



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