

**Title: 3A. Societal Impacts**

**Goal:** To enhance student knowledge of the social and ethical dimensions of science, engineering, and technology.

**Module Objectives:** Introduce students to: 1) The Roles and Limits of Codes of Ethics; 2) The Distinctions between Ethics, Laws and Regulations, and Codes; 3) The Concepts of Virtue and Moral Character; 4) Nanotechnology and Privacy; 5) The Model of Engineering as Social Experimentation; 6) The Precautionary Principle

**Prerequisites by topic:**

- Module 2A

**Required Texts:**

- Martin, Mike W. and Roland Schinzinger, "Engineering as Social Experimentation" in *Ethics in Engineering*, 2<sup>nd</sup> Ed. (New York: McGraw Hill, 1989). 63-104, excerpts.
- Harris, Charles E. "The Good Engineer: Giving Virtue its Due in Engineering Ethics," *Science and Engineering Ethics* (2008) 14:153-164
- Foster, Kenneth R., Paolo Vecchia, and Michael H. Repacholi, "Science and the Precautionary Principle," *Science* (12 May 2000) 288:5468, 979-981.
- Professional Codes of Ethics:
  - American Institute of Chemical Engineers
  - Institute of Electrical and Electronics Engineers
  - ABET (formerly – Accreditation Board for Engineering and Technology)
  - American Society of Civil Engineers
  - American Society of Mechanical Engineers
  - Society of Manufacturing Engineers
  - International Council on Systems engineering
  - National Society of Professional Engineers
  - Association for Computing Machinery

**Required Text:**

**Reading: Write-up of this module**

**References:** [Refs. 14-17, 20]

**Student Learning Outcomes:**

- Be able to explain the roles and limits of professional Codes of Ethics
- Be able to compare engineering practice and medical experimentation
- Be able to recognize the ethical dimensions of decisions, actions, and policies
- Be able to differentiate between personal values and professional ethics
- Be able to identify Professional Engineering Societies and explain their role
- Be able to employ major ethical theories – Virtue Ethics
- Be able to discuss and debate the ethical dimensions of decisions, actions, and policies
- Be able to propose possible solutions to ethical concerns
- Be able to compare and evaluate differing possible solutions using the Precautionary Principle
- Develop critical thinking skills and judgment

- Develop an ethical identity to carry forward to working life

Topics Covered: (Green highlighted topics are priority#1, Yellow highlighted are if time permits)

- **Lecture I:** Developing an Ethical Framework 2: Engineering as Social Experimentation
  - Engineering Practice and Medical Experiments (Martin and Schinzinger)
  - The Precautionary Principle (Foster, Vecchia, and Repacholi)
- **Lecture II:** Developing an Ethical Framework 3:
  - Virtue Ethics (Harris)
  - Codes of Ethics and their Limits (notes and PowerPoint)
  - Nanotechnology and Privacy

### Relationship to ABET Program Outcomes

[Note: Please, refer ABET program outcomes list (a) through (l) in attached standard template.]

- (c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical constraints as well as considerations of public health and safety, manufacturability, and sustainability.
- (f) An understanding of professional and ethical responsibility.
- (g) An ability to communicate effectively.
- (h) The broad education necessary to understand the impact of engineering solutions in a global economic, environmental, and societal context.
- (i) A recognition for the need for and an ability to engage in lifelong learning.
- (j) A knowledge of contemporary issues.