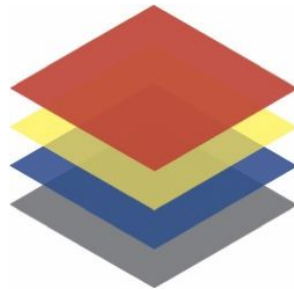


# Assessment

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Educational assessment is the art of  
quantifying the unmeasurable”  
- Michael Loui (2019)

# Translating Learning Goals to Assessment

1. improving ethical **sensitivity** (the ability to recognize problems covered by the relevant standards),
2. (b)increasing ethical **knowledge** (appropriate terms, relevant standards, related institutional practices, such as “hot lines”, decision procedures, and other ethical resources),
3. enhancing ethical **judgment** (the ability to make competent choices of the appropriate sort for the appropriate reasons more often than chance or common sense), and
4. reinforcing ethical **commitment** (the likelihood that students will act on what they have learned).

In assessment in a classroom, it's good to stick to goals 1-3, goal 4 is easier in a longer course or over the duration of a program.

(Davis and Feinerman, 2012)

# Possible Classroom Assessment Techniques

- Minute paper/most confusing point paper
  - What was the most important thing you learned during this class?
  - What important question(s) remain unanswered?
  - What was the most confusing point in the text, class....?
- One-sentence summary
  - In a long sentence (of about 50 words), define the term *engineering professional responsibility*.  
Address *who*, *what*, and *why*.

*Useful for accessing ethical sensitivity & knowledge, where students struggling (such as ambiguity of ethical cases)*

# Homework

- Reflection Paper
  - Explain how the learning will be used in your future as a student/engineer
  - Identify further questions that you would like to answer
- Case Study Analysis
  - What ethical issues does this case raise?
  - What is affected by the case? What are their perspectives on the case?
  - What actions might the characters consider to resolve the ethical issues?
  - Among these actions, which should the characters choose? For what reasons?

*Useful for ethical sensitivity, knowledge, ethical-decision-making skills and own concepts around personal responsibility and connections to professional ethics, personal scripts for how to raise and discuss concepts*

# Possible Rubric – Case Study Discussion

Criteria	Unsatisfactory	Satisfactory	Excellent
Recognition of Dilemma	Only infers problem/does not recognize	Recognizes obvious ethical dilemmas	Clearly identifies and frames key ethical dilemmas
Information/ Argumentation	Lists facts without judgement, missing key facts, only recognizes certain actors.	Justifies facts relevant to identified dilemmas, notes some information missing, identifies key actors	Recognizes and justifies unknown and known facts. Identifies primary and secondary actors, uses expertise to add information
Analysis of ethical issues	Authoritative/ rules driven without justification, If ethical theory cited, used incorrectly, minimal effort at analysis and justification	Applies rules or standards with justification, notes possible conflicts, correctly recognizes applicability of ethical concepts, coherent approach	Correctly applies ethical constructs, applies more than one rationale, Discusses responsibility of key actors
Perspective (Fairness)	Gives one point of view	Some recognition of multiple perspectives	Global view of situation, considers consequences of various perspectives
Resolution/ Argumentation	Only applies/cites rules with little or no justification, only states possible solution, only infers consequences.	Limited ability to differentiate among alternatives, recognizes recommendation has consequences	Systematic and logical Arguments, understands consequences of action

Quiz or Exam – put ethics question(s) or a mini case study analysis in the existing final exam:

1. Why are researchers investigating nanotechnology to correct environmental pollution?
2. List advantage(s) of using nanotechnology for environmental pollution remediation.
3. List disadvantage(s) of using nanotechnology for environmental pollution remediation.
4. Give an example of an acceptable and an unacceptable use of nanotechnology for environmental pollution remediation.

*Useful for accessing ethical sensitivity, knowledge, and judgement, ability to recognize alternate viewpoints and use ethical frameworks to defend position.*

(Davis and Feinerman, 2012)

# Final Project Ethical Analysis

- Students create and analyze their own case study - conduct research, conduct an ethical analysis of the case, and draw conclusions based on research and ethical framework. Could also include leading a case discussion with the class.
- Students submit a reflection paper discussing ethical questions/issues raised as part of their final project, who are the stakeholders, what are the main values at play, and discussing the decision process and analysis of their solution to the questions/issued raised.
- Reflexive Ethics Journaling: Students asked to respond to prompts in their journal throughout the design of a project,, and also submit a short pre and post course essay that ask them to reflect on their teamworks skills, concepts on personal and professional responsibility, as well as reflections on micro and macro-ethical issues that came up.



# Published Ethics Assessment Instruments

- Baseline test of responsible conduct of research (Heitman et al., 2007)
- TESSE: Test of Ethical Sensitivity in Science and Engineering (Borenstein et al., 2008)
- ESIT: Engineering and Science Issues Test (Borenstein et al., 2010)
- EERI: Engineering Ethics Reasoning Instrument (Zhu et al., 2014)
- EDM: Ethical Decision-Making Measure (Mumford et al., 2006)
  
- See list of full assessment members at <https://onlineethics.org/collection-detail/Evaluation%20Tools>

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- Davis, Michael, and Alan Feinerman. 2012. "Assessing Graduate Student Progress in Engineering Ethics." *Science and Engineering Ethics* 18 (2):351-367.  
<https://philpapers.org/rec/DAVAGS#download-options>
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- Keefer, Matthew W., and Michael Davis. 2012. "Curricular Design and Assessment in Professional Ethics Education: Some Practical Advice." *Teaching Ethics: The Journal of the Society for Ethics Across the Curriculum* 13 (1):81-90.

# Rubrics

- Graduate Case Study Discussion Rubric -  
<https://onlineethics.org/media/906>
- Undergraduate Case Study Discussion Rubric -  
<https://onlineethics.org/media/901>
- Pittsburgh-Mines Engineering Ethics Assessment Rubric (2003),  
<https://www.engineering.pitt.edu/contentassets/5fe6606c68914eb79daf16a31a819f3c/pittsburgh-mines-engineering-ethics-assessment-rubric.pdf>