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Submission Date: _____
Action-Date: App 4/15/97

CURRICULUM PROPOSAL COVER SHEET
University-Wide Undergraduate Curriculum Committee

Senate App
4/29/97

I. CONTACT

Contact Person Robert D. Soule Phone X 3019
Department Safety Sciences Department

II. PROPOSAL TYPE (Check All Appropriate Lines)

- COURSE** ENV SAF & HLTH REGS
Suggested 20 character title
- New Course *** SA 210, Environmental Safety & Health Regulations
Course Number and Full Title
- Course Revision** _____
Course Number and Full Title
- Liberal Studies Approval +** _____
for new or existing course Course Number and Full Title
- Course Deletion** _____
Course Number and Full Title
- Number and/or Title Change** _____
Old Number and/or Full Old Title
- _____ New Number and/or Full New Title
- Course or Catalog Description Change** _____
Course Number and Full Title
- PROGRAM:** _____ **Major** _____ **Minor** _____ **Track**
- New Program *** _____
Program Name
- Program Revision *** _____
Program Name
- Program Deletion *** _____
Program Name
- Title Change** _____
Old Program Name
- _____ New Program Name

III. Approvals (signatures and date)

11/11/96 Lo H. Ferguson
Department Curriculum Committee
Mary E. Smith 11/11/96
College Curriculum Committee

11 Nov 96 Robert D. Soule
Department Chair
11 Nov 96 Charles J. Zoni
College Dean
2/4/00 W. Stang

+ Director of Liberal Studies (where applicable)

* Provost (where applicable)

* no new proposals requested

Attachment C

SA 210 Environmental Safety

CATALOG DESCRIPTION

SA 210 Environmental Safety & Health Regulations 3c-01-3sh

Prerequisites: CH 102, SA 101, or permission of instructor

This course offers the student a practical approach to the understanding of, and compliance with, the various environmental regulations that impact on business. A thorough discussion of the definitions, categories, and evaluation of hazardous materials is included. Environmental laws covered include the Clean Water Act, the Clean Air Act, the Resource Conservation and Recovery Act, the Comprehensive Environmental Response, Compensation and Liability Act, the Occupational Safety and Health Act, and other related laws.

III. Detailed Course Outline

- A. Introduction; Background; Historical Perspectives (4 hours)
 - 1. Interrelationships of Matter, Energy and Environment
 - 2. Interactions Between Organisms and the Environment
 - 3. Ecosystems and Communities
- B. Hazardous Materials (4 hours)
 - 1. Categories of Hazardous Materials Properties
 - a. Flammability
 - b. Reactivity/Instability
 - c. Toxicity
 - d. Other Hazards
 - 2. Hazardous Materials Definitions
 - 3. Determination of Properties of Hazardous Materials
- C. Environmental Transport Processes (3 hours)
- D. Environmental Regulations (3 hours)
 - 1. Overview
 - 2. Trends
 - 3. Appropriateness of Risk Assessment
- E. Regulations Pertaining to Air Quality (8 hours)
 - 1. Basic Issues
 - 2. Major Sources of Air Pollution
 - 3. Extent of the Air Pollution Problem
 - 4. General Methods for Controlling Emissions
 - 5. Air Pollution Case Studies
 - 6. The Clean Air Act and Amendments (CAAA)
 - 7. Other Major Air Quality Regulations
- F. Regulations Pertaining to Water Quality (6 hours)
 - 1. Basic Issues
 - 2. Major Sources of Water Pollution
 - 3. Extent of the Water Pollution Problem
 - 4. General Methods for Controlling Pollution
 - 5. Clean Water Act (CWA)
 - 6. Safety Drinking Water Act (SDWA)
 - 7. Other Major Water Quality Regulations
- G. Regulations Pertaining to Soil Contamination (8 hours)
 - 1. Basic Issues
 - 2. Major Sources of Solid Waste
 - 3. Extent of the Solid Waste Problem
 - 4. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
 - 5. Resource Conservation and Recovery Act (RCRA)
 - 6. Other Solid Waste Regulations

- H. Related Regulations (3 hours)
1. National Environmental Policy Act (NEPA)
 2. Emergency Planning and Community Right-to-Know Act (EPCRA)
 3. Toxic Substances Control Act (TSCA)
 4. Occupational Safety and Health Act (OSHA)
 5. Regulation of Pesticides
 6. Regulations Promulgated by Nuclear Regulatory Commission
- I. Environmental Safety and Health Program (3 hours)
1. Administration of the Program
 2. Environmental Emergency Planning
 3. Environmental Audits

IV. Evaluation Methods

The faculty person assigned to teach this course could be any one of several faculty within the Safety Sciences Department. What follows is an example of the evaluation methods and weighting used by one of those faculty.

The final grade in this course will be determined by using a combination of at least four (4) of the following evaluation methods, within the range of weighting shown and totalling 100%, as determined by the individual faculty member.

- A) A minimum of two (2) written EXAMS consisting of combinations of multiple choice, true/false, matching, completion, essay questions or other interactive exams. Make-up exams will be provided at the option and discretion of the individual instructor (25%).
- B) Periodic QUIZZES, including unannounced quizzes at the discretion of the instructor. Make-up quizzes may be permitted at the option of the instructor (20%).
- C) Periodic out-of-classroom, i.e., HOMEWORK assignments (10%).
- D) Preparation of formal, technical PAPERS/PROJECTS on topics assigned and/or approved by the instructor (20%).
- E) Presentation of an ORAL REPORTS on topics assigned and/or approved by the instructor (15%).
- F) CLASSROOM PARTICIPATION and relevant contribution to class discussions (10%).

Extra credit can be assigned in any one of the above evaluation areas at the discretion of the individual instructor. Work submitted after the due date in any of the above methods may have a penalty imposed at the discretion of the instructor.

In general, the following scale will be used in assigning letter grades, related to the evaluation of student performance based on a "percentage" grading scale:

90 - 100%	A
80 - 89%	B
70 - 79%	C
60 - 69%	D
<59%	F

At the discretion of the individual instructor, a grading curve that results in an appropriate distribution of grades may be used in place of the scale described above.

V. Required Textbooks, Supplemental Books and Readings

A. Required Textbook; the textbook(s) required for this course will be selected from the following list:

Ayers et al, "Environmental Science and Technology Handbook", Rockville, MD: Government Institutes, Inc., 1994.

McGregor, Gregor I., "Environmental Law and Enforcement", Boca Raton, FL: CRC Press/Lewis Publishers, 1994.

Sullivan, Thomas F. P., ed., "Environmental Law Handbook", 13th ed., Rockville, MD: Government Institutes, Inc, 1995.

Woodside, G., "Hazardous Materials and Hazardous Waste Management", New York: John Wiley & Sons, 1993.

B. Supplemental Readings: Additionally, appropriate current, primary literature, readings and other course support materials will be provided by the instructor for use by the students during the course.

VI. Special Resource Requirements

This course requires no out-of-the-ordinary, student-supplied, materials or equipment. No special fees are associated with this course.

VII. Bibliography

- Confer, R. G. and Confer, T. R., Occupational Health and Safety: Terms, Definitions, and Abbreviations, Boca Raton, FL: CRC Press, 1994.
- Greenberg, H. R. and Cramer, J. J., Risk Assessment and Risk Management for the Chemical Process Industry, New York: Van Nostrand Reinhold, 1991.
- Hallenbeck, W. H., Quantitative Risk Assessment for Environmental and Occupational Health, 2nd ed., Boca Raton, FL: CRC Press, 1993.
- Harrison, L., Environmental, Health, and Safety Auditing Handbook, 2nd ed., New York: McGraw-Hill, 1995.
- Howard, P. H. and Neal, M., Dictionary of Chemical Names and Synonyms, Boca Raton, FL: Lewis Publishers, 1992.
- Lippmann, M., ed., Environmental Toxicants: Human Exposures and Their Health Effects, New York: Van Nostrand Reinhold, 1992.
- Lowry, G. G. and Lowry R. C., Handbook of Hazard Communication and OSHA Requirements, Chelsea, MI: Lewis Publishers, 1988.
- Ott, W. R., Environmental Statistics and Data Analysis, Boca Raton, FL: CRC Press, 1995.
- Pierce, D. F., Total Quality for Safety and Health Professionals, Rockville, MD: Government Institutes, 1995.
- Vincoli, J. W., Basic Guide to Environmental Compliance, New York: Van Nostrand Reinhold, 1993.
- West, G. A. and Michaud, R. W., eds., Principles of Environmental, Health & Safety Management, Rockville, MD: Government Institutes, 1995.
- Working Safely with Hazardous Materials in the Workplace: an Employee Handbook, New York: Genium Publishing, 1993.

Course Analysis Questionnaire
[SA 210: Environmental Safety and Health]

Section A: Details of the Course

- A1: This course will be a required course at the sophomore level in the undergraduate program leading to a baccalaureate degree in safety sciences. Although designed for the safety sciences major, the course might be of interest to students in other programs as well, e.g., environmental health.
- A2: This course is an addition to the current curriculum and, as such, does not require any changes in content of existing courses.
- A3: This course has been offered once before at IUP as a dual-level, special topics course, in the Fall Semester, 1994, and is scheduled for Fall Semester, 1996. The Fall 1994 offering had an enrollment of 25 undergraduate and 14 graduate students.
- A4: This course is being proposed as an undergraduate course only, at this time.
- A5: This course will not be available for variable credit.
- A6: Courses similar in content are available at many higher education institutions. The following are believed to be representative of those offerings:

Grand Valley State	OSH404: Environmental Safety & Waste Management
Marshall	SED 354: Industrial Environmental Protection
Wisconsin-Whitewater	463.420: Principles of Environmental Safety

Descriptions of the courses listed above are included as Attachment A.

- A7: The undergraduate program in safety sciences was the first in the country, and currently is one of only nine programs, accredited by the American Society of Safety Engineers (ASSE) and now by the Accreditation Board for Engineering and Technology (ABET). Since the most recent reaccreditation in 1993, ABET has modified their accreditation criteria to now require programs to include a mandatory course on "environmental safety". As indicated in the accompanying documentation (Attachment B), the criteria call for a separate course addressing this content area.

Section B: Interdisciplinary Implications

- B1: This course will be taught by one instructor, i.e., there is no anticipation of team-teaching.
- B2: There is no other course in any other program at IUP which has the same content as this proposed course. Courses most closely addressing the content, BI 321 and BI 322: Environmental Protection I and II, offer minor overlap with SA 210; this has been discussed with Environmental Health faculty who have acknowledged the difference in focus provided by the respective courses.
- B3: As is the practice with lower level (100s - 200s) courses in the safety sciences program, a limited number of seats (typically four) will be made available to students in the School of Continuing Education.

Section C: Implementation

- C1: Current faculty resources are adequate to allow addition of this course to the curriculum. These resources are, and for several years have been, made available through the use of continuing sources of external funding, i.e., the PA/OSHA Consultation Program, faculty replacement for off-campus course offerings, and the National Environmental Education and Training Center (NEETC). As a general adjustment, and in conjunction with program changes beyond and in addition to this course, the number of sections of major courses will be reduced from three to two per year.
- C2: No resources in addition to those currently in place will be required for this course; those resources now in place are adequate for all intended uses. This observation applies to space, equipment, laboratory supplies, consumable items, library materials, and travel funds.
- C3: None of the resources necessary for this course are funded by any specific source of external funding.
- C4: It is anticipated that a minimum of two sections of this course will be offered each academic year. There are no restrictions as to certain semesters or sessions for offering of the course.
- C5: Typically, one section of the course will be offered each academic semester, although it is possible that no more than one additional section could be offered in a given semester from time to time.
- C6: It is anticipated that, on average, a total of 70 - 80 students will enroll in this course each year, resulting in sections with 35 - 40 students. Limitations on class size usually are those associated with the maximum number of seats in the rooms in Johnson Hall (32 - 40) normally used for safety sciences courses.

C7: There are no specific recommendations from any professional societies or accreditation agencies for enrollment limits or parameters for a course of this nature.

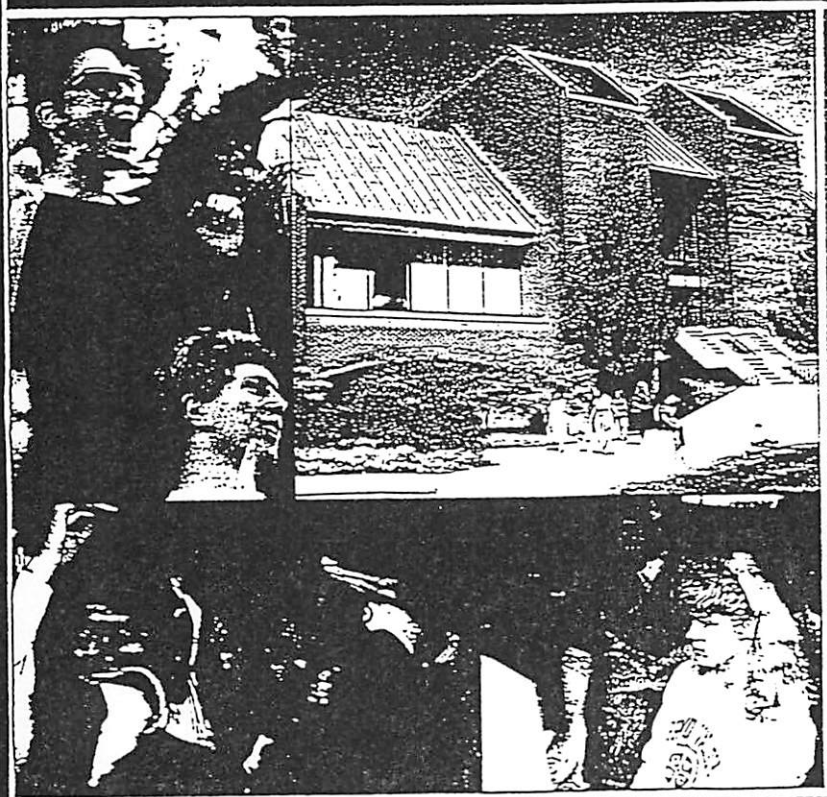
Section D: Miscellaneous

No additional information is being provided.

Attachment A

Descriptions of Similar Courses
Offered at Other Universities

Grand Valley State University



Occupational Safety and Health

OSH 120 Occupational Safety and Health Legislation
CHM 111 General Chemistry I
MTH 110 Algebra
PSY 201 Introduction to Psychology

First Year, Second Semester

OSH 130 General and Mechanical Hazards
PHY 200 Physics for the Health Sciences
ENG 150 English Composition
Electives

Second Year, First Semester

OSH 210 Loss Control
CHM 231 Introductory Organic Chemistry*
CS 140 Computer Programming in Basic*

or
MTH 215 Statistics I*
Electives

Second Year, Second Semester

OSH 221 Principles of Industrial Hygiene
HS 223 Public Health Concepts
CHM 232 Biological Chemistry*
HSC 202 The Technological Revolution
Electives

Third Year, First Semester

OSH 314 Chemical and Physical Hazards
MGT 331 Concepts of Management
PHI 101 Introduction to Philosophy
Electives

Third Year, Second Semester

OSH 312 Safety Engineering
MGT 334 Law of Labor Management Relations
Electives

Fourth Year, First Semester

MGT 333 Personnel Management
OSH 415 Safety Administration**
Electives

Fourth Year, Second Semester

OSH 404 Environmental Safety and Waste Disposal
OSH 495 Internship in Occupational Safety and Health
Electives

Courses of Instruction

OSH 110 Introduction to Occupational Safety and Health. Covers pertinent laws, hazard recognition, hazard control, personal protective equipment, and safety program administration. (3-0-0). Three credits. Offered fall semester.

OSH 120 Occupational Safety and Health Legislation. An in-depth study of state and federal occupational safety laws, product safety laws, and workers' compensation laws. (3-0-0). Three credits. Offered fall semester.

OSH 130 General and Mechanical Hazards. A study of general and mechanical hazards found in the work place and methods of controlling them to limit employee exposure. (3-0-0). Three credits. Offered winter semester.

OSH 210 Loss Control. A study of methods and techniques used to administer safety programs and control loss from accidents. (3-0-0). Three credits. Offered fall semester.

OSH 221 Principles of Industrial Hygiene. A study of industrial hygiene methods, measurements, and equipment. Prerequisite: Chemistry 111 or permission of instructor. (3-0-0). Three credits. Offered winter semester.

OSH 312 Safety Engineering. A study of engineering methods used by safety specialists. Topics covered include fault tree analysis, blueprint review, chemical compatibility, and materials of construction. Three credits. Prerequisite: Physics 200 or permission of instructor. (3-0-0). Offered winter semester.

OSH 314 Chemical and Physical Hazards. A study of chemical and physical hazards found in the work place and methods of controlling them to limit employee exposure. Prerequisite: Chemistry 232 or permission of instructor. (3-0-0). Three credits. Offered fall semester.

OSH 404 Environmental Safety and Waste Disposal. A study of air pollution laws and abatement methods, water pollution laws and abatement methods, and hazardous waste laws and disposal methods. Prerequisite: Chemistry 232 and Physics 200 or permission of instructor. (3-0-0). Three credits. Offered winter semester.

*Successful completion of CS 140 or MTH 215, CHM 231, and CHM 232 satisfies the B.S. cognate for all OSH majors.

**Capstone course.



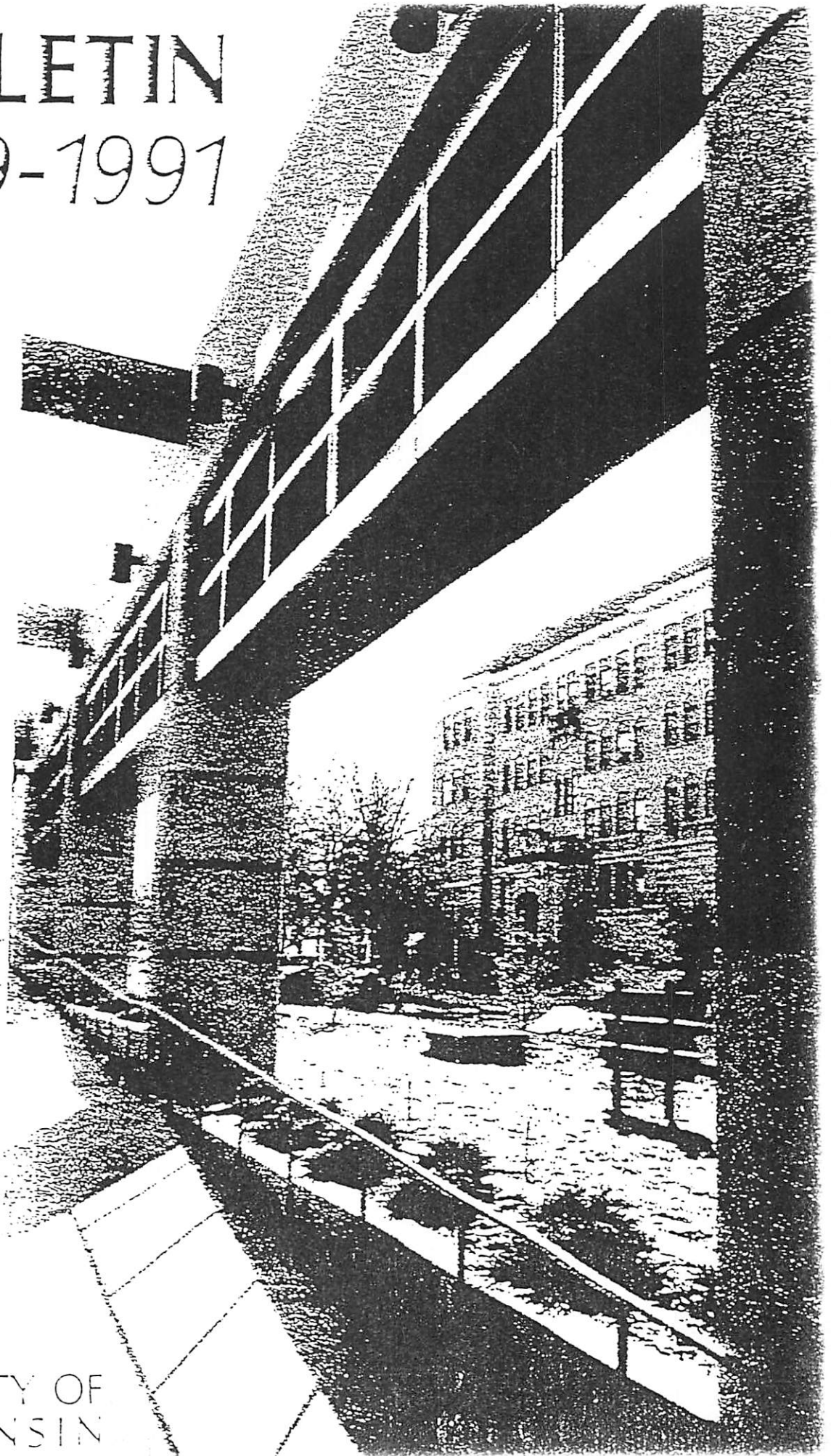
MARSHALL
UNIVERSITY

1991 UNDERGRADUATE CATALOG

- 280-283 Special Topics. 1-4; 1-4; 1-4; 1-4 hrs.
- 354 Industrial Environmental Protection. 3 hrs.
The importance of environmental protection related to an industrial setting. Air quality, water impoundments, noise pollution, and waste control. (PR: SED 235)
- 372 Safety and Industrial Technology I. 3 hrs.
Industrial processes, graphics, materials, and dynamics, instrumentation, and design factors involving safety. (PR: SED 235)
- 373 Safety and Industrial Technology II. 3 hrs.
Continuation of SED 372 with focus on general industrial manufacturing complex. (PR: SED 372)
- 375 Construction Safety I. 3 hrs.
Basic construction site safety focus on site preparation, planning, and inspection for safe operations. (PR: SED 372)
- 376 Construction Safety II. 3 hrs.
Continuation of SED 375 with focus on system safety techniques applied to the construction industry. (PR: SED 375)
- 378 Safety Evaluation and Measurement. 3 hrs.
Methodologies of safety performance and evaluation for accident prediction and control. (PR: PSY 223)
- 385 Traffic Safety and Driver Education. 3 hrs.
An introductory course in the teaching of safety and driver education, including techniques of classroom and behind-the-wheel instruction. 2 lec-2 lab. (PR: SED 235, ability to drive an automobile, and possession of a valid driver's license)
- 400 Traffic Law and Enforcement. 3 hrs. II. S.
A course designed to study and evaluate the varied and complex system of laws governing the control of all forms of traffic and the influences and responsibilities of traffic law enforcement in present-day society.
- 410 Problems and Practices in Traffic Safety and Driver Education. 3 hrs.
A survey course designed for supervisors of traffic accident prevention programs. Examines and evaluates problems, attitudes, philosophies, activities and administrative practices in school, city and state traffic safety programs. Supplements basic teacher training courses in traffic safety. (PR: SED 235)
- 420 Teaching Driver Education to the Handicapped. 3 hrs.
A survey of driver education for the handicapped, including physical, mental and social aspects. The course is recommended for students preparing to teach driver education or other related safety subjects.
- 440 Teaching Driving: Range, Multimedia, Simulation. 3 hrs.
A basic course of study designed to provide the student with insight into the technology of range, multimedia and simulation instruction through hands-on and practical learning experiences.
- 450 Traffic Engineering. 3 hrs.
Concerned with traffic and pedestrian flow, channelization, light coordination, intersection control, and devices related to safe, convenient and economical transportation of persons and goods.
- 451 Occupational Safety and Health Management. 3 hrs.
Emphasis is placed on principles, facts, and methodology rather than on incidental detail concerning safety management. (PR: SED 497)
- 465 Accident Investigation/Reconstruction. 3 hrs.
An introductory course in traffic accident investigation designed to give insight into the recognition and collection of evidence, collecting and recording data and reconstructing the accident based on the facts.
- 475 Systems Safety. 3 hrs.
Introduction to and application of concepts and methods of system safety techniques. (PR: PSY 223)
- 480-483 Special Topics. 1-4; 1-4; 1-4; 1-4 hrs.
Students with specialization in safety education only, with permission of department chairman.
- 485-488 Independent Study. 1-4; 1-4; 1-4; 1-4 hrs.
- 489 Occupational Hazard Control. 3 hrs.
A study of the latest industrial safety information which will assist the student in designing a program to reduce or eliminate all incidents which downgrade the system.
- 490 Safety Internship. 3 hrs.
Supervised experience on the job site. (Permission of Instructor)
- 491-494 Workshop. 1-4; 1-4; 1-4; 1-4 hrs.
Workshop in selected areas of occupational safety and health.
- 497 Occupational Safety and Health Programs. 3 hrs.
Safety functions in industry. Principles of organization and application of safety programs. Prevention, correction and control methods are outlined and evaluated.
- 498 Occupational Safety and Health Legislation. 3 hrs.
A survey of the legislation that has affected the safety movement with special emphasis on the 1969 Coal Mine Health and Safety Act and the 1970 Occupational Safety and Health Act.
- 499 Organization, Administration and Supervision of Safety Programs. 3 hrs.

BULLETIN

1989-1991



UNIVERSITY OF
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462 380 INDUSTRIAL ACCIDENT PREVENTION (3 cr)

A combination of principles and practices designed to provide the student with a basis for understanding the nature of occupational accident prevention and loss reduction. The topics to be examined include legislative aspects, accident causation, strategies for minimizing injuries and losses, and sources of assistance in resolving safety and health problems.

462 381 ANALYSIS AND DESIGN FOR SAFETY IN INDUSTRIAL OPERATIONS (3 cr)

The course examines the need for an interpretation of occupational safety and health standards. Emphasis is placed on local, state, federal and association standards to numerous applications including materials handling and storage, powered industrial trucks, machine guarding, working with hot and cold metals, welding and cutting, electrical hazards and flammable and combustible liquids. Class visitations to selected industries will be scheduled to assist students in understanding industrial and plant processes and to recognize potential hazards.

Prereq: 462 380 or cons instr.

462 382/582 SAFETY IN THE CONSTRUCTION INDUSTRY (3 cr)

Students will examine problems and practices posed to the nation's work force involved with the construction industry. The course will examine administrative and organizational policies in developing a construction safety program. Students will be introduced to specific detailed problems and countermeasures for correction. An analysis of applicable standards will be conducted as they apply to the construction trade.

462 383/583 INTRODUCTION TO SECURITY (3 cr)

A study of the physical, personnel, and informational aspects of the security field. Concepts of these areas will be integrated with management as they relate to safety and will be discussed in relationship to industrial and business environments.

462 457/657 PRINCIPLES OF OCCUPATIONAL EPIDEMIOLOGY (3 cr)

This course will introduce the principles of occupational epidemiology and discuss the application of these principles in the recognition, control and prevention

of disease and injury. The course will review the etiology of various acute, chronic, infectious, occupational and environmental diseases.

Prereq: 230 245 or 423 482 or 760 231

462 480/680 INDUSTRIAL HYGIENE INSTRUMENTATION (2 cr)

Occupational Safety students will gain a working knowledge of Industrial Hygiene and Safety equipment, which will aid them in recognizing, analyzing, and evaluating specific health hazards in industrial settings. Chemical, physical, biological and ergonomic hazards will be evaluated for potential hazards involving: noise, heat, cold, ionizing radiation, nonionizing radiation, ventilation, electrical illumination, hazardous atmospheres, and other related environments.

Prereq: One year of general chemistry, 462 485, or con reg or cons instr.

462 483/683 INDUSTRIAL SAFETY MANAGEMENT (3 cr)

Emphasis will be on the organizational and administrative problems that relate to an occupational accident prevention program. The course is especially designed for students majoring in the business related areas as well as teachers and future safety professionals who desired to emphasize an understanding of these management problems as well as some applicable solutions.

Prereq: 462 380 or cons instr.

462 484/684 INDUSTRIAL HYGIENE (3 cr)

An introduction to the science and art of industrial hygiene, including the chemical, physical, and biological agents which affect the health and safety of employees; the application of control measures for the various agents.

Prereq: 630 120, 800 130, 640 109 or cons instr.

462 485/685 FIRE PROTECTION/PREVENTION (3 cr)

Control of fire through study of building construction to prevent fire spread, occupancy-hazard relationships, exposure to and from adjacent occupancies life-saving aspects, and the development of professional knowledge of flammable gases, liquids, combustible solids, dusts, chemicals, and explosives. Interpretation of appropriate codes will be covered.

Prereq: 640 109 or 540 102 and 640 104 or cons instr.

462 486/686 SAFE HANDLING OF MATERIALS (3 cr)

Study the manual and mechanical handling of materials as major contributors to accident-causation in industry. Training and placement of personnel maintenance and operation of equipment, interaction of manual-mechanical systems and handling of hazardous materials are emphasized.

Prereq: 462 380 or cons instr.

462 487/687 PRODUCT SAFETY (3 cr)

An analysis of the trends of the product liability problem and the agencies relating products. Special emphasis is given to legal theories related to product liability and landmark litigation procedures as the basis for case law. A substantial portion of the course will be devoted to examining the elements of product liability programming.

Prereq: 462 380 or cons instr.

462 489/689 CHEMICAL SAFETY (3 cr)

Principles, practices, regulations and procedures for the storage, transportation and use of industrial chemicals. Investigation of plant lay-out and process design for chemical operations. Attention will be given to the proper handling laboratory and macro quantities of chemicals, as well as common chemical reactions and toxicity.

Prereq: Chemistry 640 109 or 540 104 and 640 104, or cons instr.

462 496/696 SPECIAL STUDIES (1-3 cr)

A course which offers study in selected topics in safety which are not regularly included in the curriculum.

May be retaken to 9 credits in degree.

463

463 420 PRINCIPLES OF ENVIRONMENTAL SAFETY (3 cr)

A course concerning Industrial Pollution and Health Protection Laws and the responsibility of the Safety Engineer to insure corporation compliance with these laws. Areas covered include application of laws and regulations relating to air pollution, solid and hazardous waste management, water supplies, wastewater disposal, industrial noise control, environmental impact statements, industrial application of pesticides and environmental epidemiology which relates to industrial pollution. Major environmental safety and health legislation currently being enforced in the United States will be reviewed.

Prereq: 460 251, 540 104, 630 120, 380.

Attachment B

**Full Text of Accreditation Criteria
for
Safety Programs**

*Criteria for Accrediting Engineering-Related Programs
Program*

2. Curriculum.

a. **Basic Science and Mathematics.** (Amplifies criteria section IV.C.3.) A minimum of 15 semester-credit hours (approximately 1/2 academic year) will be required in mathematics and a minimum of 15 semester hours (approximately 1/2 academic year) will be required in basic sciences. The course work in mathematics shall be in courses beyond trigonometry and shall not include courses in computer programming skills or other courses that study computer hardware, systems, software, and organization. (See criteria section IV.C.3.b.)

b. **Basic Sciences.** (Amplifies criteria section IV.C.3.a.) Surveying and mapping students shall complete a minimum of two semesters studying the major topics of physics, including mechanics, sound, light, optics, and electricity.

c. **Engineering-Related Sciences—Definition.** (Amplifies criteria section IV.C.1.) Engineering-related sciences shall be termed surveying and mapping sciences and shall expand topics of basic science toward application in professional practice. A topic shall be identified as a surveying and mapping science if it amplifies basic science or mathematics, is taught by surveying and mapping faculty, solves closed-form problems, and contains quantitative expression.

d. **Engineering-Related Sciences—Program Requirements.** (Amplifies criteria section IV.C.1.) In order to practice in the broad surveying and mapping profession, the academic program shall introduce the student to the tools, methods, terminology, and professional services of each professional area. Toward that goal, a core program in surveying and mapping sciences is specified consisting of a minimum of 2 semester hours in any five of the following six areas:

1. Field surveying instruments and methods.
2. Photogrammetric mapping and image interpretation and remote sensing.
3. Surveying calculation and data adjustments.
4. Geodetic coordinates and astronomy.
5. Cartographic representation, projections, and map production.
6. Computer-based multi-purpose cadastre, geographic information systems.

e. **Engineering-Related Specialties.** (Amplifies criteria section IV.C.2.) Engineering-related specialties shall be termed surveying and mapping professional practice where surveying and mapping sciences are applied to solve needs of society and identified clients. A topic is properly placed in this category if it applies surveying and mapping sciences to the needs of clients, employs open-form problems usually resulting in a written solution, involves cost and ethical considerations, and requires independent judgment to integrate specialty areas into a professional service.

f. **Program Level and Course Requirements.** (Amplifies criteria section IV.A.1.b.) A minimum of 15 semester hours must be in surveying and mapping sciences. Another 15 semester hours must be in surveying and mapping professional practice, including a minimum of 3 semester hours in the professional area of boundary surveying. The remaining 15 of the 45 required hours of surveying and mapping courses may be in either category; however, in those jurisdictions which include subdivision design, or phases thereof, under their definition of land surveying, a course in subdivision design may be included under surveying and mapping science and/or surveying and mapping professional practice as deemed appropriate. In addition, in these jurisdictions, up to a maximum of 12 semester hours of engineering science and/or engineering design, required as preparation for a subdivision design course, may be used as part of the course work used to satisfy the remaining 15 hours of the 45 required semester hours of surveying and mapping courses.

g. **Unspecified Hours.** (Amplifies criteria section IV.A.1.) The unspecified portion of a curriculum gives freedom to meet state objectives without constraint by the accrediting process. Professional practice in surveying/mapping varies from state to state, depending on state law and local custom. Unique program objectives may met by courses placed here, thus leading to the possibility of program specialization within the broad surveying/mapping profession.

3. Faculty.

a. **Size of Faculty.** (Amplifies criteria section IV.F.2.) To achieve sufficient breadth and depth, a minimum faculty equivalent to three full-time members is required.

b. **Faculty Qualifications.** (Amplifies criteria section IV.F.1.) Surveying and mapping faculty members will not only lecture students but shall generate new knowledge and demonstrate new ways to apply basic principles to real situations. When registration certification exists in a faculty member's area of expertise, it is expected that he or she will be registered or certified as an indicator of professional competence. It is also expected that each faculty member will have had practical experience at a responsible level insure that current attitudes and methods are imparted to students. Active participation in state and national professional societies is further expectation.

PROGRAM CRITERIA FOR SAFETY AND SIMILARLY NAMED ENGINEERING-RELATED PROGRAMS Submitted by the American Society of Safety Engineers

1. Applicability—Baccalaureate.

These program criteria apply to safety, occupational safety, industrial safety, and similarly named engineering-related programs at the baccalaureate level.

a. Curriculum.

1. **Basic Science and Mathematics.** (Amplifies criteria section IV.C.3.)

- (a) The minimum requirements for mathematics must include: (i) differential and integral calculus; and (ii) descriptive and inferential statistics.
- (b) The minimum requirements for basic sciences must include: (i) two courses with laboratories for physics; (ii) two courses with laboratories for chemistry, including organic; and (iii) one course with laboratory for human physiology, human anatomy, or general biology.

2. **Communications, Humanities, and Social Sciences.** (Amplifies criteria section IV.C.4.) The minimum requirements for communications must include: (a) one course in written composition, and (b) one course in speech.

The minimum requirements for social sciences must include an introduction to psychology.

A business or management course is recommended.

3. **Engineering-Related Sciences—Definition.** (Amplifies criteria section IV.C.1.) Some engineering-related sciences shall be termed safety sciences and shall expand topics of basic sciences toward application in professional practice. A topic shall be identified as a safety science if it amplifies basic science or mathematics, is taught by safety faculty, solves closed-form problems, and contains quantitative expression.

4. **Engineering-Related Sciences—Program Requirements.** (Amplifies criteria section IV.C.1.) The minimum requirements for engineering-related sciences

Criteria for Accrediting Engineering-Related Programs
Program

must include a course or its equivalent in applied mechanics.

The minimum requirements for safety sciences must include:

- (a) courses in the following: (i) analysis and design for safety; (ii) industrial hygiene and toxicology with laboratory; (iii) system safety and other analytical methods for safety, and
- (b) An educational experience in measurement of safety performance.

5. **Engineering-Related Specialties—Definition.** (Amplifies criteria section IV.C.2.) Some engineering-related specialties shall be termed safety professional practice where safety sciences are applied to solve needs of society and identified clients. A topic is properly placed in this category if it applies safety sciences to these needs, employs open-form problems usually resulting in a written solution, involves cost and ethical consideration, and requires independent judgment to integrate specialty areas into a professional service.

6. **Engineering-Related Specialties—Program Requirements.** (Amplifies criteria section IV.C.2.) The minimum requirement for engineering-related specialties must include an introduction to industrial or manufacturing processes.

The minimum requirement for safety professional practice must include:

- (a) courses with comprehensive coverage of the following subjects:
 - (i) introduction to safety and health
 - (ii) safety and health program management
 - (iii) fire prevention, protection, and control
 - (iv) ergonomics
 - (v) legal aspects of safety
 - (vi) Environmental safety and health, and
- (b) significant educational experience in the following subjects:
 - (i) accident/incident investigation and analysis
 - (ii) psychology of accidents and their prevention
 - (iii) product safety
 - (iv) construction safety
 - (v) educational and training methods for safety.

7. **Program Level and Course Requirements.** (Amplifies criteria section IV.A.1.b.) There must be a minimum of 54 semester hours in safety sciences and safety professional practice.

8. **Unspecified Hours.** (Amplifies criteria section IV.A.1.e.) The unspecified portion of a curriculum gives freedom to meet stated objectives without constraint by the accrediting process. Professional practice in safety varies from state to state, depending on local law and custom, the nature of the profession varies by employer and type of business. Unique program objectives may be met by courses placed here, leading to the possibility of program specialization within the broad safety profession.

Faculty.

1. **Size of Faculty.** (Amplifies criteria section IV.F.2.) To achieve sufficient breadth and depth, a minimum faculty of three full-time members is required.
2. **Faculty Qualifications.** (Amplifies criteria section IV.F.3.) Safety faculty will not only lecture to students but will also generate new knowledge and demonstrate new ways to apply basic principles to real situations.

The majority of the faculty members must have advanced degrees appropriate to their area of expertise, extensive professional experience, and certification by the Board of Certified Safety Professionals, or, if appropriate to their area, by the American Board of Industrial Hygiene. Active participation in state and national professional societies is expected of all faculty members. The majority of faculty members are expected to be active in research, scholarly activities, and/or consulting.

3. **Leadership.** A full-time employee must be identified as being administratively in charge of the program. (see criteria section IV.H.4.)

2. Applicability—Masters.

The following program criteria apply to safety, occupational safety, industrial safety, and similarly named engineering-related programs at the master's level.

- a. **Candidate Requirements.** (Amplifies criteria section IV.A.2.1.) Candidates for master's-level degree programs must hold a baccalaureate degree based on a minimum of 120 semester hours or the equivalent that must include 60 or more, and preferably 68 or more, semester-hour credits in undergraduate or graduate-level courses in science, mathematics, engineering, and technology, with at least 15 of those hours at the upper (junior, senior, or graduate) level and a minimum of 21 semester-hour credits or the equivalent in communication, humanities, and social sciences. (See also criteria section IV.C.5.)

b. **Curriculum.**

1. To be considered for accreditation, a safety program must be designed to prepare students for the practice of or advancement in the safety profession. Such a program must have: (a) an adequate foundation in mathematics and basic sciences, humanities and social sciences, safety sciences, and safety professional practice, and (b) a specialization in advanced safety topics appropriate to the challenges presented by today's occupational, system, process, product, transportation, or environmental safety problems.
2. A minimum of 30 semester hours will be required for a master's degree in safety. The safety program must demonstrate an intensive and comprehensive level of interdisciplinary instruction. Its content may include special projects, research, and a thesis or internship. Special emphasis also may be placed on the development of research capability, management skills, and interdisciplinary and governmental relationship. (Amplifies criteria section IV.A.2.b.)
3. **Engineering-Related Sciences—Program Requirements.** (Amplifies criteria section IV.C.1. See program criteria for safety and similarly named engineering-related programs section 1.2.(3) for definition of engineering-related sciences.)

To prepare students for practice in the safety profession, the academic program must introduce the student to the tools, methods, terminology, and professional services of the requisite interdisciplinary areas. Toward that goal, a master's-level program in safety must offer the following areas:

- (a) principles and practice of the safety profession
- (b) principles and practice of health and environmental sciences
- (c) analytical methods in safety
- (d) measurement of safety performance
- (e) analysis and design for safety

*Criteria for Accrediting Engineering-Related Programs
Program*

4. **Engineering-Related Specialties—Program Requirements.** (Amplifies criteria section IV.C.2. See program criteria for safety and similarly named engineering-related program, section a.1.(5), for definition of engineering-related specialties.)

A master's-level program in safety must offer safety professional practice courses. Typical topics are:

- (a) fire prevention, protection, and control
- (b) legal aspects of safety
- (c) accident investigation and analysis
- (d) management of safety programs
- (e) environmental aspects of safety
- (f) education and training for safety
- (g) human performance and safety
- (h) control of hazards.

5. **Program Level and Course Requirements.** (Amplifies criteria section IV.A.1.b.) A minimum of 20 semester hours must be in safety sciences and safety professional practice. Course content must be signifi-

cantly more specialized, complex, or advanced than similar courses offered at a lower level.

6. **Unspecified Hours.** (Amplifies criteria section IV.A.1.e.) The unspecified portion of the curriculum gives freedom to meet stated objectives without constraint by the accrediting process. Professional practice in safety varies from state to state, depending on law and custom. The nature of the profession varies by employer and type of business. Unique program objectives may be met by courses placed here, leading to possibility of program specialization within the safety profession. Typical topics are: (a) legal, regulatory processes, public policy, and protection of the public; (b) safety practices related to particular industries (construction, petroleum, mining, manufacturing, transportation, health care, government, and (c) application of advanced methods and technologies to safety.

c. **Faculty.** The program must meet the same faculty requirements as specified in program criteria for safety and similarly named engineering-related programs, section 1.c.

96-56c

Subject: Proposed SA 210 Environmental Safety and Health Regulations
To: Dr. Robert E. Soule, Chairperson
Safety Sciences
From: Donald A. Walker, Chairperson *Daw*
Economics
Date: April 23, 1997

Representatives of the Department of Economics met with you on April 21, 1997 to discuss the relationship of your proposed course SA 210 Environmental Safety and Health Regulations to the Department of Economics curriculum. It was made clear to the Department of Economics that the course does not overlap to an appreciable degree with Department of Economics courses, and we support its introduction into the Safety Science curriculum.

walker8/soule.ltr