



## Teaching Geoethics Across the Geoscience Curriculum

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Training in geoethics is an important part of pre-professional development of geoscientists. Professional societies, governmental agencies, and employers of the geoscience workforce increasingly expect that students have had some training in ethics to guide their professional lives, and the public demands that scientists abide by the highest standards of ethical conduct. The nature of the geosciences exposes the profession to ethical issues that derive from our work in a complex, dynamic Earth system with an incomplete geologic record and a high degree of uncertainty and ambiguity in our findings. The geosciences also address topics such as geohazards and resource development that have ethical dimensions that impact on the health, security, public policies, and economic well-being of society. However, there is currently no formal course of study to integrate geoethics into the geoscience curriculum and few faculty have the requisite training to effectively teach about ethics in their classes, or even informally in mentoring their research students. To address this need, an NSF-funded workshop was convened to explore how ethics education can be incorporated into the geoscience curriculum. The workshop addressed topics such as where and how should geoethics be taught in a range of courses including introductory courses for non-majors, as embedded modules in existing geoscience courses, or as a dedicated course for majors on geoethics; what are the best pedagogic practices in teaching ethics, including lessons learned from cognate disciplines (philosophy, biology, engineering); what are the goals for teaching geoethics, and what assessments can be used to demonstrate mastery of ethical principles; what resources currently exist to support teaching geoethics, and what new resources are needed? The workshop also explored four distinct but related aspects of geoethics: 1) Geoethics and self: what are the internal attributes of a geoscientist that establish the ethical values required to successfully prepare for and contribute to a career in the geosciences? 2) Geoethics and the geoscience profession: what are the ethical standards expected of geoscientists if they are to contribute responsibly to the community of practice expected of the profession? 3) Geoethics and society: what are the responsibilities of geoscientists to effectively and responsibly communicate the results of geoscience research to inform society about issues ranging from geohazards to natural resource utilization in order to protect the health, safety, and economic security of humanity? 4) Geoethics and Earth: what are the responsibilities of geoscientists to provide good stewardship of Earth based on their knowledge of Earth's composition, architecture, history, dynamic processes, and complex systems? Consideration of these components of geoethics will prepare students to recognize ethical dilemmas, and to master the skills needed for ethical decision-making in their professional lives. Collections of resources, case studies, presentations and working group summaries of the workshop can be accessed at: <http://serc.carleton.edu/geoethics/index.html>