INTEGRATING THE “ENVIRONMENTAL” IN SAFETY SCIENCES CURRICULUM
There is an increased demand for environmental skills for today’s safety professionals.

Our Graduate Exit Survey identified environmental weaknesses in the undergraduate curriculum.
ASSESSMENT OF THE NEED FOR CHANGE

- Graduate Exit Survey
  - General background information on students
  - Student perceptions on instructors and facilities
  - Student perceptions on general & specific program outcomes
  - Program strengths and weaknesses
Assessment of the Graduate Exit Survey focused on two areas:

- **Student Perceptions on Program Outcomes (evaluation of specific Safety Sciences topic areas)**
  - Safety and Health Fundamentals
  - Industrial Hygiene
  - Systems Safety
  - Legal/Regulatory Aspects of Safety and Health
  - **Environmental Safety**
  - Fire Prevention and Protection
  - Construction Safety
  - Safety and Health Management
  - Ergonomics
  - Accident Investigation and Analysis
  - Safety Training
  - Safety Performance Indicators

- **Identifying Strengths and Weaknesses of the Program**

**Integrating the "Environmental" in Safety Sciences Curriculum**
ASSESSMENT OF THE NEED FOR CHANGE

- Evaluation of specific Safety Sciences topic areas (Environmental Safety)
  - Environmental Safety ranked 10th (of 13 topic areas) in terms of overall ratings
  - Only 35% of the students “strongly agreed” that they had gained the necessary skills in this area

Placing this topic area LAST!!
ASSESSMENT OF THE NEED FOR CHANGE

Strengths and weaknesses of the program

- **Weakness**: Need for more information on Environmental Safety

  - This was the *third* most significant weakness of the program
ASSESSMENT OF THE NEED FOR CHANGE

- Advisory Board
  - Comprised of professionals in general manufacturing, transportation, services, food industry, and the chemical industry
  - Membership includes the past-presidents of ASSE and ACGIH, current and past officers of local chapters of the ASSE

- Outcomes of Advisory Board (April, 2011)
  - Environmental aspect of the program needs to be enhanced
  - ABET EHS accreditation should be sought
ABET CRITERIA

- On-going merger of the Safety, Occupational Health and Environmental Safety professions
- Separate accreditation criteria developed for Safety, Health and Environmental Programs in 2005
2012-13 ABET General Criteria

- An ability to apply knowledge of mathematics, science, and applied sciences;
- An ability to design and conduct experiments, as well as to analyze and interpret data;
- An ability to formulate or design a system, process, or program to meet desired needs;
- An ability to function on multidisciplinary teams;
- An ability to identify and solve applied science problems;
- An understanding of professional and ethical responsibility;
2012-13 ABET General Criteria (cont.)

- An ability to communicate effectively;
- The broad education necessary to understand the impact of solutions in a global and societal context;
- A recognition of the need for and an ability to engage in life-long learning;
- A knowledge of contemporary issues; and
- An ability to use the techniques, skills, and modern scientific and technical tools necessary for professional practice.
ABET Specific EHS Program Criteria

- Physiological and/or toxicological interactions of physical, chemical, biological, and ergonomic agents, factors, and/or stressors with the human body;
- Anticipation, identification, and evaluation of potentially hazardous agents, conditions and practices;
- Fundamental exposure assessment techniques (both qualitative and quantitative);
- EH&S data interpretation including statistical and epidemiological principles;
- Development of hazard control designs, methods, procedures and programs;
ABET Specific Program Criteria (cont.)

- Accident/incident investigation and analysis;
- Industrial and construction safety;
- Legal aspects of EH&S practices;
- EH&S program management;
- Hazardous materials/waste recognition, control, and remediation;
- Air pollution fundamentals and control technologies;
- Water pollution fundamentals and control technologies;
- Environmental regulations and permitting processes; and
- Environmental sampling and measurement methodologies.
The results of the Gap Analysis identified a need for:

- The addition of two new courses to enhance students’ knowledge *directly*
- The addition of two new courses to enhance students’ environmental preparation *indirectly*
- Revisions to three courses to incorporate additional environmental topics
- Program title change
PROGRAM CHANGE

- In January 2012, the University Senate at Indiana University of Pennsylvania approved the name change from Safety Sciences of the undergraduate degree to: Safety, Health and Environmental Applied Sciences with the following changes.

- However, other departments with "environmental tracks" had some issues / concerns with this change and had to be "brought into the fold"
OTHER PROGRAMS

- Department of Biology
  - Track in Environmental Health
- Department of Geology
  - Track in Environmental Geology
- Department of Geography
  - Track in Environmental Geography

Integrating the "Environmental" in Safety Sciences Curriculum
WHERE DO THE CREDITS COME FROM?

- Liberal Studies Curriculum Revision: - 4 CR
- Construction Safety (4 to 3 CR): - 1 CR
- Elimination of Business Communications Class: - 3 CR
- New Environmental/Industrial Stressors Class: +2 CR
- New Air and Water Pollution Class: +2 CR
- New EHS Communications Class: +3 CR
- New Ethics Class: +1 CR

Total Change in Credit Hours: 0 CR

Integrating the "Environmental" in Safety Sciences Curriculum
Industrial and Environmental Stressors (SAFE 335)

Course overview:
- 2-credit lecture course (case study approach)
- Focuses on understanding and applying safety, regulatory, toxicological, environmental, and epidemiological information, data and models to determine risk from exposure to common industrial and environmental stressors
- Course also covers product safety risk from consumer exposure to manufactured products
- Complements toxicological information presented in two 4-credit industrial hygiene courses (SAFE 330 and SAFE 430)
Industrial and Environmental Stressors (SAFE 335)

Specific Program Criteria met includes:

- Physiological and/or toxicological interactions of physical, chemical, biological, and ergonomic agents, factors, and/or stressors with the human body; and

- EH&S data interpretation including statistical and epidemiological principles
Industrial and Environmental Stressors (SAFE 335)

General Program Criteria met includes:

- An ability to apply knowledge of mathematics, science, and applied sciences;
- An ability to design and conduct experiments, as well as to analyze and interpret data; and
- An ability to use the techniques, skills, and modern scientific and technical tools necessary for professional practice.
NEW COURSES DIRECTLY RELATED TO MEETING “ENVIRONMENTAL” CRITERIA

Industrial and Environmental Stressors (SAFE 335)

Course Outcomes:

- Understand terminology and foundational principles used in performing occupational safety and product safety risk assessments;
- Demonstrate an understanding of the physiological and/or toxicological interactions of physical, chemical, and biological agents, factors, and/or stressors with the human body;
Industrial and Environmental Stressors (SAFE 335)

Course Outcomes: (cont.)

- Apply fundamental qualitative and quantitative exposure assessment techniques using EHS data, statistics, and models;
- Interpret and apply safety, regulatory, toxicological, environmental and epidemiological information to determine risk to workers and the public from industrial and environmental stressor exposure; and
- Interpret and apply safety, regulatory, toxicological, environmental and epidemiological information to determine product safety risk to the public from environmental stressor exposure.

Integrating the "Environmental" in Safety Sciences Curriculum
Air and Water Pollution (SAFE 361)

Course overview:

- 2-credit lecture course
- Focuses on major aspects of industrial air and water pollution management. Includes sources and analysis of industrial air and water pollution, evaluation and control of air and water pollutants, and atmospheric and water chemistry
- Course designed largely from a civil engineering/public health/industrial technology perspective
Air and Water Pollution (SAFE 361)

Specific Program Criteria met includes:

- Air pollution fundamentals and control technologies;
- Water pollution fundamentals and control technologies; and
- Environmental sampling and measurement methodologies
Air and Water Pollution (SAFE 361)

Course outcomes:

- Demonstrate an understanding of air and water pollution fundamentals and control technologies;
- Demonstrate an understanding of environmental permitting, sampling and measurement methodologies;
- Identify the common sources and major classes of environmental contaminants contained within air, water, and wastewater resources;
Air and Water Pollution (SAFE 361)

Course outcomes: (cont.)

- Integrate the frequently used sampling and analysis methods for collecting and identifying contaminants in air, water, and wastewater;
- Select the appropriate methods to be used to treat and control industrial pollution in water, wastewater and air resources; and
- Conduct an impact analysis that focuses on industrial pollutant emission data/information and recommend courses of action.
NEW COURSES INDIRECTLY RELATED TO MEETING “ENVIRONMENTAL” CRITERIA

Safety, Health & Environmental Communications (SAFE 215)

Course overview:
- 3-credit writing-intensive course
- Focus is on enabling students to learn, both in writing and orally, how to use communication skills to convince management and employees to embrace and adopt EHS-related initiatives and changes in the workplace
- Students will learn how to communicate with regulators and they will apply these communication skills towards employees and effectively inform and educate them about specific EHS hazards and risks in their jobs
Safety, Health & Environmental Communications (SAFE 215)

Course outcomes: (cont.)

- Demonstrate their ability to effectively communicate EHS information *in writing* to different audience types;
- Demonstrate their ability to communicate EHS information persuasively and *orally* to different audience types;
- Summarize and contrast the content requirements and writing styles associated with various types of EHS documentation;
- Demonstrate competency in working in multidisciplinary teams;

**NEW COURSES INDIRECTLY RELATED TO MEETING “ENVIRONMENTAL” CRITERIA**

Integrating the "Environmental" in Safety Sciences Curriculum
Safety, Health & Environmental Communications

Course outcomes: (cont.)

- Apply adult learning theories in the development and completion of EHS training;
- Develop an ability to apply business and risk management concepts as they pertain to EHS program management and written documentation; and
- Explain the value of the EHS function and EHS initiatives to management and employees.
Examples of course projects/deliverables:

- Conduct an environmental training needs assessment to determine if training is the best solution to an environmental-related performance deficiency;
- Write effective learning objectives and lesson plans and deliver an effective training presentation for an environmental-related training class;
Examples of course projects/deliverables: (cont.)

- Develop an online training course related to the environment
- Write environmental-related programs, plans and procedures;
- Write an environmental inspection or audit report; and
- Evaluate and communicate environmental cost and budgetary information to management
Ethics and Professionalism (SAFE 415)

Course overview:

- 1-credit course
- Senior-level course (prior to internship)
- Focuses on providing students with a basic understanding of ethics and professionalism related to the EHS profession.
- Course would educate students about EHS professional organizations and certification bodies so they could prepare themselves for entry into the “Environmental” aspect of their job.
Hazardous Materials and Emergency Management (SAFE 220)
Process and Systems Safety (SAFE 345)
Environmental Safety and Health Regulations and Sustainability (SAFE 310)
Environmental Safety and Health Regulations and Sustainability (SAFE 310)

Student outcomes include:

- Demonstrate an ability to identify and apply applicable EHS standards, regulations and codes covering air resources and air pollution, water resources and waste water pollution, waste management, and public safety;
- Demonstrate an understanding of environmental permitting requirements and processes;
- Develop a knowledge of contemporary safety, health, and environmental issues within a global and social context; and
- Apply sustainability concepts to the workplace, including continual improvement and proactive management approaches.
CONCLUSIONS

“Transition Roadmap”

- Additional course revisions
- Applying EHS ABET accreditation requirements
- 2 new courses (indirectly related)
- 2 new courses (directly related)

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