Objective

This simple guide was developed to assist researchers who oversee the work of undergraduate trainees. The guide begins with the core values of research integrity, followed by basic concepts/topics for discussion. Topics are not presented in order of importance, and mentors should feel free to discuss topics most relevant for their undergraduate trainees.

Introduction

Roughly 41% of UNE undergraduates engage in some sort of research and scholarship experience during their time at UNE. Involving undergraduates in research is valuable for their education and career, vital for science, and rewarding for mentors. As you help prepare the next generation of researchers, instilling the importance of research integrity as fundamental to the advancement of knowledge should be part of your goal as a mentor, but this work is sometimes challenging. Therefore, the core values, concepts, and topics below provide a tool for mentors as they train undergraduate researchers in the responsible conduct of research.

1. The conduct of research and scholarship is driven by six core values:

   - Objectivity ~ conducting the work in a way that personal beliefs and/or other motivations do not introduce bias into the research.
   - Honesty ~ being truthful about the conduct of research and interpretation of results.
   - Openness ~ being transparent about how the work was conducted, sharing all the information about the research relevant to its conduct and conclusions.
   - Accountability ~ taking responsibility for one's actions and how the research was conducted.
   - Fairness ~ treating others with respect.
   - Stewardship ~ using resources efficiently and attending to one's responsibilities within the scientific enterprise.

   At UNE, **safety** is an additional core value. Safety refers to the prioritization of safe environments and safe behaviors, including completing safety trainings.

   Takeaway: Ensure you understand your responsibilities as a researcher, and how your responsibilities relate to these core values, including safety.

2. As a researcher-in-training, you have a lot to learn and likely many questions to ask. Depending on the scenario in which you are working, your research may be overseen by a faculty mentor, postdoctoral researcher, lab manager/research technician, graduate student, or senior undergraduate student, or some combination thereof. Find out early who will be overseeing your learning, who you should go to with questions, seek advice from, and look to for guidance in your work. It may be one person or several individuals. In some cases, you may be working with your peers. You should always be proactive in seeking clarity on your roles and responsibilities on the research team.

   Takeaway: Know your roles and responsibilities, as well as the roles of the people overseeing your research training and people working with you. This will help you develop a mutually beneficial working relationship where you can learn, ask questions, and excel in your work.

3. Managing your time effectively can be key to conducting research with integrity. A common reason why researchers behave in ways that negatively impact the integrity of their research is due to poor planning and

time management. Managing time effectively can reduce the likelihood that you will rush through experiments or cut corners to meet a deadline.

Takeaway: Have realistic expectations about how long the research process can take vs. How much time you can commit to the research project, and learn time management skills if you have concerns about managing your time effectively (See: https://www.rasmussen.edu/student-experience/college-life/time- management-tips-college)

4. Open, candid, ongoing communication is vital to the success of collaborative research. This includes discussions of:

    a. Individual responsibilities and duties
    b. On-going progress on projects
    c. Problems/mistakes/concerns
    d. Unexpected results

    Do not be afraid to ask questions or to acknowledge errors or mistakes. Mistakes are common during the learning process. Being honest about errors, mistakes, concerns, and unexpected results can help you learn and improve as a researcher.

    Takeaway: Establish early in your research experience good communication practices with those with whom you work.

5. Ensuring the integrity of research and scholarly activities includes prioritizing safe environments and safe behavior in the field. The integrity of a research project may be called into question if the safety of a team or individual members is compromised for the sake of a research activity. Conducting research and scholarship safely, regardless of the type of activity or location of that activity, is of primary importance. Safety should be assessed at the Individual, team, and project/site levels. If you do not know what training is required of you, ask your mentor and reach out to Human Resources (hr@une.edu) for a list of required safety trainings based on your position and type of work prior to starting your work.

    Takeaway: Value safety. Ensure you have completed all required safety trainings (e.g., Laboratory Safety, Hazard Communication, CITI training, etc.) and understand your responsibilities for maintaining a safe environment and safe behavior.

6. Research team members should be treated with respect. Every member has the right to a safe work and training environment free from mistreatment or inappropriate/unprofessional behavior that promotes professional, scientific, and personal growth and integrity. UNE's policy on research misconduct can be found here and UNE's Office of Title IX and Civil Rights Compliance can be found here, including reporting locations and resources.

    Takeaway: Know the standards of professional and respectful behavior. Know who to contact if you feel you or another member of the research team is being treated unfairly. If your mentor is responsible for the mistreatment or unresponsive, you can contact UNE's Office of Research Integrity (ORI) or UNE's Office of Title IX and Civil Rights Compliance.

7. The collection and generation of data are integral aspects of research. In such activities, data:

    - Serve as a record of an investigation.
    - Form the basis from which conclusions are drawn.
    - Enable replication of procedures and processes.

    The integrity of research depends on accurate, organized, complete, and accessible data. Data management is an integral part of good research practice.

    Takeaway: Be proactive about learning good data management practices early in your research experience.

8. Behaviors that directly breach the values of research and scholarship are called misconduct. At UNE, scholarly misconduct is defined as:

    - *the knowing, intentional or reckless fabrication, falsification, or plagiarism in the conduct of scholarly activity.*

    At UNE, retaliation of any kind against a person who has brought forth an allegation of misconduct or who has provided information about a suspected case of misconduct is also considered misconduct.

    Takeaway: Understand what is meant by research misconduct, including plagiarism, and what is acceptable regarding the treatment of data:

    https://www.une.edu/research/integrity/research-misconduct
    https://ori.hhs.gov/avoiding-plagiarism-self-plagiarism-and-other-questionable-writing- practices-guide-ethical-writing

9. In addition to plagiarism, writing practices that may be detrimental to the integrity of your research include:

    - Inappropriate text recycling
    - Inappropriate image manipulation
    - Selective reporting of data or methods
    - Omitting data or methods without disclosure

    Takeaway: Ensure you understand what constitutes ethical writing practices in your discipline.

10. Formal "authorship" refers to inclusion in the list of contributors to research. An author willing to take credit for their contributions must also be willing to assume responsibility for the accuracy and integrity of the work as a whole. Authorship credit should reflect significant contributions to at least one of the following areas:

    - Theoretical development, concept, or design
    - Execution of the work
    - Modeling or simulation of processes
    - Analysis and interpretation of data

- Preparation and revision of the manuscript

Individuals listed as authors, and the order in which they are listed should reflect the relative contributions to the work by the individuals. In addition, author order should reflect disciplinary norms. In some cases, contributions may be acknowledged but not sufficient to warrant authorship. Authorship criteria and decisions should be discussed openly and frankly, and agreed upon, preferably in writing, in advance. An individual should only be listed as an author with their knowledge and permission.

Takeaway: Ask about your research team's conventions on authorship generally, and for projects you work on specifically.

11. Use of generative AI writing tools (such as ChatGPT) should be fully disclosed in research. Given that the use of AI writing tools creates ethical considerations related to responsible authorship, plagiarism, and accountability, some scholarly communities consider the use of AI writing tools to be research misconduct (e.g., using ChatGPT is considered plagiarism; AI writing tools do not have free will and thus cannot be held accountable for what they produce). Other scholarly communities suggest AI writing tools can be used if they are documented, disclosed, and cited like other types of software.

    Takeaway: Ask what, if any, use is acceptable and how it should be disclosed and cited. See also: Hosseini, M., Resnik, D. B., & Holmes, K. (2023). The ethics of disclosing the use of artificial intelligence tools in writing scholarly manuscripts. *Research Ethics*. https://doi.org/10.1177/17470161231180449

12. Most institutions have policies and educational programs addressing research integrity. The policies detail institutional requirements, researchers' rights and responsibilities, and where to go and what to do if you have questions. Educational programs are directed at:

    a. Raising the consciousness of faculty, staff, and students regarding the ethical and responsible conduct of research and scholarly activity,
    b. Establishing a knowledge base that defines normative and/or professional behavior to assist faculty, staff, and students in making ethical and responsible decisions in the conduct of research and scholarly activity, and
    c. Fostering an institutional culture of integrity in research and scholarly activity encompassing all stages of individuals' careers.

    Takeaway: Know where to access the policies and read those that relate to your research (https://www.une.edu/research/integrity) and participate in the research integrity educational program activities (https://www.une.edu/research/integrity/responsible-conduct; https://sites.une.edu/research/category/ri/rcr/)