

Ethics in Research

Physics 3110

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American Physical Society (APS) Guidelines on Ethics

<https://www.aps.org/policy/statements/>

- The success of the scientific enterprise rests upon two ethical pillars.
- The first of them is the obligation to tell the truth, which includes avoiding fabrication, falsification, and plagiarism.
- The second is the obligation to treat people well, which prohibits abuse of power, encourages fair and respectful relationships with colleagues, subordinates, and students, and eschews bias, whether implicit or explicit.

Ethical Issues

- Experimental Techniques and the Treatment of Data
- Misconduct in Science
- Conflicts of Interest
- Publication and Openness
- Allocation of Credit and Authorship Practice
- Health & Safety
- Equal Opportunity

From On Being a Scientist – Responsible Conduct in Research, 2nd Edition, Committee on Science, Engineering, and Public Policy, National Academy Press, Washington, D.C. 1995

www.nap.edu/readingroom/books/obas

Experimental Techniques and the Treatment of Data

- “The experimentalist should feel a sense of responsibility for the numbers (data) obtained.” “You are responsible for your data.” The Art of Experimental Physics, D. Preston & E. Dietz, NY, John Wiley, (1991), pp.36 & 37.



- Describe your methods, so that others can test them.
- Question your own data.
- Selection of Data: be objective
- In Class: If you can not get your own data due to broken equipment, etc., you may use somebody else's provided you acknowledge it, with the instructor's permission.

Misconduct in Science

- Fabrication – Making up data or results
- Falsification – Changing or misreporting data or results
- Plagiarism – Using ideas or words of another person without giving appropriate credit
- Error versus Negligence
 - Honest mistakes versus haste, carelessness, and inattention

Jan Hendrik Schön, formerly a physicist at Bell Labs, was dismissed in 2002 for scientific misconduct.

Allegations were made about 25 publications, involving 20 coauthors.

A Bell Labs (Lucent Technology) committee found that he had falsified published data, committed scientific misconduct in 16 papers.

He did not keep proper laboratory records, original electronic data files, or working devices. It is therefore not possible to confirm or refute his scientific claims.

2004, University of Konstanz revoked his Ph.D. Went to courts, revocation finally upheld in 2014.

“Report of the Investigation Committee on the Possibility of Scientific Misconduct in the Work of Hendrik Schon and Coauthors”,
http://www.lucent.com/news_events/pdf/summary.pdf



Conflicts of Interest

- If you are in a situation where conflict of interest could occur, you must report it.
- If it becomes a problem, you may need to quit an activity.
- Research versus funding agency
- Research versus personal interests
 - financial, friends and family, personal advancement

Publication and Openness

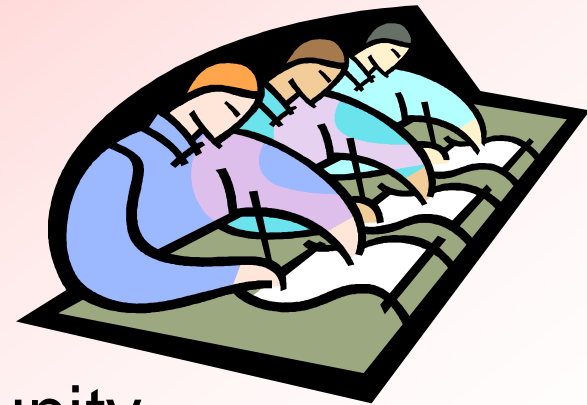
(When to share data and techniques.)

- Publication of results in a peer reviewed journal gives credit for the work to the authors, and makes it available to other scientists.
- Before publication, research results are privileged material.



Allocation of Credit and Authorship Practices

- Authorship, acknowledgments, references
 - See APS Supplementary Guidelines on Responsibilities of Coauthors and Collaborators
 - Authorship is limited to those who have made a significant contribution to the work.
- Order of authors' names
 - Convention
- Peer Review
 - Responsibility of Scientific Community



Notebooks: Ownership of Data

- At most institutions, lab notebooks and data are the property of the lab or institution, not the individual researcher.
- Ask Principle Investigator up front.

Equal Opportunity

- Women

- Earn ~20% of physics B.S. degrees, since about 1995¹
- Nearly 75% of women undergraduates report having experienced some form of harassment²

- Minorities

- Earned ~13.5% of physics B.S. degrees in 2017³

- LGBTQ

- 11% - 49% report having experienced some form of harassment⁴

•American Physical Society, Programs, <https://www.aps.org/programs/index.cfm>

•For specifics, see final slide.

Equal Opportunity

https://www.aps.org/policy/statements/88_1.cfm

...In particular, actions that create a hostile, intimidating, or offensive work environment for any group undermine the affirmative action efforts of the Society and should be eliminated. These actions include the public posting and viewing of materials that are insulting, derogatory, or exclusionary to a particular group.

We call upon all members of the Society to help ensure that persons of every race, gender, and ethnic origin may feel a welcome part of the physics community.

Revision Approved by the Council on November 9, 2018

Equal Opportunity

UH Diversity and Inclusion Statement

<https://uh.edu/about/>

- The University of Houston is the second most ethnically diverse major research university in the United States.
- UH Mission: The University of Houston draws strength from its diversity to transform lives and communities through education, research, service and innovation in a real world setting. UH is an engine for discovery, conversation and change that informs and leads local, state, national and global partnerships.

Ethics Case Studies



Data Acquisition Case Study: Data Handling and Record Keeping

You are a graduate student working in a lab where data are accumulated for the purposes of measuring the optical absorption of a variety of samples. For each sample there is a large data file stored on a computer in the lab. In reviewing a lab notebook from one of your predecessors in the lab and comparing that to data published by the lab, you find a gap. That is, some of the data that were published are not accounted for in the lab notebook. Furthermore, you are unable to locate the computer files for this missing data. You talk to a fellow graduate student about this situation, and he tells you that you should be very concerned about the situation and that it should be reported.

Question

What are some possible situations that could explain the “missing” data, and how should you proceed for each?

Publishing Practices Case Study: Credit for Work

As a graduate student, you have worked closely with a professor and her post-doc on a project studying experimental techniques in microfluidics. The project is going very well and you've even published some of your initial results. You will be graduating this spring with your master's degree.

Your advisor is now writing a subsequent paper with a colleague who is developing a theory that accounts for your results. You see a draft of the paper and notice that you are not listed as one of the four authors of the paper, who are the professors and their senior post-docs. However, the paper is directly based on the work that you did, and includes a new experimental plot that you created in addition to the theoretical calculations.

Question

What should you do?

UH Who to Contact

- Your Professor
- Undergraduate Advisor, Dr. Koerner
- Graduate Advisor, Dr. Varghese
- Department Chair, Dr. Bassler
- Fraud and Non-Compliance Hotline, link at bottom of every UH webpage

References

1. American Physical Society, “Bachelor’s Degrees Earned by Women, by Major”, accessed 2/11/2020,
<https://www.aps.org/programs/education/statistics/womenmajors.cfm>.
2. Lauren M. Aycock, Zahra Hazari, Eric Brewe, Kathryn B. H. Clancy, Theodore Hodapp, and Renee Michelle Goertzen, “Sexual harassment reported by undergraduate female physicists”, *Phys. Rev. Phys. Educ. Res.* **15**, 010121 (2019).
3. American Physical Society, “Degrees Earned by Underrepresented Minorities in Physics”, accessed 2/11/2020,
<https://www.aps.org/programs/education/statistics/minorityphysics.cfm>.
4. APS Ad-Hoc Committee on LGBT Issues, “LGBT Climate in Physics”, presented at APS March Meeting (2016),
<https://www.aps.org/programs/lgbt/upload/LGBTMarchMeetingPresentation.pdf>.
Ethics Case Studies, APS Task Force on Ethics Education, Edited by Heide Doss and Gabriel Popkin, Illustrations and design by Nancy Bennett-Karasik,
<http://www.aps.org/programs/education/ethics/upload/Ethics-Case-Studies-Student-Edition.pdf>, accessed 9/12/14.
Moral Reasoning in Scientific Research, Cases for Teaching and Assessment, M. J. Bebeau, K. D. Pimple, K. Muskavitch, S. Borden, and D. Smith, 1995.

Ethics Homework

- According to the U.S. Federal Policy on Research Misconduct, Section II, what are the three requirements for a finding of research misconduct?
- <https://ori.hhs.gov/federal-research-misconduct-policy>