and findings must be repeatable, and experiments and data collection are key to the self-correcting nature of science. While data may be interpreted differently among scientists, there is very good agreement on what constitutes the core of ethical or Responsible Conduct of Research (RCR).

Before participating in research funded by the National Science Foundation (NSF) or the National Institutes of Health (NIH), the federal government requires that you be trained in the basic elements of RCR. The basic elements of RCR are: research misconduct; data collection, ownership and management; responsible authorship and peer review; conflict of interest; mentoring; and collaborative research. Studies involving human or animal subjects have additional requirements that are necessary before participating in research.

Although all Principal Investigators (PIs) at St. Mary's College of Maryland (St. Mary's) are bound by the *St. Mary's College of Maryland Responsible Conduct of Research Compliance Policy* and the *St. Mary's College of Maryland Responsible Conduct of Research Compliance Procedures*, PIs may elect to develop their own RCR training plan to ensure adherence with NSF and NIH requirements. PIs electing this route should coordinate with the Office of Research and Sponsored Programs.

The basic elements of RCR that should be considered as discussion points for PIs and research participants are listed below. The list is not necessarily exhaustive, nor are all elements necessarily relevant to each research project. PIs should use their best judgement to ensure RCR training covers the topics relevant to their research project and that each research participant clearly understands how to ethically and responsibly conduct their part of the research project before beginning work.

Basic Elements of RCR

Research Misconduct: Research misconduct or misconduct in science means fabrication, falsification, plagiarism, or other practices that seriously deviate from those that are commonly accepted within the scientific community for proposing, conducting, or reporting research. Fabrication is making up data or results and recording or reporting them. Falsification is manipulating research materials, equipment, or processes, or changing or omitting data/results. This means that the research is not accurately represented in the research record. Plagiarism is the

appropriation of another person's ideas, processes, results, or words, without giving appropriate credit. Research misconduct does not include honest errors or honest differences in interpretations or judgments of data.

Data Collection, Ownership and Management: Data means all recorded information, regardless of the form or media on which it may be recorded. Data are the underlying forms of output that are used as a basis for reporting scientific results and findings. Responsible planning, collection, analysis, publication, retention, and sharing of data is critical in maintaining the quality of science. This area of RCR also includes decisions on what to collect, how to collect it, and who will collect it. Data must be accurate, unbiased, and retrievable. Depending on the context of the research, confidentiality may also be an important component of proper data management.

Responsible Authorship and Peer review: The outcome of scientific research is usually a published paper or conference presentation. There are several fundamental principles in determining authorship. The expectation is that an author is one who has made substantial contribution to conception, design, acquisition of data, or analysis and interpretation of data. Another principle is that an author has contributed to drafting of an article or revising it critically for intellectual content. A third principle is that an author has given final approval of the version to be published. Peer review is the flip side of authorship. Scientists are often called upon to review each other's papers, grant proposals, or requests for conference presentations. Almost always these reviews are confidential which allows reviewers to maximize their independence in making impartial judgments and reaching an unbiased evaluation. Three principles in proper peer review are: don't copy, don't share with colleagues, and never contact an author directly about a paper or grant proposal.

Conflict of Interest: Conflict of interest is a legal term that encompasses a wide spectrum of behaviors or actions involving personal gain or financial interest. The contextual definition depends on state and federal laws. Generally, a conflict of interest exists when an individual exploits, or appears to exploit, his or her position for personal gain or for the profit of a member of his or her immediate family or household. However, conflicts of interest need not be exclusively financial; any conflict which puts at risk the integrity and objectivity of the research process is cause for concern. This includes conflicts of commitment when an individual is trying to do too much and fails to do a good job on the research project, and conflict of conscience when a deeply held conviction interferes with the ability to be completely objective in the conduct of science.

Mentoring: It is widely accepted that the proper conduct of science depends greatly on good mentoring. Mentoring conveys the notion of a deeper, more involved, relationship than simply advising. Mentoring begins with a clear understanding of mutual responsibilities, a commitment to maintain a productive and supportive research environment, proper supervision and review, and an understanding that the main purpose of the relationship is to prepare trainees to become successful researchers. Mentors typically have expectations for their students and laboratory workers including active participation in lab activities, a good work ethic, honest communication with the mentor regarding research progress, and an effort to foster a collegial relationship with the mentor. It is recommended, but not required, for mentors and mentees at St. Mary's to agree to a written learning contract or similar document to make expectations of the relationship explicit.

Collaborative Research: Modern science is increasingly collaborative often involving large teams of investigators, sometimes at other universities or at entities outside academics such as corporations. This increased complexity brings with it certain responsibilities. These include:

agreement on ground rules early in the collaboration, avoiding authorship disputes, sharing of materials and information with internal and external collaborating researchers, agreeing on goals and anticipated outcomes. It is important to agree, early in the collaboration, on the role of each partner in the collaboration, methods for data collection, storage, and access. It is also important to agree on how changes in the scope of the research will be addressed, who will draft publications, how authorship will be determined, and how intellectual property rights and data ownership will be determined.

Human and Animal Subjects: There is a legislative history and many rules and regulations regarding the use of human beings in research. The St. Mary's Institutional Review Board (IRB) evaluates research using human participants that is conducted by members of the college community. The IRB reviews all human subject research including proposed changes in previously approved human subject research. The IRB has the authority to approve, require modification in, or disapprove all human subject research. Likewise, there is a legislative history and specific rules and regulations regarding the use of animals in research. All research (including classroom activities and St. Mary's Project research) involving vertebrate animals must be approved by the St. Mary's Institutional Animal Care and Use Committee.

Training Components

As stated in the *St. Mary's College of Maryland Responsible Conduct of Research Compliance Procedures*, instruction in RCR should occur both formally and informally throughout the research training experience. Substantial face-to-face discussions among the participating trainees/fellows/scholars/participants; a combination of didactic and small-group discussions (e.g., case studies); participation of faculty members during instruction in RCR; and use of available online training courses as part of research training are highly encouraged.

Online courses covering RCR are provided by the Collaborative Institutional Training Initiative (CITI, see below) training program and are available to all PIs and research participants at St. Mary's. It is **highly recommended** that all undergraduate students, graduate students, and postdoctoral researchers supported by NSF research funding and all trainees, fellows, participants, and scholars receiving support through any NIH training, career development award, research education grant, or dissertation research grant complete an online RCR course through CITI. While online courses can be a valuable supplement to instruction in RCR, **online instruction is not considered adequate as the sole means of instruction**. At the discretion of the PI, if the participant is properly trained in RCR elements as outlined above, the online training component can be waived.

If other external sponsors require RCR training it is the responsibility of the PI to work with the Office of Research and Sponsored Programs at St. Mary's to ensure that those requirements are met.

Helpful Resources

You are a critical part of responsible conduct of research at St. Mary's. You can help by being aware of these issues and participating responsibly. There is a considerable amount of reading material and websites on these topics (see examples below) and your Principal Investigator (PI) may have additional materials for you to read.

- Federal Office of Research Integrity website: <http://ori.hhs.gov/>

- American Association for the Advancement of Science: Scientific Responsibility, Human Rights & Law website: <https://www.aaas.org/programs/scientific-responsibility-human-rights-law/programs>
- *On Being A Scientist: A Guide to Responsible Conduct In Research* (third edition book) is available as a PDF from Research Administrator Jenn Kersch at mjkersch@smcm.edu.

CITI Training for RCR

CITI provides RCR courses, which help address RCR training requirements when combined with face-to-face mentoring on responsible and ethical conduct of research. All St. Mary's employees have access to these courses, which are customized into the following discipline-specific options: Biological Sciences, Humanities, Physical Science, Engineering, Social and Behavioral, and Administrative.

In partial fulfillment of RCR training requirements, individuals engaged in sponsored research may take the online CITI training for RCR. To do so, please follow the instructions below:

- Go to: www.citiprogram.org/.
- Register with CITI by entering 'St. Mary's College of Maryland' as your institution and completing the required fields. Registering with CITI will create a username and password. Feel free to say 'no' to the Continuing Education credit option (this option is at the discretion of individual users).
- Select the RCR course that is most appropriate for the research you will be conducting. If you cannot complete the training in one sitting, you can save and finish at a later time (i.e., you can stop and start as many times as you need).
- Once you have completed a course, you may view, print, or share a completion report. **It is recommended that you keep a copy of your completion report, but you do not need to submit the report;** the St. Mary's coordinator for CITI training can view completion reports for all completed courses.
- Jenn Kersch (mjkersch@smcm.edu) is the current St. Mary's coordinator for CITI training and will be happy to assist you and answer any questions.

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