Reference Guide for Research Integrity

Toronto Metropolitan University

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About the Reference Guide

This Reference Guide for Research Integrity is a complementary resource to the University's Research Integrity Training Modules. The Reference Guide provides additional information on matters concerning SRC integrity, including an extended introduction detailing the importance of research integrity education and training, and an elaboration of research integrity values and principles as they align with the research cycle. Additional resources, case studies, and tools can be located throughout the Reference Guide to further your inquiry into, and understanding of, research integrity.
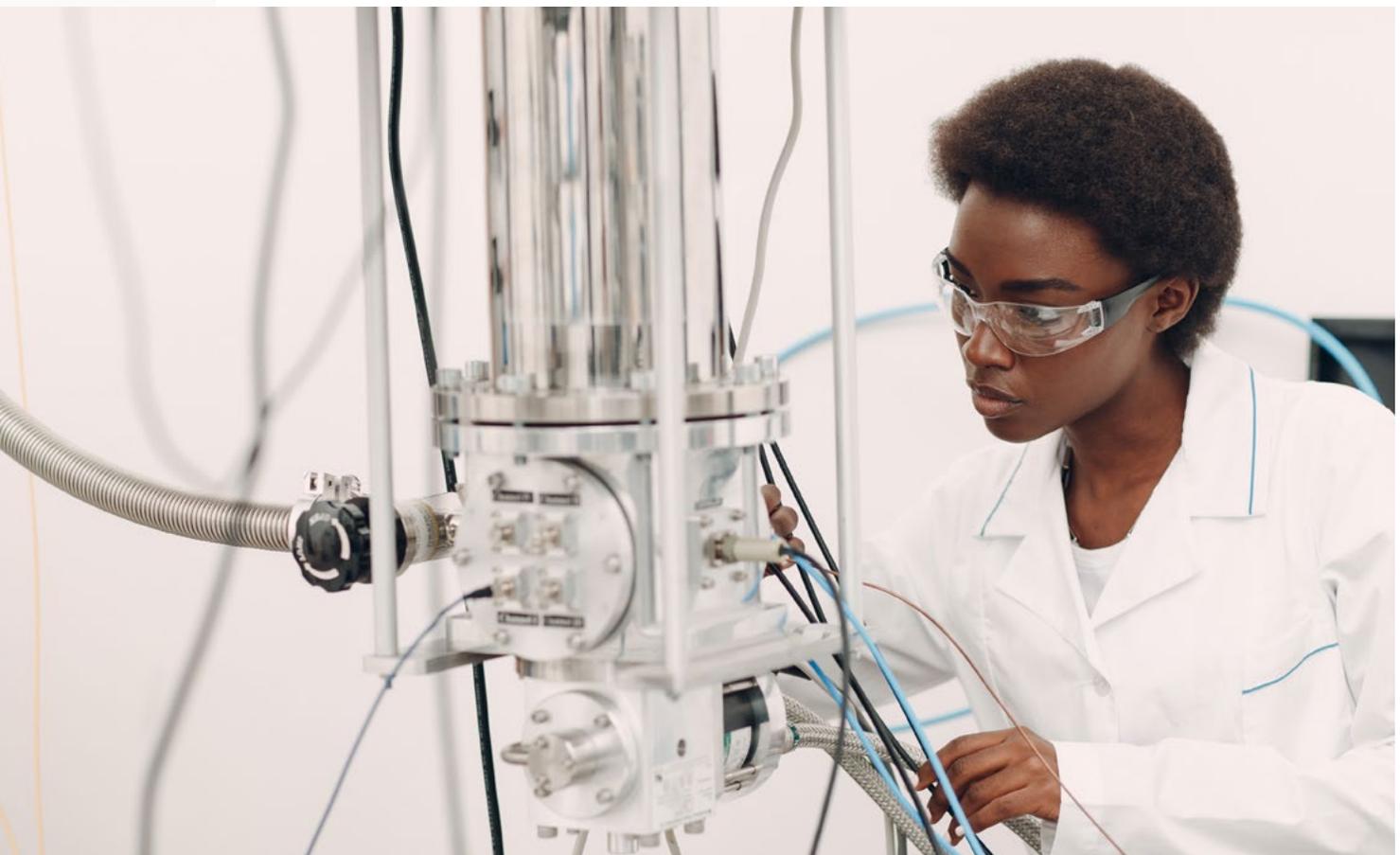
Introduction

Research integrity is ever-evolving. There is no one definition of research integrity and understandings of research integrity can take on many meanings. For some, research integrity denotes a set of aspirational virtues and principles one must uphold in the academic pursuit. Principles may entail trustworthiness, honesty, carefulness, and rigour in the research endeavour.[1] Research integrity is also commonly defined in opposition to research misconduct, where misconduct refers to unacceptable behaviours such as plagiarism, the falsification of data, and the fabrication of data.[2] Research integrity has also taken on a broader meaning that refers to the set of behaviours, practices, and attitudes that inform the entire research process. In this interpretation, research integrity refers to the orientation and conduct of the individual researcher.[3] Put simply, research integrity encompasses all of the ways in which a researcher leads with integrity.

Research integrity seeks to uphold the validity of the scientific pursuit. Discussions of research integrity have gained traction to ensure the public trusts in scientific research to "advance knowledge of the social world and … use that knowledge to improve the human condition".[4] In promoting research integrity, institutions and regulatory bodies actively discourage research misconduct due to the growing concern that grave misconduct in research threatens the validity of science as a whole.[5] The promotion of research integrity thus aims to ensure resources are being used effectively, mitigate potential harm to research participants, and halt fraudulent research that can lead to harmful activities and/or the dissemination of harmful or unsafe products or practices.[6]

The advancement and support of research integrity are all the more relevant in the context of global research. Research is seldom taken on as an individual pursuit, and increasingly it is a global activity. As such, there is a growing concern for the international science community to ensure research integrity is being upheld across geographic boundaries.[7] There are unique regulatory, ethical, and cultural challenges facing the international research community, including technological advances that permit new ways to share, collect, and store data; different norms and values that may shift the purpose and use of research; and collaboration with culturally diverse communities that may pose difficulties to the design and implementation of research projects.[8] In response to the increasingly global research climate and these unique pressures, there are efforts to understand the shared principles of research integrity and also to promote and standardize research integrity from country to country.[9] These efforts are reflected in the coordination of the World Conference on Research Integrity (WCRI).

1. Nichols-Casebolt, A. (2012) **2.** Hickling Arthurs Low (2009) **3.** Rossouw, T.M., van Zyl, C. and Pope, A. (2014) **4.** Nichols-Casebolt (2012). p. 5
5. Hickling Arthurs Low (2009) **6.** Hickling Arthurs Low (2009) **7.** Hickling Arthurs Low (2009) **8.** Nichols-Casebolt (2012) **9.** Roussouw, van Zyl, and Pope (2013)

Overview of Research Integrity Policies

There are guiding documents that uphold research integrity in Canadian institutions. Canada's Tri-Agency Framework: Responsible Conduct of Research (2021) refers to policies and guidance on research integrity for the medical, natural, and social sciences.[10] The Tri-Agency Framework outlines research integrity principles and policies to investigate allegations of research misconduct. The Tri-Agency Framework is upheld by all publicly funded colleges and universities and supported by the Canadian Secretariat for the Responsible Conduct of Research. The Secretariat works to implement the Tri-Agency Framework, making compliance a condition for funding.[11] Individual institutions are responsible for investigating allegations against individual researchers. The Secretariat "only has the power to conduct investigations in the case of allegations against institutions, or in instances when an individual researcher is not affiliated with an institution eligible for Agency funding".[12]

The University's Policy 51: Ethical Conduct for Research Involving Human Participants and Policy 118: Scholarly, Research and Creative (SRC) Integrity Policy ensures all members of the University comply with federal, provincial, and municipal legislation regarding scholarly, research, and creative (SRC) activities. Policy 118 serves to promote a culture of SRC integrity among the University's community members, provides guidance for the community regarding what may constitute a breach of the policy, ensures compliance with the standards of granting agencies, and provides a process for dealing with allegations of a breach of the policy and conflicts of interest in a fair, transparent, and timely manner.

Through Policy 118, the University commits to educating the SRC community and fostering a culture of integrity. A culture of integrity is meant to nurture virtues, such as concern for others, collaboration, and trustworthiness.[13]

10. Government of Canada (2016) **11.** Zimmerman, S.V. and Wallace, K. (2013) **12.** Zimmerman and Wallace (2013). p. 400 **13.** Barsky, A. E. (2010)

The Values and Principles of Research Integrity

In 2010, an expert panel on research integrity in Canada was formed to assess and provide guidance on research integrity in the national context. Emerging from that initiative is a set of five core values and 11 fundamental principles (detailed below). The values help to define research integrity, and the principles describe how to enact and pursue research with integrity. These values and principles are expanded on throughout this Reference Guide and the University's Research Integrity Training Modules.

5 Core values	**+**	**11** Fundamental principles	**=**	**Guide for best practices and strategies**
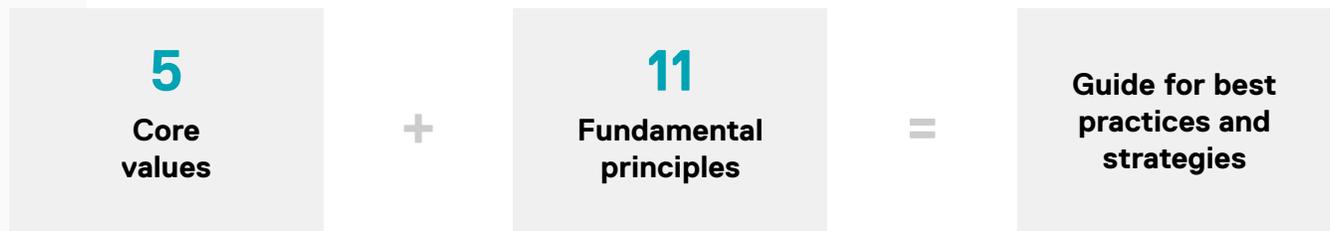
Values of Research Integrity[14]

Honesty

Being straightforward, and free of fraud and deception

Fairness

Being impartial and using sound judgement – free of prejudice and favouritism

Trust

Being reliable, as a person or institution, through character and action

Accountability

Being responsible and answerable for one's actions

Openness

Being transparent in process and practice, as characterized by visibility or accessibility of information

14. Council of Canadian Academies (2010)

Principles of Research Integrity[15]

1

Principle 1

Conduct research in an honest search for knowledge. A fair, open, and reliable approach to all activities supports, funds, or otherwise encourages research.

Honesty   *Fairness*   *Trust*   *Openness*

2

Principle 2

Foster an environment of research integrity, accountability, and public trust. Individuals and organizations at all levels should take responsibility for creating, implementing, maintaining, and complying with policies and practices designed to ensure accountability and the maintenance of public trust.

Trust   *Accountability*

3

Principle 3

Know your level of competence and your limitations, and act accordingly. Ensure you have the appropriate expertise and experience to participate in a given area of research or research administration.

Honesty   *Trust*   *Accountability*

4

Principle 4

Avoid conflicts of interest, or if they cannot be avoided, address them in an ethical manner. Personal and institutional conflicts of interest, or the appearance of conflict of interest, should be avoided. When unavoidable, each instance should be identified, disclosed, carefully examined, and managed in such a way as to avoid any corruption of the research process.

Trust   *Accountability*   *Openness*

15. Council of Canadian Academies (2010)

Principle 5

Use research funds responsibly. Individuals and organizations at all levels should ensure the responsible allocation and management of research funds in accordance with sound academic and financial principles.

Honesty   *Accountability*

Principle 6

Review the work of others with integrity. Individuals and organizations should engage in, organize, peer review, and evaluate the work of others in a manner that reflects the highest scholarly, professional, and scientific standards of fairness and confidentiality.

Fairness   *Trust*

Principle 7

Report research in a responsible and timely fashion. Publications, including clear statements of data and methodology, as well as research activities and research results, should not be unduly delayed or intentionally withheld. These considerations should be configured within each discipline's own time frame.

Trust   *Openness*

Principle 8

Treat data with scholarly rigour. The highest levels of exactitude should be ensured in proposing, performing, recording, analyzing, interpreting, reporting, publishing, and archiving research data and findings. The appropriate authorities, as mandated by applicable standards or regulations, should retain a copy of research records.

Honesty   *Accountability*

Principle 9

Treat everyone involved with research fairly and with respect. All individuals and institutions directly affected or involved in research, including human subjects and animals, should be treated fairly and with respect. Relevant regulations and applicable Tri-Agency and institutional policies should be followed and guided by common principles and values.

Fairness   *Trust*

Principle 10

Acknowledge all contributors and contributions in research. All contributors and contributions to research and research results, including financial contributions, should be acknowledged fairly and accurately whenever research is communicated.

Fairness   *Accountability*   *Openness*

Principle 11

Engage in the responsible training of researchers. Research investigators, particularly new scholars, should have access to education, mentoring, and support to develop and maintain the skills and capacities required for conducting and managing research in accordance with relevant scholarly and ethical standards. An individual's level of responsibility should be commensurate with their competence and experience.

Fairness   *Trust*

Research Integrity Throughout the Research Cycle

SRC integrity values and principles operate throughout the research cycle. The following modules describe particular characteristics of each research stage and identify opportunities to uphold research integrity. The modules also entail a case study and additional resources for your consideration.

Module 1:
Study formulation and research design

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SRC integrity is foundational at every stage of the research process. This begins with study formulation and design.

The beginning stages of research may entail:

- Conceptualizing a research project

- Conducting preliminary background research

- Identifying research methods

- Establishing research partners (if required)

- Securing funding (if required)

When making decisions about the many variables involved in this stage, including one's research questions, goals, and available resources, it is the responsibility of all individuals in the SRC community to ensure that all SRC activities are undertaken "with independence and impartiality, free of any undue influence or conflict of interest" (Policy 118, Article 6.3).

Considerations to lead with integrity:

- It is critical to lead with honesty and treat all research collaborators with respect.

- At the onset of a research project, it is critical for all members of the research team to evaluate their strengths and weaknesses, and to identify a clear role in the project. Specific training and mentoring may be required to orient new and existing team members to a research project.

- At the inauguration of a project, supervisors and research leads have an important role to play in ensuring guidelines are followed and team members are adequately supported.

- Researchers are responsible for obtaining any required approvals for research involving human participants, human biological materials, and animals. Additional guidance may be required concerning research involving Indigenous Peoples. See additional resources page.

- All information included in a grant application must be true, complete, and accurate.

- Ensure from the planning stage that there is a clear research data management plan, including the secure storage of all data. For more information, see the services and supports for research data management available at University Library.

Spotlight on Research Integrity Principles

To lead with integrity at the formulation and design stage of your SRC endeavour, reflect on the principles below.

2 **Review the work of others with integrity**

3 **Know your level of competence and your limitations**

Case study topic

Plagiarism in a grant application, see file 12 of the Responsible Conduct of Research.

Additional resources

- Five Simple Rules to Avoid Plagiarism by Holly Ober, Scott I. Simon, and Daniel Elson. Annals of Biomedical Engineering

- Avoiding Plagiarism, Self-plagiarism, and Other Questionable Writing Practices: A Guide to Ethical Writing by the Office of Research Integrity, U.S. Department of Health & Human Services

- Educating yourself about plagiarism – Case studies on Grey areas by the European Network for Academic Integrity

- Questionable research practices & research misbehaviors by The Embassy of Good Science

- Guidelines for Research Involving Indigenous Peoples in Canada

- Chapter 9: Research Involving the First Nations, Inuit and Métis Peoples of Canada TCPS2 (2018)

- Social Sciences and Humanities Research Council of Canada (SSHRC), Indigenous Research

- Canadian Institutes of Health Research (CIHR), Guidelines for Health Research Involving Aboriginal Peoples

- The First Nations Principles of OCAP

Module 2:
Research conduct and analysis

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SRC integrity is reflected in the individual's conduct throughout the research project, relating to one's orientation, attitude, and behaviours that they apply to the management of a research project.

Integrity during this stage of research will be imperative to the management of students and staff throughout the data collection process, as well as ensuring the confidentiality and privacy of all participants involved.
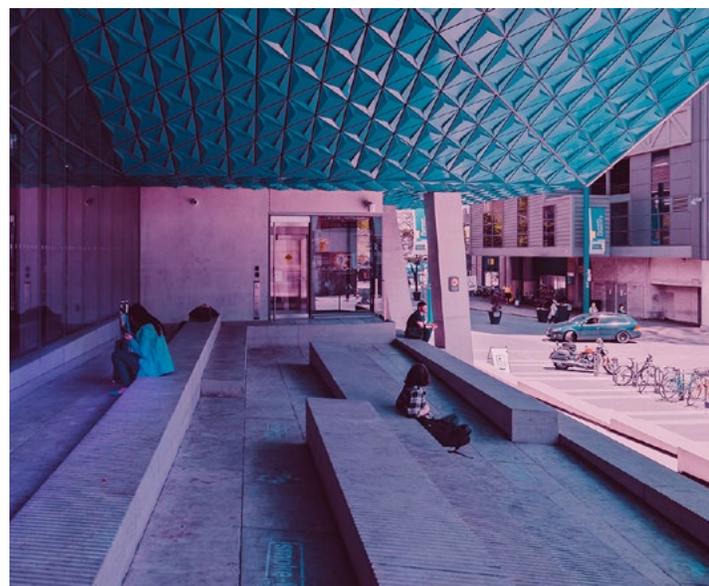
Data analysis entails the application of a logical technique to describe and evaluate data. This iterative process emphasizes transparency and accuracy to ensure the methods applied to data collection and analysis are replicable. The analytical stages of research may present challenges to researchers as they grapple with the presentation of data or perhaps data that is missing, includes outliers, or is altered.

Considerations to lead with integrity

- Research rigour is required to maintain transparency and accuracy throughout the data collection process.

- A strict ethics of care should be considered in interactions with research participants and collaborators. All research participants and collaborators should be treated with the utmost respect.

- Conducting research requires attention to detail and effective communication among research team members to ensure the progress of a project.

- The adoption of set practices to maintain quality assurance will allow researchers to share data and findings in a timely manner.

- Scholarly rigour and honesty must be applied to ensure data is represented honestly.

- For example, record keeping is a key responsibility of a researcher as outlined in the Tri-Agency Framework on the Responsible Conduct of Research (2021). Record keeping means to "a complete and accurate records of data, methodologies and findings, including graphs and images, in accordance with the applicable funding agreement, institutional policies, laws, regulations, and professional or disciplinary standards in a manner that will allow verification or replication of the work by others.

Spotlight on Research Integrity Principles

To lead with integrity at the research conduct and analysis stage of your SRC endeavour, reflect on the principles below.

**6** Review the work of others with integrity

8 Treat data with scholarly rigour

9 Treat everyone involved with research fairly and with respect

Case study topic

Data fabrication in a Ph.D. dissertation, see file 44 of the Responsible Conduct of Research.

Additional resources

▪ Are these data real? Statistical methods for the detection of data fabrication in clinical trials by Sanaa Al-Marzouki, Stephen Evans, Tom Marshall, and Ian Roberts

▪ Misrepresenting the characteristics of research participants in psychiatric studies, "Psychiatrist Engaged in Research Misconduct, Says Gov't Watchdog" by Ellie Kincaid and Ivan Oransky

▪ 3 Ways to Blow the Whistle by The Embassy of Good Science

▪ Guidelines for Responsible Data Management in Scientific Research by Clinical Tools Inc., funded by the Office of Research Integrity, U.S. Department of Health & Human Services

▪ Supervisor responsibilities: Ryerson University Graduate Supervision Guidelines (2018), Tri-Agency Framework: Responsible Conduct of Research (2021) Section 2

▪ Student responsibilities: Research Ethics Board Student Bill of Research Rights and Responsibilities: Undergraduate students as researchers

Module 3:
Research dissemination and publishing

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The publication stage of research entails the preparation and presentation of research findings.

This stage of research is guided by the principles of openness and transparency as publishing valid research is a critical step to maintain and uphold the public's trust in the scientific community.

SRC integrity is of importance in this phase when considering how to protect your data, how to acknowledge all authors and collaborators, and how to portray your research honestly.
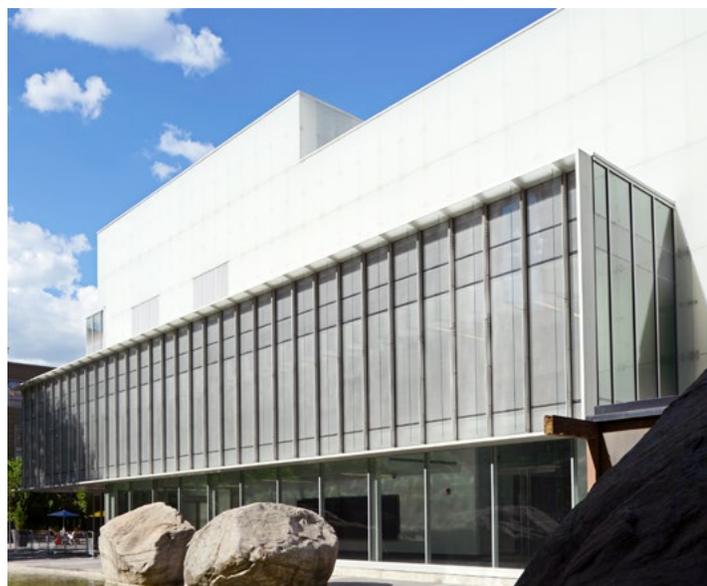
Considerations to lead with integrity

- Store data securely. Protect research data by ensuring that only research team members have access to the data.

- Disseminating research findings may be a collaborative endeavour. To avoid conflict, detail the roles, rights, and responsibilities amongst all contributors prior to the initiation of the project.

- Ensure that all authorship or inventorship is duly acknowledged.

- Apply rigour to the referencing and citing of other published work.

- In evaluating the platform and type of engagement that will have the most reach and impact, be cautious of predatory journals. The University Library provides more information on predatory journals in its guide to selecting journals for publication.

- Consider your role and responsibilities for sharing results with SRC participants and relevant communities.

Spotlight on Research Integrity Principles

To lead with integrity during the research dissemination and publication stage of your SRC endeavour, reflect on the principles below.

7 **Report research in a responsible and timely fashion**

10 **Acknowledge all contributors and contributions in research**

Case study topic

Invalid experimental results published in a journal article, see file 17 of the Responsible Conduct of Research.

Additional resources

- Peer review by The Embassy of Good Science

- Horizon 2020 Programme: Guidance – How to complete your ethics self-assessment by the European Commission Directorate-General for Research & Innovation

- Research integrity: What it Means, Why it Is Important and How we Might Protect it by Science Europe

- Authorship and Publication by QUT Library and Office of Research Ethics & Integrity

- Standards of authorship by The Embassy of Good Science

- Predatory publishing by The Embassy of Good Science

Module 4:
Financial reporting and grant management

To ensure accountability, individuals and institutions have a responsibility to report on all research activity and to use research funds responsibly.

It is critical that principal investigators ensure compliance with the standards of granting agencies. Due diligence is required when distributing research funds for various resources and equipment, as the funds will need to be reported and individuals will have to demonstrate the use of funds in support of SRC activities only.
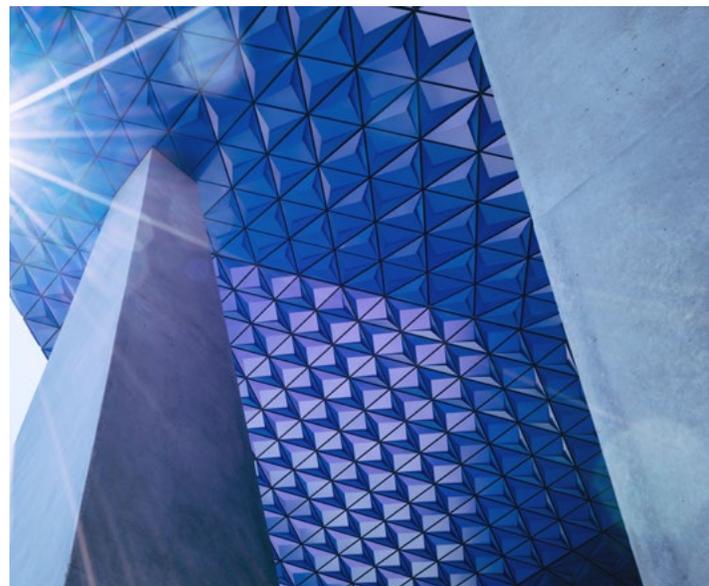
Considerations to lead with integrity:

- Make all members of the research team aware of the guidelines established in the grant application.

- Lead with transparency and honesty in reporting research funding.

- All conflicts of interest that may affect a decision about a specific application or request for a grant or award must be disclosed in writing to the relevant funding sponsor by the applicant.

- Disclose and/or address material conflicts of interest to the University, sponsors, colleagues or journal editors when submitting a grant, protocol, manuscript or when asked to undertake a review of research grant applications, manuscripts or to test or distribute products.[16]

16. Ryerson University Policy 118, Breach 7.14

Spotlight on Research Integrity Principles

To lead with integrity when reporting and managing financial details associated with your SRC endeavour, reflect on the principles below.

1 Conduct research in an honest search for knowledge

4 Avoid conflicts of interest

5 Use research funds responsibly

Case study topic

Mismanagement of grant funds, see file 59 of the Responsible Conduct of Research.

Additional resources

- Administrators and the Responsible Conduct of Research by the Office of Research Integrity, U.S. Department of Health & Human Services
- Conflicts of interest by The Embassy of Good Science
- Predatory publishing by The Embassy of Good Science
- Monitoring funding processes by The Embassy of Good Science

Conclusion

Research integrity is foundational to excellence in SRC activity. Nationally, research integrity is guided by the Secretariat for the Responsible Conduct of Research, and institutionally, the University is guided by the principles and practices of [Policy 118: Scholarly, Research and Creative Activity (SRC) Integrity](#), [Policy 51: Ethical Conduct for Research Involving Human Participants](#) and the [Tri-Agency Framework: Responsible Conduct of Research (2021)](#). [The Hong Kong Principles](#) developed at the 6th World Conference on Research Integrity seek to foster research integrity across the globe by addressing the metrics for success and career assessment practices in research institutions. These principles also advance the proposition that the outcomes in research are as important as the conduct by which they are achieved.

This Reference Guide for Research Integrity is a companion piece to the Research Integrity Training Modules. The Modules unpack the challenges unique to each stage of the research process where breaches in SRC are presented, ranging in severity from inadvertent error to fireable offence. The case studies and associated resources are meant to prompt critical reflection on how to lead SRC initiatives with integrity as well as how to manage conflict. For further information, guidance and tools, please consult the additional resources at the end of each module as well as the References section below.

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