

Research Ethics Workshop: ***Promoting Ethics in Research***

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Virginia Commonwealth University
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Agenda

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8:00 am	Registration
8:30	Introduction and Overview
9:00	Checklists: Individual Development Plans
10:30	Break
10:45	Group Policies
12:00 pm	Closing Summary, Next Steps, Workshop Assessment
12:30	Adjourn

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Introduction and Overview

Description

This workshop is designed to assist research faculty in creating concrete, discipline-specific strategies to incorporate research ethics education into the context of the research environment. The workshop is grounded in a recognition that many research ethics issues are relevant to the practice of scholarly and creative activities spanning the full range of science, engineering, and technology.

The long-term goal of this workshop is to promote education in the ethical dimensions of research. This educational need is, in itself, an ethical obligation for the research community, and is also increasingly encouraged, if not required, internationally.

Participants will be introduced to rationales, content, approaches, and resources sufficient so that they will have the means to develop and implement research ethics education in their research environment.

Learning Objectives

On successful completion of the workshop, in the context of their particular research environment, participants will be able to:

1. Articulate *rationales* for integrating research ethics education
2. List and describe ethics *topics* suitable and useful to be addressed
3. List and describe *approaches* for integrating research ethics education
4. Design one or more *activities* to introduce research ethics

Introduction and Overview

Instructors

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Kalichman has taught research ethics for over 25 years. He is founding director of the UC San Diego Research Ethics Program (<http://ethics.ucsd.edu>), the San Diego Research Ethics Consortium (<http://sdrec.ucsd.edu>), and the ethics service for the NIH CTSA-funded Clinical and Translational Research Institute. In addition, Kalichman is co-founding director for the Center for Ethics in Science and Technology (<http://ethicscenter.net>). Kalichman has taught train-the-trainer, research ethics workshops throughout the U.S. and for groups and institutions in Central America, Africa, and Asia. In 1999, with support from the Office of Research Integrity, he created one of the first online resources for the teaching of research ethics (<http://research-ethics.net>). He leads NIH- and NSF-funded research on the goals, content, and methods for teaching research ethics. Internationally, he has had significant roles in a collaboration between the AAAS and the China Association of Science and Technology (CAST), co-chairing the working group for RCR education at the 2010 Singapore meeting of the World Conference on Research Integrity, and assisting Korean leaders in setting a national research ethics agenda.

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Macrina is the author of the widely used text, *Scientific Integrity: Text and Cases in Responsible Conduct of Research* (4th ed.; 2014 ASM Press). He is the director of three courses in RCR offered at VCU. He frequently lectures in RCR courses at universities and colleges across the nation and has co-organized and taught in numerous train-the-trainer RCR workshops. Macrina has served two terms on NIH study sections and was chair of the NIDCR Board of Scientific Counselors. He also served on the NIH National Advisory Dental and Craniofacial Research Council. He was a member of the ASM Ethics Committee and the Ethics Committee of the American Association for Dental Research. He has been a consultant to the USHHS Office of Research Integrity, the National Institutes of Health, and the National Science Foundation on matters related to responsible research conduct. He was a member of the NAS/AAAS Committee on Assessing Fundamental Attitudes of Life Scientists as a Basis for Biosecurity Education. He is presently serving on the National Science Advisory Board for Biosecurity.

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Nichols-Casebolt joined the VCU School of Social Work as Associate Dean in 1993, and also served as the School's Interim Dean from July 2008-2010. She came to the VCU Office of Research and Innovation in 2005, where she is presently Senior Associate Vice President for Research Development. Her research interests have been in the areas of poverty, social welfare policy and gender issues. Nichols-Casebolt served as a member of the VCU Social-Behavioral IRB panel for over 10 years and was the Chair of the panel for five years. At the national level, she has served in a leadership capacity in several social work organizations, including six years as President of the Board of the Institute for the Advancement of Social Work Research. Nichols-Casebolt teaches an RCR course for graduate students within the Preparing Future Faculty Program at VCU, and is the author of a handbook for social work researchers, *Research Integrity and Responsible Conduct of Research*, published by Oxford University Press in 2012.

What is Research Ethics?

The subject of this workshop is research ethics. The focus is a very practical one: How should we, as researchers, act?

Unfortunately, the choices we face are not always clear. And even those cases that are clear may at times be better characterized as "right vs. right" rather than "right vs. wrong." For these reasons, our obligation is not necessarily to make the right decisions, but to strive to make the best possible decisions. In this context, "ethics" should not be confused with ethical theory, morality, and/or simply following the rules.

While there are many possible formulations for the scope of *research ethics*, one useful summary for the purpose of this workshop is to focus on our obligations as researchers. Those obligations might be summarized to include research, other researchers, and society, but also a fourth overarching responsibility in all cases to ask questions:

1. *Research:*
How should research be conducted so as to meet our obligations to preserve and promote the integrity of research findings?
2. *Researchers:*
How should researchers interact with one another to meet our obligations to other researchers?
3. *Society:*
How should researchers interact with the larger communities, academic and public, to meet our obligations to the society in which we live and work?
4. *Asking Questions:*
How, when, and where should researchers be prepared to ask questions about the conduct of science so as to meet their obligations to the research, researchers, and society?

Introduction and Overview

What topics are covered under the heading of "Research Ethics"?

Topics recommended by NIH	Other Possible Topics	
1. Research Misconduct	10. Duplicate publication	22. Communication with public about science
2. Data Management	11. Plagiarism	23. Perceptions of public about science
3. Conflict of Interest and Commitment	12. Sabotage	24. Scientists as activists
4. Authorship and Publication	13. Use of statistics	25. Censorship
5. Peer Review	14. Image manipulation	26. Deception
6. Collaboration	15. Reproducibility	27. Speaking up: When, how, consequences
7. Mentoring	16. Bias: Causes, protections	28. Dependence on funding
8. Social Responsibility	17. Credit	29. Managing budgets
9. Animal and Human Subjects	18. Open access	30. Any major scientific discovery
	19. Page charges	31. ...Other topics?
	20. Ghostwriting	
	21. Managing a research group	

Why Teach Research Ethics?

Many who believe we *should* teach research ethics have a clear idea of *why* we should do so. However, even a moment's reflection reveals *many* possible motivations for such teaching. Based on a series of interviews with teachers of research ethics, the range of possible goals was numerous and diverse (Kalichman and Plemmons, 2007). And the many possible outcomes vary greatly along dimensions such as importance, feasibility, and measurability. An understanding of this range of possible goals is a precursor to making good choices about not only what might be done to teach research ethics, but what is worth doing.

What are the goals for teaching research ethics?

- *Meet* federal, institutional, or departmental requirements for teaching research ethics?
- *Enhance* public perception of the research community?
- *Protect* the interests and welfare of the human and animal subjects of research?
- *Improve* choices of research to be pursued and research outcomes?
- *Decrease* Research Misconduct?
- *Decrease* disputes and misunderstandings?
- *Increase* responsible conduct in research (RCR)?
- *Increase* knowledge about RCR?
- *Increase* moral or ethical decision-making skills? Other skills?
- *Increase* positive attitudes and disposition for RCR? Moral sensitivity?
- *Increase* conversations about these issues?

While these goals are clearly distinguishable from one another, there is also considerable overlap. For example, an intervention designed to increase knowledge might at the same time meet departmental requirements for teaching research ethics.

Rationale for Ethics in Context

If teaching research ethics is taken to be important, then what role if any is there for ethics teaching in the context of the research environment? A case might be made that the range of goals one might reasonably consider is so wide that the research environment is neither sufficient nor perhaps appropriate to be the sole venue for delivering research ethics education. However, if it is instead seen as an appropriate adjunct to other institutional programs, then a more modest agenda might be appropriate.

With that in mind, what is the value added from integrating ethics into the fabric of what we do as researchers rather than as a separate activity or program? In the context of the research environment, researchers:

1. *Learn by example:*
researchers have the opportunity to learn by observing how others address ethical challenges.
2. *Learn in context:*
researchers can see how what they do is intertwined with the norms and standards of practice in their particular research discipline.
3. *Learn by doing:*
researchers can learn through the experience of addressing ethical challenges in the context of performing their research.
4. *Learn what is most important:*
researchers can learn about the specifics that are most important to their particular practice of research rather than the much longer list of everything that is potentially relevant to other areas of research.
5. *Continue to learn:*
working in a research group is an ongoing opportunity for continuing education, and addressing new and evolving issues that might not otherwise be covered in courses.

Mentoring and Teachable Moments

One of the most important mechanisms by which knowledge is passed from one generation to the next is *Mentoring*. In the sense that a mentor is an individual who has succeeded by overcoming the hurdles to success, he or she is in the best position to help a trainee with facing those same hurdles. Mentoring (teaching), in the context of research groups, is recognized as an important part of research training. While little has been written about teaching research ethics in this setting, it is clear that much can be learned about the roles, responsibilities, and joys of science through the process of conducting research.

Mentoring might include many topics, one of which is the responsible conduct of research or research ethics. One purpose of this discussion will be to consider the proper role for such one-on-one or small group mentoring in teaching research ethics, the topics that should be covered, and specific strategies for mentoring in research ethics.

Teaching about research ethics in the context of the research environment is widely encouraged (Whitbeck, 2001; Fryer-Edwards, 2002; Davis, 2006; Peiffer et al., 2008). The presumption is that research mentors are in an ideal position to convey standards of conduct. Unfortunately, such mentoring is infrequent or even non-existent (Brown and Kalichman, 1998; Swazey and Anderson, 1998). Although this is not happening explicitly, that does not mean an absence of socialization into science. Clearly, trainees do learn about their ethical obligations and responsibilities by doing and observing. This may often result in sufficient education, but the worry is that this ad hoc approach risks that the lessons learned will be too little, too late, or wrong. The alternative proposed here is that research mentors identify and take advantage of *Teachable Moments*.

Because research training environments vary greatly, it is not possible to prescribe one common set of teachable moments. Instead, it is worth noting that many opportunities to introduce discussion about research ethics issues might be identified for any given research group or discipline. Some examples appropriate to at least some research training environments include:

- One-on-one mentoring
- Ad hoc conversations
- Research group meetings
- Journal clubs
- Research lecture and seminar series

Introduction and Overview

Within each of these opportunities for education, there are numerous tools that might be adopted to promote thoughtful discussion and learning about research ethics. Some of these include:

1. Review of professional *Codes of Conduct*
2. Following a *Checklist* of mentoring responsibilities
3. Discussing historical, current, or fictional *Cases* that illustrate research ethics challenges
4. Adoption of mentor-trainee *Individual Development Plans* outlining mutual roles and responsibilities
5. Definition and adoption of research group *Policies* regarding one or more aspects of responsible conduct of research
6. Reading or viewing of recommended *Resources*, such as books, websites, and videos on the subject of responsible conduct of research

Checklists

Checklists

Much of teaching about research ethics can be handled effectively through one-on-one mentoring on an *ad hoc* basis. The fact that this happens all too rarely may be primarily a simple matter of being overlooked. An easy solution is to create a reminder checklist for items particularly important to cover (e.g., see Gawande, 2011) as well as stages of training when those items might best be covered. The goal is to ensure that practical issues will be addressed at appropriate times of graduate student training.

The material to be covered will vary by discipline, but some topics likely to be important for trainees in any discipline include the following:

1. Criteria for authorship
2. Recordkeeping
3. Standards for sharing
4. Ownership of materials (including plagiarism)
5. Risks of bias and how they can be addressed
6. Roles and responsibilities for mentors and trainees
7. Risks and benefits of collaborations
8. Conflicts of commitment
9. Asking questions, consensus building, and whistleblowing

Optional Questions for Discussion

- Are other items missing from this list that are likely to be important for most if not all disciplines?
- What items might you want to add specific to your focus in science and engineering?

Optional Exercise

- What, if anything, would be important to know in your research group about each of the above items?
- *When* would those items be best addressed?

Checklists

Draft Checklist

Item	When to address?
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

Agreements

Individual Development Plans

Increasingly, various science organizations have proposed agreements or "individual development plans" (IDPs) to spell out mutual obligations for mentors and postdocs (AAMC, 2008a) and mentors and graduate students (AAMC, 2008b). The value of such agreements is summarized in a widely cited manual for training of graduate students (University of Michigan, 2011):

Departments can affirm that mentoring is a core component of the educational experience for graduate students by developing a compact or agreement, relevant to the discipline or field of study, for use by faculty and the students with whom they work. Such a document would list the essential commitments and responsibilities of both parties, set within the context of the department's fundamental values. This could be included in the departmental handbook and reviewed—or even signed—by both parties to acknowledge the mentoring relationship.

The Federation of American Societies for Experimental Biology (FASEB) provides on their website an IDP for postdocs, which is not only a template for planning one's career, but also "serve[s] as a communication tool between individuals and their mentors" (<http://www.faseb.org/portals/0/pdfs/opa/idp.pdf>). The presumption is that such agreements will open channels of communication and serve as a reminder of mutual roles and responsibilities for a successful training experience.

Discussion Questions

1. Which of the sample development plan items (next page) is/are appropriate to your discipline?
2. Would such a development plan be useful or counterproductive in promoting responsible conduct?

Exercise

Using the sample plan as a starting point, design an IDP for your research group. In doing so, consider:

What should be changed? Deleted? Added?

How and when would you use such an agreement?

Present your draft agreement to the workshop participants.

Agreements

Sample Development Plan

<u>Student</u>	<u>Mentor/Advisor</u>
1. If in doubt, ask.	1. If in doubt, ask.
2. Meet with advisor once each _____.	2. Meet with student individually once each _____.
3. With mentor, define milestones for research and dissertation.	3. With trainee, define milestones for research and dissertation.
4. Request performance evaluations once each _____.	4. Provide performance evaluations once each _____.
5. Perform self-evaluation once each _____.	5. Request student self-evaluation once each _____.
6. Strive to meet expectations for recordkeeping, data ownership, sharing of data, credit, and authorship.	6. Provide guidance for expectations about recordkeeping, data ownership, sharing of data, credit, and authorship.
7. Maintain research records sufficient for others to reconstruct what was done.	7. Review original research records once each _____.
8. Pursue opportunities for professional development (e.g., writing, speaking, mentoring, learning and teaching about research ethics).	8. Propose opportunities for professional development (e.g., writing, speaking, mentoring, learning and teaching about research ethics).
9. Comply with government and institutional guidelines and regulations for the conduct of research.	9. Provide adequate information about relevant government and institutional guidelines and regulations for the conduct of research.
10. If e-mail communication is breaking down, schedule an in-person meeting.	10. If e-mail communication is breaking down, schedule an in-person meeting.

Group Policies

Group Policies

Misunderstandings and disputes among researchers are much more frequent than actual Research Misconduct (Martinson et al., 2005; Martinson et al., 2010). While some of these challenges may be unavoidable, many could be mitigated simply by clear and early communication. One way to meet this goal is by developing policy documents covering such issues as authorship or data management.

Sample Policy

Authorship Policy

Criteria for authorship:

To be included as an author on a paper, it is necessary to have made a substantial and new contribution essential to publication of the paper, to provide a good faith contribution to writing and/or editing of the manuscript, and to approve the content of the version submitted for publication.

Criteria for acknowledgement:

Contributions to the publication of a manuscript that do not meet the criteria for authorship should be recognized in the acknowledgements section of the paper.

Order of authorship:

If a paper has more than one author, and assuming all authors meet the "Criteria for authorship," then the first author will typically be the person who wrote the first draft of the manuscript, the last author will be the head of the research group, and authors listed in between will be listed in order of decreasing contributions to the project.

Disputes about authorship:

If anyone believes that someone proposed to be an author, or someone left off of the list of authors, has been not been given credit appropriate to their contributions, then they should raise their concerns with the head of the research group, who has ultimate responsibility within the group for decisions about allocation of credit.

Appeals to decisions about authorship:

In the event that the above guidance is insufficient to resolve a dispute about authorship, then the interested parties should each draft an anonymized version of their perspective on the issues at stake. These summaries will then be submitted to a mutually agreeable third party for a decision based on binding arbitration. If no clear decision is rendered, then a final decision will be made by a flip of a coin (or the equivalent if multiple competing options are proposed).

Group Policies

Examples of Possible Topics for Policies

- Dealing with particular human or animal subjects
- Recordkeeping
- Statistical Methods
- Data Sharing
- Contacts with media

Questions for Discussion

1. What topics might be appropriate for a group policy in your area of research?
2. Is it possible to have a policy that would be meaningful and not counterproductive?

Exercise

1. Identify a topic for a policy of common interest to all participants in the workshop.
2. Propose possible elements to be covered in the policy.
3. Select those elements for which there is agreement, and draft wording for the proposed policy.

How should a policy be implemented?

1. Handed out to new members of research group.
2. Annual or periodic discussions to review at group meetings.
3. Group collaboration to write or re-write policies to ensure ongoing relevance and clarity.

Assessment

Assessment

Given the proposed teaching of research ethics in the context of the research environment, the goal of assessment is to determine whether the approaches proposed have had a positive impact. At a minimum this means two overlapping, but not necessarily identical questions:

- (1) What is the impact of your use of the proposed approach for teaching research ethics to your students?
- (2) What is the overall impact of use of the proposed approaches for teaching research ethics on students of faculty who have participated in workshops like this one?

We are proposing an assessment to address question #2, but in the process one that will hopefully reflect on the general value of the different approaches and help to answer question #1. However, while assessing impact might seem straightforward, it is not easily accomplished. Even the possible goals for assessment are highly diverse.

Goals of assessment

Assessments can address many different qualities of learning outcomes (e.g., Nightingale et al., 1996; Kalichman and Plemmons, 2007), including improvements or increases in:

- knowledge
- creative or critical thinking, problem solving, determining impact, or making plans
- moral reasoning, ethical decision-making, or sensemaking
- attitudes or values in the context of research ethics
- ability to communicate, or to prevent or resolve conflicts
- frequency and effectiveness of communication with others
- making good judgments
- successful recognition of ethical dilemmas in the practice of research

Given the many possibilities, it is neither feasible nor perhaps useful to consider assessing all of these outcomes in the context of research ethics interventions in the research environment.

Challenges to conducting assessments

Each of the above outcomes, and the many other possible outcomes, potentially requires a very different and very specific approach for assessment. Some outcomes might be best assessed by objective multiple choice questions, others by written answers to open-ended questions (e.g., how, if at all, has your ability to recognize ethical dilemmas been changed?) or requests to provide an analysis of a case that describes a research ethics dilemma, and still others might require interviews or focus group discussions. And even with an appropriate method for assessing an outcome, being able to ascribe any effect to a particular approach can be problematic (e.g., having only post-assessments for those exposed to the approach vs. pre- and

Assessment

post-assessments from the same individuals vs. assessments for those exposed to the intervention as well as an appropriate control group).

Criteria for choosing assessment goals

Choosing among the many possible outcomes and measures should begin with whether a particular outcome meets the following criteria:

1. **Important:** The goal should address something that is particularly relevant (*important*) to the ethical or responsible conduct of science.
2. **Deficient:** Some things that are important may not in fact be lacking. The goal should address something that needs improvement or correction because it is *deficient*.
3. **Independent:** Even if something is important and deficient, it could be secondary to some other goal. Meeting the goal should be *independent* of first needing to meet other goals.
4. **Amenable to Intervention:** Even if something is important and deficient, we may have no realistic way to repair that deficit. The goal should be something for which we have, or we could reasonably produce or acquire, an *intervention* that would enable us to make a change.
5. **Measurable:** It is possible that there is something that we can change by intervention that is both important and deficient, but we have no means to assess our impact. The goal should be something for which we have the tools for defining *measurable* outcomes. [NOTE: Measurable outcomes can also include qualitative findings. The key is to have something credible to convince ourselves and others that there is some value added because of our efforts.]
6. **Magnitude:** It is possible that there is something that we can change by intervention that is important, deficient, and measurable, but the magnitude of our impact might be too small to be considered cost effective. The goal should be something for which we can produce a change of sufficiently large *magnitude*.
7. **Feasible:** Even if something reasonably meets all of the above criteria, it may not in fact be practical or feasible in the research environment because of the amount, type and availability of resources required or because of the characteristics of the research environment. The goal should be something that is *feasible*.

Optional Exercise

What challenges have you experienced in promoting some of the goals discussed above?

- Did you obtain feedback to indicate success in achieving your goal?
- If not, how might you assess the impact of what you did?

For the approaches we discussed today, what learning objectives would be realistic outcomes? What would be the most important outcome for your students after implementing some of these approaches?

How might you assess the impact?

Assessment

Assessment Plan

For the purposes of this project, we hope to obtain feedback both from the faculty participants in this workshop and from their students. The plans for each group are summarized below.

Faculty Feedback

Prior to the workshop and six months after the workshop we will ask you to complete a brief (2-3 minutes) online survey. Although we will need your name and e-mail address to invite your participation in the survey, your identifying information will be de-coupled from the data and not be part of any analysis, summary, or publication.

In addition to feedback on which of the proposed approaches you attempted, the two primary questions we hope to answer are:

1. Do you perceive that the proposed approaches are feasible, relevant, and effective?
2. Do you have observations or experiences consistent with the presumption of a positive impact?

Student Feedback

Prior to the workshop and six months after the workshop we will ask your trainees to complete a brief (2-3 minutes) online survey. Although we will need trainee names and e-mail addresses to invite participation in the survey, their identifying information will be de-coupled from the data and not be part of any analysis, summary, or publication.

As a control group, students are being surveyed similarly for those faculty who were interested in attending this workshop but unable to do so. In addition to feedback on which of the proposed approaches you attempted, the two primary questions we hope to answer are:

1. Do the students perceive that the proposed approaches are relevant and effective?
2. Do the students report outcomes consistent with the presumption of a positive impact?

The surveys we are using are provided on the following two pages.

Assessment

Faculty Feedback Questions

1. During the most recent academic term, which of the following strategies did you use as a basis for discussion with one or more of your trainees (graduate students and/or post-docs)?

Strategy	Yes / No
Code of ethics or conduct for your research profession	
Items on a checklist of research ethics topics	
A real or fictional case to demonstrate research ethics issues	
An Individual Development Plan establishing responsibilities for you and your students	
A group policy addressing research ethics issues	

2. For each of the above strategies that you used:
- A. Did you use this strategy in the context of a group meeting (e.g., journal club, discussions of data or research strategies) and/or one-on-one?

Using a scale of agree/neutral/disagree, please rate the following statements:

In my particular research group, this strategy for teaching research ethics is

- B. Feasible (it can be done)
- C. Relevant (it is meaningful to our practice of research)
- D. Effective (it helps to promote research integrity)

- A. How many trainees are part of your research group?

Graduate students _____ Post-docs _____

- B. Over the most recent academic term, how many hours did you discuss research ethics issues with one or more of your trainees (graduate students and/or post-docs)?

In the context of:	Hours
One of more of the proposed strategies?	
Other conversations?	

3. Please note any observations you've had that speak for or against the effectiveness for your research group of any of the above strategies you have used.

4. Please share with us any other strategies, whether purposeful or ad hoc, you have successfully used to generate discussions about research ethics in your research group.

5. Please provide any other comments you may have.

Assessment

Student Feedback Questions

1. During the most recent academic term, which of the following strategies did your research mentor use as a basis for discussion with you?

Strategy	Yes / No
Code of ethics or conduct for your research profession	
Items on a checklist of research ethics topics	
A real or fictional case to demonstrate research ethics issues	
An Individual Development Plan establishing responsibilities for your research mentor and you	
A group policy addressing research ethics issues	

2. For each of the above strategies that your research mentor used:

A. Did your mentor use this strategy in the context of a group meeting (e.g., journal club, discussions of data or research strategies) and/or one-on-one?

Using a scale of agree/neutral/disagree, please rate the following statements:
 In my particular research group, this strategy for teaching research ethics is

B. Relevant (it is meaningful to our practice of research)
 C. Effective (it helps to promote research integrity)

3. Over the most recent academic term, how many hours did you discuss research ethics issues:

With:	Hours
Your research mentor?	
Others?	

4. If the number of hours in question 3 was >0, then what impact, if any, did those conversations have on you?

5. Could you briefly describe any other approaches your mentor has used to generate discussions about research ethics in your research group?

6. Please provide any additional comments you may have.

Recommended Resources

Recommended Resources

The purpose of this section on readings is to provide a starting point for further information about the teaching of research ethics or responsible conduct of research, particularly in the context of the research environment. While all of the resources listed are recommended, this list is not intended to be comprehensive. Resources recommended as a starting point are written in **bold**.

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Recommended Resources

Selected Resources: By Topic

Recommended Starting Resources are in **bold**.

Checklists, Agreements, and Policies

1. AAMC (2008a): Compact Between Postdoctoral Appointees and Their Mentors. <https://www.aamc.org/initiatives/research/postdoccompact>
2. AAMC (2008b): Compact Between Biomedical Graduate Students and Their Research Advisors. <https://www.aamc.org/initiatives/research/gradcompact>
3. FASEB. Statement on Including Postdoctoral Mentoring Plans in Research Grant Applications. <http://www.faseb.org/portals/0/pdfs/opa/QReports/July-Sept08/MentoringRGrants.pdf>
4. FASEB: Individual Development Plan for Postdoctoral Fellows. <http://www.faseb.org/portals/0/pdfs/opa/idp.pdf>
5. **Gawande A (2011): The Checklist Manifesto: How to get things right. Picador.**
6. University of Michigan (2014): Appendix 1. Compact Between Postdoctoral Appointees and their Mentors, Handbook for Postdoctoral Fellows. <http://www.rackham.umich.edu/downloads/PostdocHandbook.pdf>
7. University of Wisconsin: Mentees Individual Development Plans Overview, Resources for each phase of the mentoring relationship. <https://mentoringresources.ictr.wisc.edu/MenteeIDPOverview>

Assessment (and Goals)

1. Antes AL, Murphy ST, Waples EP, Mumford MD, Brown RP, Connelly S, Devenport LD (2009): A Meta-Analysis of Ethics Instruction Effectiveness in the Sciences. *Ethics Behav* 19(5):379-402.
2. **Elliott D, Stern JE (1996): Evaluating Teaching and Students' Learning of Academic Research Ethics. *Science and Engineering Ethics* 2:345-366.**
3. Frankel MS (2003): Developing a Knowledge Base on Integrity in Research and Scholarship, *Phi Kappa Phi Forum* 83(2): 46-49.
4. Heitman E, Olsen CH, Anestidou L, Bulger RE (2007): New Graduate Students' Baseline Knowledge of the Responsible Conduct of Research. *Academic Medicine*. 82(9):838-845.
5. Kalichman M (2013): Why do we teach research ethics? Proceedings from National Academy of Engineering Workshop on Practical Guidance on Science and Engineering Ethics Education. pp. 5-16.
6. Kalichman MW, PJ Friedman (1992): A pilot study of biomedical trainees' perceptions concerning research ethics. *Academic Medicine* 67: 769-775.
7. Kalichman MW, Plemmons DK (2007): Reported Goals for Responsible Conduct of Research Courses. *Academic Medicine* 82(9): 846-852.

Recommended Resources

8. Mumford MD, Connelly MS, Brown RP, Murphy ST, Hill JA, Antes AL, Waples EP, Devenport LR (2008): A sensemaking approach to ethics training for scientists: Preliminary evidence of training effectiveness. *Ethics and Behavior* 18: 315-346.
9. Nightingale P, Te Wiata I, Toohey S, Ryan G, Hughes C, Magin D (1996): Assessing learning in universities. Sydney: Professional Development Centre, University of New South Wales.
10. Plemmons DK, Kalichman MW (2007): Reported Goals for Knowledge to be Learned in Responsible Conduct of Research Courses. *Journal of Empirical Research on Human Research Ethics* 2(2):57-66.
11. Powell S, Allison MA, Kalichman MW (2007): Effectiveness of a Short-term Course in the Responsible Conduct of Research for Medical Students. *Science and Engineering Ethics* 13(2): 249-264.
12. Schmaling KB, Blume AW (2009): Ethics instruction increases graduate students' responsible conduct of research knowledge but not moral reasoning. *Accountability in Research* 16:268–283

Recommended Resources

General Resources

General Web Resources

1. **Ethics Core Digital Library (National Center for Professional and Research Ethics).** <http://nationalethicscenter.org>
2. Making the Right Moves (Howard Hughes Medical Institute). <http://www.hhmi.org/resources/labmanagement/moves.html>
3. **Online Ethics Center (National Academy of Engineering).** <http://onlineethics.org>
4. Project for Scholarly Integrity (Council of Graduate Schools). <http://www.scholarlyintegrity.org>
5. **Resources for Research Ethics Education (UC San Diego).** <http://research-ethics.net>
6. Responsible Conduct of Research (RCR) for Postdocs (National Postdoctoral Association). <http://www.nationalpostdoc.org/publications/rcr>

Texts on Research Ethics

1. Barnbaum DR, Byron M (2001): Research Ethics: Text and Readings, Prentice Hall, New Jersey.
2. **Bulger RE, Heitman E, Reiser SJ (2002): The Ethical Dimensions of the Biological and Health Sciences, Cambridge Univ. Press, NY.**
3. D'Angelo J (2012): Ethics In Science: Ethical Misconduct in Scientific Research. CRC Press, Boca Raton, FL
4. Harris CE, Pritchard M, Rabins M (2008): Engineering Ethics: Concepts and Cases 4e. Wadsworth Publishing, Belmont CA.
5. Israel M, Hay I (2006): Research Ethics for Social Scientists. Sage Publications, Thousand Oaks.
6. Kovac J (2003): The Ethical Chemist: Professionalism and Ethics in Science. Prentice Hall.
7. **Macrina FL (2014): Scientific Integrity, ASM Press, 4th ed., Washington, D.C.**
8. **National Academies of Science (2009): On Being a Scientist: A Guide to Responsible Conduct in Research.** http://www.nap.edu/catalog.php?record_id=12192
9. Oliver P (2003): The Student's Guide to Research Ethics. Open University Press, NY.
10. Penslar RL, ed. (1995): Research Ethics: Cases and Materials. Indiana University Press, Bloomington.
11. Pritchard MS (2006): Professional Integrity: Thinking Ethically. Univ. Press of Kansas.
12. Shamoo AE, Resnik DB (2002): Responsible Conduct of Research, Oxford Univ. Press, NY.
13. Steneck NH (2004): ORI Introduction to the Responsible Conduct of Research. <http://ori.hhs.gov/ori-intro>

Recommended Resources

14. Steward C N (2011): *Research Ethics for Scientists: A Companion for Students*. Wiley-Blackwell, Oxford

Research Ethics Internet Courses

1. Responsible Conduct of Research (University of Pittsburgh). <https://cme.hs.pitt.edu/servlet/ltteachControllerServlet?actiontotake=displaymainpage&site=rp>
2. Responsible Conduct of Research (CMDITR). <https://nationaleticscenter.org/rcrtutorial>
3. Responsible Conduct of Research (Columbia). <http://ccnmtl.columbia.edu/projects/rcr>

Courses for Research Ethics Instructors

1. Teaching Responsible Conduct of Research (RCR) Certificate program: National Center for Professional and Research Ethics. <http://ethicscenter.csl.illinois.edu/teaching-rcr>

Fostering Integrity in Research

1. IOM (2002): *Integrity in Scientific Research: Creating an Environment That Promotes Responsible Conduct*. National Academies Press, Washington, DC. http://www.nap.edu/catalog.php?record_id=10430
2. Kalichman MW (2007): Responding to challenges in educating for the responsible conduct of research. *Academic Medicine* 82(9): 870-875.
3. Martinson BC, Anderson MS, DeVries R (2005). Scientists Behaving Badly. *Nature* 435, 737-738 (9 June 2005) | doi:10.1038/435737a; Published online 8 June 2005
4. Martinson BC, Crain LA, De Vries R & Anderson MS (2010). The Importance of Organizational Justice in Ensuring Research Integrity. *JERHRE*, 67-83

Integrating Ethics in the Curriculum or Discipline

1. Bebeau MJ (2002): Influencing the Moral Dimensions of Professional Practice: Implications for Teaching and Assessing for Research Integrity. In: Steneck NA and Scheetz MH (eds.): *Proceedings of the First ORI Research Conference on Research Integrity*. Office of Research Integrity, Washington, DC pp. 179–187.
2. Collaborative Development of Ethics Across the Curriculum Resources and Sharing of Best Practices, University of Puerto Rico at Mayaguez. <http://cnx.org/lenses/eactoolkit/eactoolkit>
3. **Davis M (2004): Five Kinds of Ethics Across the Curriculum. *Teaching Ethics* 4(2):1-11. http://ethics.iit.edu/publication/Davis_Five_Kinds_of_Ethics.pdf**
4. Davis M (2006). Integrating Ethics into Technical Courses: Micro-Insertion. *Science and Engineering Ethics*, 12, 717-730.

Recommended Resources

5. Drake M, Griffin P, Kirkman R, Swann J (2005): Engineering Ethical Curricula: Assessment and Comparison of Two Approaches. *Journal of Engineering Education* 94:223-231.
6. Society for Ethics Across the Curriculum. <http://www.rit.edu/cla/ethics/seac>
7. Teaching Ethics Across the Engineering Curriculum, Michael Davis, Illinois Institute of Technology. <http://www.onlineethics.org/cms/8924.aspx>

Mentoring and Responsible Conduct

1. **Anderson MS, Horn AS, Risbey KR, Ronning EA, DeVries R & Martinson BC (2007): What Do Mentoring and Training in the Responsible Conduct of Research Have To Do with Scientists' Misbehavior? Findings from a National Survey of NIH-Funded Scientists. *Academic Medicine* 82(9):853-860.**
2. Anderson MS, Louis KS (1994): The graduate student experience and subscription to the norms of science. *Res Higher Ed* 35:273-99.
3. Brown S, MW Kalichman (1998): Effects of training in the responsible conduct of research: A survey of graduate students in experimental sciences. *Science and Engineering Ethics* 4(4): 487-498.
4. Eastwood S, Derish P, Leash E, Ordway S (1996): Ethical issues in biomedical research: Perceptions and practices of postdoctoral research fellows responding to a survey. *Science and Engineering Ethics* 2: 89-114.
5. Fryer-Edwards K (2002). Addressing the Hidden Curriculum in Scientific Research. *American Journal of Bioethics*, 2(4): 58-59.
6. Peiffer AM, Laurenti PJ, Hugenschmidt CE (2008). Fostering a Culture of Responsible Lab Conduct. *Science*, 322:1186
7. **Swazey JP, Anderson MS (1996): Mentors, advisors, and role models in graduate and professional education. Association of Academic Health Centers, Washington, DC.**
8. **Whitbeck C (2001): Group mentoring to foster the responsible conduct of research. *Science and Engineering Ethics* 7:541-558.**
9. Wright DE, Titus SL, Cornelison JB (2008): Mentoring and Research Misconduct: An Analysis of Research Mentoring in Closed ORI Cases. *Science and Engineering Ethics* 14(3): 323-336. <http://www.springerlink.com/content/70w5wu2142w6151g/fulltext.html>

Mentoring

1. Macrina FL (2014): Chapter 3. Mentoring. In: (Macrina FL, au.) *Scientific Integrity. An Introductory Text with Cases*. 4th Edition, ASM Press, Washington, D.C. <http://www.scientificintegrity.net>
2. **National Academy of Sciences, National Academy of Engineering, and Institute of Medicine (1997): Adviser, Teacher, Role Model, Friend: On Being a Mentor to Students in Science and Engineering. National Academy Press, Washington, D.C., 84 pp. http://www.nap.edu/catalog.php?record_id=5789**

Recommended Resources

3. National Institutes of Health: A Guide to Training and Mentoring in the Intramural Research Program at NIH. <http://www1.od.nih.gov/oir/sourcebook/ethic-conduct/mentor-guide.htm>
4. University of Michigan (2010): How to Get the Mentoring You Want: A Guide for Graduate Students, Rackham Graduate School. <http://www.rackham.umich.edu/downloads/publications/mentoring.pdf>
5. **University of Michigan (2011): How to Mentor Graduate Students: A Guide for Faculty. Rackham Graduate School.** <http://www.rackham.umich.edu/downloads/publications/Fmentoring.pdf>
6. University of Wisconsin: Resources for Each Phased of the Mentoring Relationship. <https://mentoringresources.ictr.wisc.edu/MentoringResources>

Readings for Students about Science and Ethics

1. Angier N, Thomas L (1999): Natural Obsessions: Striving to Unlock the Deepest Secrets of the Cancer Cell. Mariner Books.
2. Barker K (2002): At the Helm: A Laboratory Navigator. Cold Spring Harbor Laboratory Press.
3. Barker K (2005): At the Bench: A Laboratory Navigator. Cold Spring Harbor Laboratory Press.
4. Beveridge WIB (1950): The Art of Scientific Investigation. Vintage Books, New York.
5. Bishop JM (2003): How to Win the Nobel Prize: An Unexpected Life in Science. Harvard University Press.
6. Feibelman PJ (1993): A Ph.D. is Not Enough: A Guide to Survival in Science. Addison-Wesley, Reading, MA.
7. Grinnell F (2008): The Everyday Practice of Science Oxford University Press.
8. Gunsalus CK (2012): The Young Professional's Survival Guide: From Cab Fares to Moral Snares. Harvard University Press.
9. Kanigel R (1993): Apprentice to Genius: The Making of a Scientific Dynasty. Johns Hopkins University Press.
10. **Kennedy D (1997): Academic Duty. Harvard University Press.**
11. Lang JM (2005): Life on the Tenure Track: Lessons from the First Year. Johns Hopkins University Press, Baltimore.
12. Medawar PB (1979): Advice to a Young Scientist. Harper & Row, Philadelphia.
13. Ramon y Cajal S (1999): Advice for a Young Investigator. MIT Press
14. Selye H (1964): From Dream to Discovery: On Being a Scientist. McGraw-Hill, New York.
15. Schoenfeld C (1992): Mentor in a manual: climbing the academic ladder to tenure. Magna Publications, Madison, WI.
16. Sindermann CJ (1987): Survival Strategies of New Scientists. Plenum Press, New York.

Recommended Resources

17. Skloot R (2010): *The Immortal Life of Henrietta Lacks*. Crown.
18. Slack JMW (1998): *Egg and Ego: An Almost True Story of Life in the Biology Lab*. Springer Press.
19. Sutton RI (2007): *The No Asshole Rule: Building a Civilized Workplace and Surviving One That Isn't*. Business Plus.

Recommended Resources

Other Approaches for Ethics in Context

The approaches discussed in this workshop are only selected examples that may be useful for you and your research environment. However there are many other approaches that might be worth considering. Some of these include the following:

1. Review of research plans or protocols:
Depending on the nature of your research, it may be that existing documents outline methods, approaches, and/or plans for the conduct of your research. A careful review of those plans can be a useful exercise to identify ethical or values issues intrinsic to your research.
2. Guest speakers:
Inviting others with appropriate expertise is an opportunity to gain helpful perspectives on topics that might be a good match for your area of research. Some possibilities might be a campus ombudsperson to talk about how to handle difficult questions, someone from internal audit services to discuss recordkeeping, or a representative from an office that has oversight responsibility for research with animal subjects, human subjects, or stem cells.
3. Illinois Two-Minute Challenge (2MC) Approach:
Originally developed for teaching ethics and professional responsibility at the University of Illinois by C.K. Gunsalus, Director of the National Center for Professional and Research Ethics, two minute challenges are designed to present realistic dilemmas that arise concerning research ethics, along with a structured decision-making framework for assessing how to respond. Given the brief time commitment, this is a good option for use in the research environment. The National Center for Professional and Research Ethics (NCPRE) [<http://ethicscenter.csl.illinois.edu>] hosts a library of 2MCs that connect to other resources including teaching materials, bibliographies, videos, etc.

Your anonymous evaluation of this workshop will be invaluable for planning for future versions of this type of program.

Using a scale of 1 to 5 (1=very low, 5=very high), please rate the extent to which today's workshop helped you to meet the stated objectives for your particular research environment, which include being able to:

1. Articulate *rationales* for integrating research ethics education. _____
2. List and describe ethics *topics* suitable and useful to be addressed. _____
3. List and describe *approaches* for integrating research ethics education. _____
4. Design one or more *activities* to introduce research ethics. _____

5. Using a scale of 1 to 5 (1=very low, 5=very high), how would you score the overall value of this workshop? _____
6. How, if at all, have your perceptions or understanding been changed by participating in today's workshop?

7. How would you describe the value of this workshop to your plans for teaching or promoting research ethics?

8. What changes would you recommend to help improve future versions of this workshop?

9. Please use the space below or the back of this page if you have any additional comments or suggestions about future workshops on this topic: