



Online Ethics Center
FOR ENGINEERING AND SCIENCE

An Instructor's Guide for Ethical Issues in Physics

Author(s)

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Description

An excellent guide for physics instructors interested in integrating ethics into their courses.

Body

This material is designed to provide assistance to those involved in ethics education in physics. It is not intended to be a complete discussion of all topics in ethics relevant to the physics community. Rather, it is designed to give the reader some feel for the breadth of relevant topics, to point the reader towards useful resources, and to suggest ways in which this material could be addressed in a classroom setting.

The underlying premise of this work is that much has already been written about ethics in physics, but most of this existing material is not readily located by searching on the terms “ethics” and “physics”. These chapters will not describe ethical issues and case studies in detail but instead will point the reader to sources that do supply the more detailed perspective. The intent is to identify resources that can conveniently be used as reading assignments in undergraduate or graduate level physics classes. Part of the challenge in making ethical decisions is dealing with the complexity that real-world situations introduce. For that reason, where possible sources in which physicists describe cases they have had personal

experience with will be used.

Incorporated into the description of each resource will be suggestions on how to run a class discussion based on the material. It is hard to over-emphasize the usefulness of guided classroom discussion as a means for providing multiple perspectives and further insight into ethical issues. It is helpful to ground these discussions in the professional codes discussed in Chapter 1.

Chapter titles:

0. [Introduction: Pedagogy and Assessment](#)
1. [Ethical Codes in Physics and Related Fields](#)
2. [Laboratory Practices](#)
3. [Data: Recording, Managing and Reporting](#)
4. [Publication Practices](#)
5. [Peer Review](#)
6. [Underrepresented Groups in Physics](#)
7. [Physics and Military Research](#)
8. [Climate Change](#)
9. [Communicating Science to the General Public](#)

Detailed Outline

Chapter 0: Introduction: Pedagogy and Assessment

- Using case studies
- Managing class discussions
- Other activities to engage the mind
- Assessment
- About this guide

Chapter 1: Ethical Codes

- Section 1.1: Introduction
- Section 1.2: The American Physical Society Guidelines on Ethics
- Section 1.3: Other American Institute of Physics codes

Section 1.4: Physics codes outside of the United States
Section 1.5: Codes from other fields
Section 1.6: Ethical standards implied by institutional policies
Section 1.7: Human subjects research issues: sometimes overlooked in physics

Chapter 2: Laboratory Practices

Section 2.1 Introduction
Section 2.2: Research misconduct and how it harms the scientific community
 Ninov
 Schön
Section 2.3: Carelessness and how it harms the scientific community
 Pathological science
 Cold fusion
Section 2.4: Computational physics
Section 2.5: Laboratory safety
Section 2.6: How common is research misconduct in physics?

Chapter 3: Data: Recording, Managing, and Reporting

Section 3.1: Introduction
Section 3.2: The lab notebook
Section 3.3: Data management and archiving
Section 3.4: Digital images
Section 3.5: Reporting results
Section 3.6: Case studies
 Ninov
 Schön
 Millikan

Chapter 4: Publication Practices

Section 4.1: Introduction
Section 4.2: Authorship
Section 4.3: Citations
Section 4.4: Plagiarism
Section 4.5: Self-plagiarism, dual submission, and fragmented publication
Section 4.6: Errata and retractions
Section 4.7: Conflicts of interest

Section 4.8: Publication metrics
Section 4.9: Journal quality
Section 4.10: Publication in the electronic age

Chapter 5: Peer Review

Section 5.1: Introduction
Section 5.2: Fairness
Section 5.3 Participation
Section 5.4: Timeliness
Section 5.5: Confidentiality
Section 5.6: Conflicts of interest
Section 5.7: Career advancement
Section 5.8: Textbooks

Chapter 6: Underrepresented Groups in Physics

Section 6.1: Introduction—The need for diversity
Section 6.2: Statistics
Section 6.3: APS policy statements
Section 6.4: Explicit bias
Section 6.5: Systemic bias
Section 6.6: Implicit bias
Section 6.7: Programs of the American Physical Society and other organizations
Section 6.8: Role models

Chapter 7: Physics and Military Research

Section 7.1: Introduction
Section 7.2: The Manhattan Project
 Edward Teller
 Leo Szilard
 Herbert York
 Luis Alvarez
Section 7.3: The Strategic Defense Initiative
Section 7.4: Arms control in the age of nuclear weapons
Section 7.5: Dual-use technology
Section 7.6: General discussion prompts for the entire chapter

Chapter 8: Climate Change

Section 8.1: Introduction

Section 8.2: Observational data

Section 8.3: Some elements in a climate model

Section 8.4: Global Climate Models

Section 8.5: Focused action

Adaptation

Geoengineering

Mitigation

Section 8.6: Broader action on climate change

Chapter 9: Communicating Science to the General Public

Section 9.1: Introduction

Section 9.2: Communicating about climate change

Section 9.3: Communicating with the media

Section 9.4: Communicating with political leaders

Rights

Use of Materials on the OEC

Resource Type

Instructor Materials

Topics

Collaboration

Conflict of Interest

Data Management

Employer/Employee Relationships

Human Subjects Research

Mentors and Trainees

Publication Ethics

Reproducibility

Research Misconduct

Workplace Ethics

Discipline(s)

Computer, Math, and Physical Sciences

Physics

Teaching Ethics in STEM

Research Ethics