IOWA STATE UNIVERSITY

Department of Electrical and Computer Engineering

CPRE/EE 394 Program Exploration

Class Meeting

Facilitators: Dr. Diane Rover and Dr. Mani Mina

Resources: https://iastate.box.com/v/394-meeting-info

Overview

- Engineering profession, competencies and student outcomes
- Engineering solutions, broader issues and systems thinking
- Making connections with the real world

Engineering Profession

- What is a profession?
  - Wikipedia…
  - Elements (several sources):
    - Specialized knowledge, skills and experience, including education and training at a high level and continued professional development
    - Expansion of knowledge through research
    - Autonomy through accreditation, certification, licensing, code of ethics and conduct
    - Robust professional association
    - Well-defined social good associated with work

Engineering Competencies

- Recall CPRE/EE 294
- ISU Engineering Workplace Competencies
- Competency: grouping of knowledge, skills, behaviors and motivations

PROFESSIONALISM
SAFETY AWARENESS
CULTURAL ADAPTABILITY
INNOVATION
CONTINUOUS LEARNING
INTEGRITY

ENGINEERING KNOWLEDGE
COMMUNICATION
PLANNING
QUALITY ORIENTATION
GENERAL KNOWLEDGE
TEAMWORK
ANALYSIS & JUDGEMENT
CUSTOMER FOCUS

ABET Engineering Student Outcomes

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

2. an ability to apply engineering design to produce **solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors**

3. an ability to **communicate effectively** with a range of audiences

ABET Student Outcomes (continued)

4. an ability to **recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts**

5. an ability to **function effectively on a team** whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

ABET Student Outcomes (continued)

6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and **use engineering judgment to draw conclusions**

7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

→ Technical and professional skills are interwoven in the student learning outcomes.

Professional and Ethical Responsibility

- Areas of professional responsibility
  - Work competence
  - Safety, health and well-being of the public and stakeholders
  - Communication honesty
  - Financial responsibility (e.g., value and cost of products/services for employer/client)
  - Property ownership and respect (including information and ideas)
  - Sustainability (e.g., 3 E's: economy, environment, equity; 3 P's: profits, planet, people)
    - Meeting the needs of the present without compromising the ability of future generations to meet theirs
  - Social responsibility (products/services that benefit society)

Engineering Solutions and the Bigger Picture

- Academic courses
- Internships
- Research experiences
- Design projects and competitions
- Professional organizations and clubs (e.g., activities, newsletters)
- Companies and practicing engineers
- Technical media
- Mainstream media
- Etcetera

Broader Issues in the Field

- Example media sources:
  - IEEE Spectrum, https://spectrum.ieee.org
  - IEEE Computer Society Tech News, https://www.computer.org/publications/tech-news
  - IEEE Computing Edge, https://www.computer.org/publications/computing-edge
  - IEEE Potentials Magazine, https://www.ieee.org/membership/students/potentials.html
  - NPR Technology, https://www.npr.org/sections/technology/
  - ASEE First Bell, http://asee.bulletinmedia.com/archive.aspx

Activity

- Browse the IEEE and other media sources.
- Find a technical article that interests you in relation to your career-related activities and goals.
- Read the article and think about the following:
  - What topics and issues in the article are most interesting to you?
  - What topics are you familiar with?
  - What topics are you curious about?
  - What engineering competencies, knowledge, and skills are needed to understand and evaluate the issues and to design and implement solutions?

Activity (continued)

- Identify a key topic or central issue in the article.
- Create a concept or mind map around the selected topic/issue. Use information from the article and your own experiences. Add interesting technical and contextual details. Draw it by hand or use a tool. Try to include at least 10-15 nodes in the map.
- For more information about mapping:
  - https://zapier.com/blog/mind-mapping-tutorial/
  - https://www.lucidchart.com/pages/how-to-make-a-mind-map
  - https://en.wikipedia.org/wiki/Concept_map