



Online Ethics Center
FOR ENGINEERING AND SCIENCE

Institutional Programs Bibliography

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Description

This detailed bibliography includes information on initiatives and funding opportunities, "Ethics Across the Curriculum Programs", example ethics resource centers, developing ethics courses, informal ethics instruction, and evaluation and assessment strategies.

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Initiatives and Funding Opportunities

The Project for Scholarly Integrity

This initiative of the [Council of Graduate Schools \(CGS\)](#), seeks to advance the scope and quality of graduate education in the ethical and responsible conduct of research. Supported by the [Office of Research Integrity \(ORI\)](#), CGS has made awards to seven institutions participating in five projects, each of which is developing and assessing educational models that promote responsible scholarly conduct. This site serves as a tool for sharing ideas developed in these projects and as a clearinghouse of resources relevant to graduate deans and other university administrators, faculty, researchers, and graduate students. The resources on this site address curricular needs across a wide range of topics typically covered in responsible conduct of research (RCR) education and training. The site also addresses broad ethical issues, such as the ethical obligations of universities, as well as strategies for institutionalizing changes in the research environment. The web page also includes a well designed database of relevant articles on assessment, broad areas of ethics in universities, and topics in RCR and science research ethics.

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Ethics Across the Curriculum Programs

Ethics Across the Curriculum programs seek to help faculty and instructors from across departments or universities integrate ethics education into their courses and instruction programs. The following resources include examples of university-wide EAC programs and workshops and a large number of articles discussing how to start a program of this kind.

Examples of Ethics Across the Curriculum Programs

Loyola University, Chicago

This web site includes a discussion of workshops for faculty, topics addressed during these workshops, and an article discussing learning objectives for undergraduate education in ethics.

Illinois Institute of Technology Ethics Across the Curriculum

From 1997-2003, the Center for the Study of Ethics in the Professions at IIT hosted colleagues from institutions internationally and across the country for the Ethics Across the Curriculum summer workshops. Running seven days, these workshops

allowed twenty participants from a variety of disciplines to discuss ways to meaningfully integrate ethics into undergraduate and graduate curricula. Since then, a number of other institutions have started hosting their own workshops. This resource gives a detailed synopsis of what was covered in these workshops, and gives some very general advice and a further list of resources and readings for individuals looking at integrating ethics into their course, or in developing a university-wide Ethics Across the Curriculum program.

University of Oklahoma “Sense-making Approach”

The University of Oklahoma has developed a “sense-making” approach to ethics instruction that they have successfully incorporated into classes in the areas of science, technology, engineering and mathematics. A set of procedures have been developed for translating ethics sense-making instruction into various different fields. This instructional development template can be obtained by contacting Alison Antes (aantes@psychology.ou.edu) at the University of Oklahoma.

For a further description of the sense-making approach and its application at the University of Oklahoma see:

[Current Issues and Directions in Ethics Instruction for Scientists and Engineers](#)

by Michael D. Mumford and Alison L. Antes of University of Oklahoma

Brock, Meagan E., Andrew Vert, Vykinta Kligyte, et al. “Mental Models: An Alternative Evaluation of a Sensemaking Approach to Ethics Instruction.” *Science and Engineering Ethics*. 14:3 (September 2008) 449-472.

This paper assesses a novel responsible conduct of research curriculum developed at the University of Oklahoma that focuses on metacognitive reasoning strategies that professionals use when making sense of professional issues that have ethical implications for science. To find out the overall effectiveness of the sensemaking approach, the authors also studied mental models of field experts, faculty, and graduate students who were both trained and untrained in sensemaking. The study found that sensemaking training has the potential to lead in a shift in mental model structure and introduces a new way for research to think about the novel, highly complex, and ambiguous ethical situations that research professionals often face in their daily lives.

Union College

Union College has developed a program that along with providing contacts and resources for faculty, also offers a grant to assist instructors in buying teaching materials, traveling to ethics-related conferences, organizing campus activities, and bringing outside speakers to campus.

Further Resources on Ethics Across the Curriculum:

Davis, Michael. "Five Kinds of Ethics Across the Curriculum." An Introduction to Four Experiments with One Kind." *Teaching Ethics* 4 (Spring 2004: pp. 1-14.

Davis describes five different approaches some universities have taken in designing an Ethics Across the Curriculum program and how the goals and outcomes of each strategy differ.

Matchett, Nancy J. "Ethics Across the Curriculum." *New Direction in Higher Education* 142 (Summer 2008) 25-38.

This article discusses how colleges and universities can begin to coordinate ethics teaching throughout the undergraduate and graduate curriculum, and identifies a basic set of ethics learning outcomes that does not threaten the academic freedom of academic faculty members, or suggest that all campus adopt a one-fits-all approach. This volume of *New Direction in Higher Education* is devoted to ethics education teaching strategies and studies.

Ozar, David. "[Learning Outcomes for Ethics Across the Curriculum](#)" *Teaching Ethics* 2:1 1-29.

This paper discusses undergraduate ethics education from the point of view of a learning-outcomes-centered approach to curriculum design. It aims to identify the kinds of learning-outcomes that Ethics Across the Curriculum programs ought to aim at and be judged successful by. The first section explains the learning-outcomes-centered approach to designing and evaluating curriculum proposals. The second section applies this approach specifically to ethics education for undergraduates. It concludes with a proposal for Ideal Learning Outcomes for ethics education in an undergraduate curriculum. The third section asks which of these learning outcomes can reasonably be achieved by an Ethics Across the Curriculum program and which of these learning outcomes could not dependably be achieved unless a formal course in ethics is a requirement for every student. The fourth section briefly examines teaching strategies for Ethics Across the Curriculum programs and

discusses ways of helping faculty in Ethics Across the Curriculum programs become effective ethics teachers.

Simonson, Larry. "Introducing Ethics across the Curriculum at South Dakota School of Mines and Technology." *Science and Engineering Ethics* 11:4 (October 2005) 655-658.

A short article describing the development and implementation of an EAC program by the Electrical and Computer Engineering Department at the South Dakota School of Mines.

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Example Ethics Resource Centers/Sponsored Research Web sites

[University of Minnesota Teaching Ethics for Research, Scholarship, & Practice](#)

This web resource includes a list of contacts for questions research ethics and policies, instructional guides that can be used in classes, and an online database of materials on teaching ethics, compiled by the University of Minnesota Library.

[University of Pittsburgh Survivor Skills and Ethics Program](#)

Provides annual workshops for students on topics such as research ethics, writing and applying for grants, and giving oral presentations, as well as providing train-the-trainer workshops. The site includes further resources and examples of handouts used in the workshops, and articles on the rationale behind their approach to responsible conduct of research training.

[Western Michigan University - Center for the Study of Ethics in Society](#)

The Office of the Vice President for Research and the Center for the Study of Ethics in Society has developed a web resource focusing on research ethics which includes an extremely good summary of the nine areas of responsible conduct of research, information on compliance and IRB's, as well as a bibliography of materials for further research.

[University of Alaska, Fairbanks Office of Research Integrity](#)

The Office of Research Integrity of the University of Alaska, Fairbanks has set up an annual seminar series for faculty and students to help them fulfill the National

Science Foundation's Responsible Conduct of Research Training requirement for postdoctoral researchers and graduate student trainees. They have also worked with the RCR Education Committee of the Association for Practical and Professional Ethics to develop a self-directed online tutorial that introduces researchers to RCR topics, whose text faculty are urged to use in their courses and workshops.

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Developing Capstone, Required, and Elective Ethics Courses & Programs

A number of universities have sought to develop ethics courses or workshops to fulfill ethics education requirements of various educational and professional accreditation boards. What follows is a series of articles of how various universities have gone about developing these programs.

Feldhaus, Charles. R. Robert M. Wolter, Stephen P. Hundley, and Tim Diemer. "A Single Instrument: Engineering and Engineering Technology Students Demonstrating Competence in Ethics and Professional Standards. *Science and Engineering Ethics* 12:3 (June 2006) 291-311.

This paper details efforts by the Purdue School of Engineering and Technology at Indiana University Purdue University Indianapolis (IUPUI) to create a single instrument for honors science, technology, engineering and mathematics (STEM) students wishing to demonstrate competence in the IUPUI Principles of Undergraduate Learning (PUL's) and Accreditation Board for Engineering and Technology (ABET) Engineering Accreditation Criterion (EAC) and Technology Accreditation Criterion (TAC) 2, a through k. Honors courses in Human Behavior, Ethical Decision-Making, Applied Leadership, International Issues and Leadership Theories and Processes were created along with a specific menu of activities and an assessment rubric based on PUL's and ABET criteria to evaluate student performance in the aforementioned courses. Students who complete the series of 18 Honors Credit hours are eligible for an Honors Certificate in Leadership Studies from the Department of Organizational Leadership and Supervision. Finally, an accounting of how various university assessment criteria, in this case the IUPUI Principles of Undergraduate Learning, can be linked to ABET outcomes and prove student competence in both, using the aforementioned courses, menu of items, and

assessment rubrics; these will be analyzed and discussed.

Gorman, M., Hertz, M., Louis, G., Magpili, L., Mauss, M., Mehalik, M., et al. (2000). Integrating ethics & engineering: A graduate option in systems engineering, ethics, and technology studies. *Journal of Engineering Education*, 89(4), 461-470:

This project-based program in engineering ethics involves ethics students and engineering students in collaborative investigation of the ethical implications of technology. An example of how interdisciplinary projects and classes can be used to help students understand the ethical standards of professions outside of their own.

Smaldino, Sharon. "Classroom Strategies for Teaching Ethics." *New Directions in Higher Education*. 142 (Summer 2008) 87-101.

Describes the approach faculty at Northern Illinois University took in developing an ethics education curriculum to meet new Illinois State standards for Technology Specialists, including surveying what ethics education opportunities currently existed on the campus, identifying key professional standards, and designing the overall course including selection of topics, instructional approaches, and assessment methods.

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Other Approaches to Ethics Instruction

- Annual half or full day workshops, sponsored by the Vice President for Research
- Designating an Ethics "resource" person for each department
- Student forum/groups that meet periodically (face to face or online)
- Ethics columns/blogs in university/department newsletter (ex. Department of Sponsored Research newsletter)
- Required RCR "survival skills" classes (university-wide)
- Train the trainer workshops
- Speaker series or occasional lectures.

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Evaluation and Assessment Strategies across Numerous Courses/University Programs

Defined Issues Test (DIT)

This machine scored test is perhaps one of the only standardized ways of measuring changes in a person's moral judgment. Based on Kolberg's stages of moral development, the DIT has test-takers read about five moral dilemmas and has them rank a number of statements about each situation according to their importance. The data gathered reveals information about the three schemas of moral reasoning, Personal Interests, Maintaining Norms, and the Postconventional. This test is appropriate for measuring changes over longer periods of time (months to years). For more information, visit the [Center for the Study of Ethical Development of the University of Minnesota](#).

Purdue School of Engineering and Technology's Assessment Tool

The Purdue School of Engineering and Technology has developed an assessment tool that can be used for honors science, technology, engineering and mathematics students wishing to demonstrate competence not only in the School's ethics and leadership criteria, but also the Accreditation Board for Engineering and Technology (ABET) Engineering Accreditation Criterion (EAC) and Technology Accreditation Criterion (TAC). The full process of developing this assessment tool and courses that fulfill these three sets of requirements is described in the following article.

Feldhaus, Charles. R. Robert M. Wolter, Stephen P. Hundley, and Tim Diemer. "A Single Instrument: Engineering and Engineering Technology Students Demonstrating Competence in Ethics and Professional Standards. *Science and Engineering Ethics* 12:3 (June 2006) 291-311.

University of Oklahoma's "Sensemaking" Approach

The University of Oklahoma has developed an interactive "sensemaking" approach to ethics instruction that has received extremely positive feedback from faculty and students. The team has developed an assessment method to evaluate the effectiveness of research-ethics courses using this strategy at the university. The

survey methods and results are described in the following two articles.

Brock, Meagan E., Andrew Vert, Vykinta Kligyte, et al. "Mental Models: An Alternative Evaluation of a Sensemaking Approach to Ethics Instruction." *Science and Engineering Ethics*. 14:3 (September 2008) 449-472.

This paper assesses a novel responsible conduct of research curriculum developed at the University of Oklahoma that focuses on metacognitive reasoning strategies that professionals use when making sense of professional issues that have ethical implications for science. To find out the overall effectiveness of the sensemaking approach, the authors also studied mental models of field experts, faculty, and graduate students who were both trained and untrained in sensemaking. The study found that sensemaking training has the potential to lead in a shift in mental model structure and introduces a new way for research to think about the novel, highly complex, and ambiguous ethical situations that research professionals often face in their daily lives.

Kligyte, Vkyinta, Richard T. Marcy and Ethan P. Walples et al. "Application of a Sensemaking Approach to Ethics Training in the Physical Sciences and Engineering." *Science and Engineering Ethics* 14:2 (June 2008) 251-278.

This study assesses the effectiveness of a newly-developed responsible conduct of research training in enhancing the ethical decision-making of researchers in the physical sciences and engineering, and examines the influence of training and trainee characteristics on ethical decision-making and application of broad metacognitive reasoning strategies.

Further resources:

Bebeau, Muriel J. "The Defining Issues Test and Four Component Model: Contributions to Professional Education." *Journal of Moral Education*. 31:3 (September 2002) 271-295.

Describes a standard test for measuring the moral development of students over a period of time. This test has often been used to assess the effectiveness of ethics instruction strategies in department and university-wide programs.

Clancy, Edward A, Paula Quinn, and Judith E. Miller. "Assessment of a Case Study Laboratory to Increase Awareness of Ethical Issues in Engineering."

***IEEE Transactions on Education*. 48:2 (May 2005) 313-17.**

This article discusses the assessment of a three-hour “laboratory period,” during which students read and discussed three short cases on engineering ethics. The assessment included focus groups and surveys, and while in focus groups students agreed that this activity enhanced their awareness of ethical issues, the survey results, were equivocal.

DuBois, Dueker, Anderson and Campbell. [“The Development and Assessment of an NIH-Funded Research Ethics Training Program”](#)

***Academic Medicine* 83:6 (June 2008) 596-603.**

Describes the development of a research-ethics training from at the University of St. Louis that included distance and on-site learners. The program used a pre-and post-test strategy for assessment, and found that the program succeeded in increasing participants’ belief that they could identify ethical issues, locate problem-solving resources, and solve ethical problems. Scores on the case-based problem solving section of the test dropped during the post-test, however, apparently because of diminished confidence about the right course of action in the dilemma presented.

Elliott, Deni, and Judy E. Stern. “Evaluating Teaching and Students’ Learning of Academic Research Ethics.” *Science and Engineering Ethics* 2:3 (September 1996) 345-366.

This article describes the assessment methods developed for a responsible conduct of research course developed at Dartmouth College. After describing some of the difficulties in measuring moral development in students, the authors outline some of the criteria they developed for assessment, and the development and scoring of the pre and post tests finally used in assessing the Dartmouth course.

Funk, Carolyn L., Kristin A. Barrett, Francis L. Macrina. “Authorship and Publication Practices: Evaluation of the Effect of Responsible Conduct of Research Instruction to Postdoctoral Trainees.” *Accountability in Research: Policies and Quality Assurance* 14:4 (October-December 2007) 296-305.

This article reports the results of a study that looked at the effectiveness of responsible conduct of research education in the areas of authorship and publication. Using a three-way telephone and online survey conducted over a period of three years, the researchers looked at individual participants before and after taking the course. They found that while participants were more knowledgeable about standards and practices in publication, the results of the study failed to suggest a significantly increased level of ethically appropriate behavioral responses

measured in the study, or significant effect on increasing awareness of or attention to ethical guidelines about authorship and publication. The researchers argue that the survey results do not show that responsible conduct of research education is not effective, but rather that it highlights the importance of careful articulation of course goals and objectives with attention to the background and experience of the student audience when developing ethics education curricula.

Kligyte, Vkyinta, Richard T. Marcy and Ethan P. Walples et al. "Application of a Sensemaking Approach to Ethics Training in the Physical Sciences and Engineering." *Science and Engineering Ethics* 14:2 (June 2008) 251-278.

This study assesses the effectiveness of a newly-developed responsible conduct of research training in enhancing the ethical decision-making of researchers in the physical sciences and engineering, and examines the influence of training and trainee characteristics on ethical decision-making and application of broad metacognitive reasoning strategies.

Kirkman, Robert. "Teaching for Moral Imagination: Assessment of a Course in Environmental Ethics." *Teaching Philosophy* 31:4 (2008) 333-50.

This article looks at the results of an assessment project on a course in environmental ethics whose goals were to measure the impact of the course on students, as well as to contribute to a broader goal of developing assessment tools for ethics education.

Newton, Lisa H. "Outcomes Assessment of an Ethics Program: Purposes and Challenges." *Teaching Ethics: The Journal of the Society for Ethics Across the Curriculum*. 2:1 (Fall 2001) 29-45.

Describes the development of an assessment method for a university-wide ethics program developed at Fairfield University.

Pimple, Kenneth. "Assessing Teaching and Learning in the Responsible Conduct of Research" Washington, DC: Institute of Medicine Committee on Assessing Integrity in Research Environments, 2001.

This literature review looks at teaching methods, the development of goals, and some of the challenges that exist in assessing learning in ethics. The paper lists a large number of techniques used for assessment and evaluation, and describes the benefits and drawbacks of many of these methods.

Powell, Allison, and Kalichman. "Effectiveness of a Responsible Conduct of Research Course: A Preliminary Study" *Science and Engineering Ethics*. 13.2: 249-264, 2007.

Medical students participating in a NIH-funded research program at the University of California, San Diego were surveyed after a short-term course on ethics.

Development of the survey is discussed. The survey found that the only statistically significant improvement associated with the course was an increase in knowledge, with a non-significant tendency towards improvements in ethical decision-making skills and attitudes towards the importance of RCR instruction.

Rudnicka, Ewa A. "Ethics in an Operations Management Course." *Science and Engineering Ethics*. 11:4 (October 2005) 645-654.

Article includes a model of a grading rubric for evaluating students' understanding of ethics case studies.

Steneck, Nicholas H. "Designing Teaching and Assessment Tools for an Integrated Engineering Ethics Curriculum." *Proceedings of the 29th ASEE/IEEE Frontiers in Education Conference*. (1999): 12d6-11, 12d6-17.

This paper describes the development of learning goals and assessment tools for an across the curriculum approach to teaching ethics at the College of Engineering at University of Michigan. The goal was to develop techniques that engineering faculty could use to weave ethics into their existing courses. The paper includes a chart listing the specific learning criteria of the ethics program, and the specific assessment methods used to measure if students could meet that criteria.

[MIT Reporting Organizations and Relationships, Office of Vice President for Research and Associate Provost](#)

This page offers access to MIT documents on academic and research integrity, including their Fostering Academic Integrity: Report of the Committee on Academic Responsibility, which makes observations about compromises of academic and research integrity, and their causes and remedies.

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RCR Guidelines for Government-funded Programs and Projects

[Policy on Instruction in the Responsible Conduct of Research \(RCR\)](#)

The Public Health Service (PHS) Policy on Instruction in the Responsible Conduct of Research (RCR) was issued December 1, 2000. This policy, issued by PHS (Public Health Service), requires that all "research staff at extramural institutions shall complete a basic program of instruction in the responsible conduct of research."

[Office of Research Integrity \(ORI\)](#)

Part of the U.S. Department of Health and Human Services, includes guidelines for "[whistleblowing](#)" and the [Policy on Instruction in the Responsible Conduct of Research \(RCR\)](#) Issued December 1, 2000, this policy, requires that "all staff at extramural institutions engaged in research or research changing with PHS funds, or who work on PHS-supported projects must have training in the responsible conduct of research."

[National Science Foundation - RCR](#)

The America COMPETES Act, passed in 2008, includes in section 7009 the requirement that each institution that applies for financial assistance from the National Science Foundation for engineering or science research or education provides RCR training to students involved in these projects. This page provides information for Principle Investigators and university administrators comply with these new guidelines.

[Proposals for Safeguarding Good Scientific Practices](#)

Written by members of the German Research Foundation (DFG), circa 1998. This report provides a series of recommendations for universities, government agencies and institutions, on how to prevent misconduct and improve good scientific practice in organizations.

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See also: The [Institutional Programs](#) section of the OEC.

This bibliography is a work in progress. Please help us by [recommending articles](#) or letting us know of any assessment projects that you may be involved in.

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Discipline(s)

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