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Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person(s)	Email Address
Dr. John M. Engler	**jme@iup.edu**
Proposing Department/Unit	Phone
Safety Sciences	**7 - 3271**

Check all appropriate lines and complete all information. Use a separate cover sheet for each course proposal and/or program proposal.

1. Course Proposals (check all that apply)

__X__ New Course _____ Course Prefix Change _____ Course Deletion

_____ Course Revision _____ Course Number and/or Title Change _____ Catalog Description Change

Current course prefix, number and full title: _____

Proposed course prefix, number and full title, if changing: ***SAFE 335 Industrial and Environmental Stressors***

2. Liberal Studies Course Designations, as appropriate

_____ This course is also proposed as a Liberal Studies Course (please mark the appropriate categories below)

_____ Learning Skills _____ Knowledge Area _____ Global and Multicultural Awareness _____ Writing Intensive (include W cover sheet)

_____ Liberal Studies Elective (please mark the designation(s) that applies – must meet at least one)

_____ Global Citizenship _____ Information Literacy _____ Oral Communication

_____ Quantitative Reasoning _____ Scientific Literacy

3. Other Designations, as appropriate

_____ Honors College Course _____ Other: (e.g. Women's Studies, Pan African)

4. Program Proposals

_____ Catalog Description Change _____ Program Revision _____ Program Title Change _____ New Track

_____ New Degree Program _____ New Minor Program _____ Liberal Studies Requirement Changes _____ Other

Current program name: _____

Proposed program name, if changing: _____

5. Approvals	Signature	Date
Department Curriculum Committee Chair(s)	Dr. Jan K. Wachter Jank Wachter	9-13-2011
Department Chairperson(s)	Dr. Lon Ferguson Lon H Ferguson	9-15-2011
College Curriculum Committee Chair	Dr. Jan K. Wachter Jank Wachter	10-20-2011
College Dean	Dr. Mary Swinker Mary E. Swinker	10/21/11
Director of Liberal Studies (as needed)		
Director of Honors College (as needed)		
Provost (as needed)		
Additional signatures (with title) as appropriate:		
UWUCC Co-Chairs	Gail S Sechrist	12/19/11

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New Course Proposal: SAFE 335 Industrial and Environmental Stressors

Part II. Description of Curricular Change

1. Syllabus of Record.

   The syllabus of record is attached in Appendix A.

2. Course Analysis Questionnaire

Section A: Details of the Course

A1. How does this course fit into the programs of the department? For which students is the course designed? Explain why this content cannot be incorporated into an existing course.

This course is designed as a junior level course for Safety, Health and Environmental Applied Sciences Majors. To meet basic level program criteria for environmental, health, and safety applied science programs additional academic preparation is needed to enhance student knowledge and understanding of risk assessments and the interactions of chemical, physical, and biological stressors from industrial and environmental sources with workers. Through this course, students learn how to apply safety, regulatory, toxicological, environmental, and epidemiological information, data, models and statistics to determine occupational risk from exposure to common industrial and environmental stressors. Faculty believes this two credit course, taken concurrently with courses in industrial hygiene, will help to improve the students' abilities to characterize worker risk to health stressors and develop management strategies for their control. This course will support basic level ABET Accreditation program criteria for Environmental, Health, and Safety and similarly named applied science programs (See Appendix B) as well as the following accreditation outcomes:

A. Baccalaureate degree programs must demonstrate that graduates have:

(a) an ability to apply knowledge of mathematics, science, and applied sciences
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to formulate or design a system, process, or program to meet desired needs
(d) an ability to function on multidisciplinary teams
(e) an ability to identify and solve applied science problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of solutions in a global and societal context
(i) a recognition of the need for and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern scientific and technical tools necessary for professional practice.

A2. Does this course require changes in the content of existing courses or requirements for a program?

No, all content is new.

A3. Has this course ever been offered at IUP on a trial basis?

No, it has not been offered on a trial basis.

A4. Is this course to be a dual-level course?

No, this course will not be dual level.

A5. If this course may be taken for variable credit, what criteria will be used to relate the credit to the learning experience of each student?

This course will not be offered for variable credit.

A6. Do other higher education institutions currently offer this course?

Although an identical undergraduate course on Industrial and Environmental Stressors was not found in a review of the curricula of four accredited B.S. Safety Programs, a three credit course entitled OSHA 523 Occupational Diseases is offered by Murray State University and appears to address topics that are tangentially related to those proposed in SAFE 335. According to the Murray State Course Catalog, OSHA 523 Occupational Diseases is a "Survey of occupational diseases covering routes of entry and modes of action. In particular, the pathogenicity, epidemiology, and diagnosis of occupational diseases will be stressed as they relate to chemical, biological and radiological hazards, dermatoses, airway diseases, plant and wood hazards, chemical carcinogens and pesticides."

A7. Is the content, or are the skills, of the proposed course recommended or required by a professional society, accrediting authority, law or other external agency?

Yes, our accreditation criteria from the ASAC of ABET require the specific coverage of material that enables our students to learn about stressors to the human body (See Appendix B). In particular, the course meets these specific requirements:

(b) physiological and/or toxicological interactions of physical, chemical, biological, and ergonomic agents, factors, and/or stressors with the human body;

(e) environmental, health, and safety data interpretation including statistical and epidemiological principles.

Section B: Interdisciplinary Implications

B1. Will this course be taught by instructors from more than one department or team taught within the department?

This course will be taught by Safety Sciences Faculty only and it will not be team taught.

B2. What is the relationship between the content of this course and the content of courses offered by other departments?

The content of this course focuses on employee industrial exposures to physical, chemical and biological stressors and the applied methods and tools used to determine worker risk. Students will learn how to conduct risk assessments and characterize and communicate hazards.

The IUP Biology department offers BIOL 323 - Introduction to Toxicology and Risk Assessment. This three credit "elective" course presents "a study of uptake, distribution, metabolism, and excretion of environmental chemicals; mechanisms of their toxicity; and their effects on major organ systems. Knowledge of these topics is applied to risk assessment procedures." SAFE 335 does not cover extensively the biological or mechanistic aspects of toxicological exposure to agents, but rather looks at "end-points" of human exposure to specific industrial and environmental stressors. SAFE 335 is designed primarily to aid the student in collecting, analyzing and synthesizing safety, regulatory, toxicological, environmental, and epidemiological information and data, and through application of models, statistical analysis, and regulations, determine and communicate worker risk due to industrial and environmental stressor exposure. Case studies will be an important means to instruct students on how risk assessments are performed in industry and communicated in the real working environment. In addition, product-safety assessments are also covered in a limited degree in this course.

(1) The industrial- and worker-orientation, (2) the more general end-approach to understanding toxicology, (3) the broader basis of components contributing to risk assessments, including regulations, (4) product safety aspects, (5) communication components, (6) the use of case studies in SAFE 335, and (7) the 2-credit (versus 3-credit) nature of the course, differentiate SAFE 335 substantially from BIOL 323.

Another course offered by the IUP Biology department, BIOL 456 - Ecological Toxicology presents "a study of the impact of chemical pollutants and other stresses on non-human biological systems from the sub cellular to ecosystem levels. An ecological risk assessment is conducted in the field and laboratory settings". SAFE 335 will not address toxicological effects or assessment in non-human biological systems, including ecological systems.

B3. Will this course be cross-listed with other departments?

No, this course will not be cross listed with other departments.

Section C: Implementation

C1. Are faculty resources adequate?

Faculty resources are adequate to support this new course with the following changes to our program (See SAFE Program Revision for specific details.) To add the new courses to our program we needed to find ways to reduce faculty load so we could make these changes without increasing faculty complement. Based on input from faculty and our Advisory Committee, it was decided the best way to do that was to eliminate the lab in the fire class and take the most critical content from the labs and incorporate it into the fire lecture. This resulted in a savings of 10 credits of faculty load each year. To save an additional two credits of faculty load each year we also have decided to reduce SAFE 211 from a three credit lecture to a two credit lecture making it more in line with our existing SAFE 347 course.

C2. What other resources will be needed to teach this course and how adequate are the current resources: Reply in terms of the following:

- Space: We will use the existing classrooms for the lecture.
- Equipment: We will use the existing classroom equipment.

- Laboratory Supplies and other Consumable Goods: Not Applicable.
- Library materials: The existing library resources to teach SAFE courses are adequate.
- Travel Funds: Existing travel funds to support this class are adequate.

C3. Are any of the resources for this course funded by a grant?

None of the resources for this course are funded by a grant.

C4. How frequently do you expect this course to be offered?

We plan to offer this course in the Spring semester.

C5. How many sections of this course do you anticipate offering in any single semester?

We plan to offer one lecture section each year during the Spring semester.

C6. How many students do you plan to accommodate in a section of this course? What is the justification for this planned number of students?

We plan to accommodate 50 students in the lecture.

C7. Does any professional society recommend enrollment limits or parameters for a course of this nature?

No professional societies recommend any enrollment limits.

C8. If this course is a distance education course, see the Implementation of Distance Educations Agreement and the Undergraduate Distance Education Review Form in Appendix D and respond to the questions listed.

This course is not a distance education course.

Section D: Miscellaneous

Include any additional information valuable to those reviewing this new course proposal.

Not applicable.

Part III. Letters of Support or Acknowledgement

This new course will be for Safety, Health and Environmental Applied Sciences Majors only and will not affect any programs on campus. Therefore, letters of support were not requested.

Appendix A: Syllabus of Record

I. Catalog Description

SAFE 335 Industrial and Environmental Stressors — 2 class hours, 0 lab hours, 2 credits (2c-01-2cr)

Prerequisites: BIOL 155, CHEM 101

Focuses on understanding and applying safety, regulatory, toxicological, environmental, and epidemiological information, data and models to determine occupational risk from exposure to common industrial and environmental stressors. Also covers product safety risk from consumer exposure to manufactured products. Case studies act as important means for presenting and discussing information.

II. Course Objectives

Students will be able to:

A. Understand terminology and foundational principles used in performing occupational safety and product safety risk assessments.

B. Demonstrate an understanding of the physiological and/or toxicological interactions of physical, chemical, and biological agents, factors, and/or stressors with the human body.

C. Apply fundamental qualitative and quantitative exposure assessment techniques using safety, health and environmental data, statistics, and models.

D. Interpret and apply safety, regulatory, toxicological, environmental and epidemiological information to determine occupational risk to workers from industrial stressor exposure.

E. Interpret and apply safety, regulatory, toxicological, environmental and epidemiological information to determine product safety risk to the public from environmental stressor exposure.

III. Course Outline

A. Occupational Safety and Health Risk Assessments due to Stressor Exposure

1. Introductions (1 hour)
    a. Terminology
    b. History
    c. Sub-disciplines
    d. Relevance
2. Industrial stressors: definitions and sources (2 hours)
    a. Chemical stressors
    b. Physical stressors
    c. Biological stressors

3. Principles of industrial toxicology (4 hours)
    a. Dose-response and threshold dose
    b. No threshold dose
    c. Toxicity testing: acute, subacute and chronic testing; non-animal testing; extrapolations to humans
4. Principles of occupational health epidemiology (3 hours)
    a. Associations and correlations
    b. Cause-and-effect analyses
    c. Occupational health epidemiological studies
5. Occupational safety and health risk models (4 hours)
    a. Regulatory-based models and approaches
    b. Other models and approaches

Midterm (1 hour)

6. Risk assessment, risk communication, and epidemiological case studies on worker exposure to industrial and environmental stressors (7 hours)

B. Product Safety Risk Assessments
1. Environmental stressors: definitions and sources (1 hour)
2. Conducting product safety risk assessments (2 hours)
3. Product safety case studies (3 hours)

Final (2 hours, during final exams week)

IV. Evaluation Methods

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

Your final grade in this class will be a compilation of the following:

A. Paper/Project
B. Examinations (Mid-Term and Final Examinations)
C. Class Participation

Papers/Projects: The paper/project (10-15 pp) will require students to apply concepts learned in class to real-world scenarios. Grading will focus on students' ability to convey their message clearly and concisely. (~25% of grade).

Examinations: A mid-term and final examination will be administered. Each exam will include multiple choice, true/false, matching, and/or short/answer completion type questions. (~70% of grade)

Class Participation: This includes but is not limited to individual participation in whole class and small group discussions and other brief class presentations. (~5% of grade).

V. Example Grading Scale

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:

A = 90-100%
B = 80-89%
C = 70-79%
D = 60-69%
F = Below 60%

VI. Attendance Policy

The undergraduate course attendance policy will be consistent with the university undergraduate attendance policy included in the Undergraduate Catalog.

VII. Required Textbooks

Rothman K. J. (2002). *Epidemiology: An Introduction*. New York, NY: Oxford University Press, Inc.

Threshold Limit Values. American Conference of Governmental Industrial Hygienists (ACGIH), latest edition.

Timbrell, J. A. (2002). *Introduction to Toxicology*. Boca Raton, FL: CRC Press LLC.

VIII. Special Resource Requirements

Students will need a scientific calculator for this class.

IX. Bibliography

Burgess, W. A. (1995). *Recognition of Health Hazards in Industry, 2nd Edition*. New York, NY: John Wiley & Sons, Inc.

Greenberg, M. I., Curtis, J.A. & Haggerty, D.A. (2011). *Chapter 5 - Occupational Toxicology* in *Occupational Emergency Medicine*. Wiley Online Library: Blackwell Publishing Ltd.

Greenberg, M. I., Phillips, S. D. & McCluskey, G. J. (Eds.) (2003). *Occupational, Industrial and Environmental Toxicology*. St. Louis, MO: Mosby, Inc.

Hodgson, E. (ed.) (2011). *A Textbook of Modern Toxicology, 4th Edition*. Hoboken, NJ: John Wiley & Sons, Inc.

Hughes, W. W. (1996). *Essentials of Environmental Toxicology*. Bristol, PA: Taylor and Francis.

Leka, S. & Houdmont, J. (2010). *Occupational Health Psychology*. Chichester, West Sussex, United Kingdom: Blackwell Publishing Ltd., John Wiley & Sons.

Murray, L . *et al.* (2011). *Toxicology Handbook, 2nd Edition*. Chatswood, Australia: Elsevier Australia.

Olsen J., Saracci, R., & Trichopoulos, D. (Eds.) (2010). *Teaching Epidemiology; A guide for teachers in epidemiology, public health and internal medicine, Third Edition*. New York, NY: Oxford University Press.

Williams, P. L., James, R.C., & Roberts, S.M. (2000). *Principles of Toxicology: Environmental and Industrial Applications, Second edition*. Hoboken, NJ: John Wiley and Sons, Inc.

Stacey, N.H. (2004). *Occupational Toxicology*. Boca Raton, FL: CRC Press LRC.

Historical Bibliography

Burgess, W. A. (1995). *Recognition of Health Hazards in Industry - 2nd Edition.* New York, NY: John Wiley & Sons, Inc.

Dinardi, S.R. (Ed.) (1997). *The Occupational Environment - Its Evaluation and Control.* Fairfax, VA: American Industrial Hygiene Association.

Everly, G.S. & Feldman, R.H.L. (1985). *Occupational Health Promotion.* New York, NY: John Wiley & Sons, Inc.

Kola, J. P. et al. (1996). *Fundamentals of Occupational Safety and Health.* Rockville, MD: Government Institutes.

Levy, B.S. & Wegman, D.H. (Eds.) (1995). *Occupational Health, 3rd Edition*. New York, NY: Little, Brown, and Company.

Peterson, J. E. (1992). *Industrial Health, 2nd Edition*. Cincinnati, OH: American Conference of Governmental Industrial Hygienists.

Stern, M. B. & Mansdorf, S.Z. (1998). *Applications and Computational Elements of Industrial Hygiene.* Boca Raton, FL: CRC Press.

Appendix B: ABET Accreditation Criteria

ACCREDITATION CRITERIA 2011/12
Criteria for Accrediting Applied Science Programs

PROGRAM CRITERIA FOR ENVIRONMENTAL, HEALTH, AND SAFETY AND SIMILARLY NAMED APPLIED SCIENCE PROGRAMS

Lead Societies: American Industrial Hygiene Association or American Society of Safety Engineers
These program criteria apply to applied science programs having environmental, health, and safety in their program titles. Each program evaluated under these Program Criteria must designate which society is to serve as Lead Society for that program.

I. PROGRAM CRITERIA FOR BACCALAUREATE LEVEL PROGRAMS

Program Criteria presented herein provide the specificity needed to interpret the General Criteria with respect to the discipline of Environmental, Health, and Safety and furnish a framework upon which a given program may develop the more general Outcomes and Assessment requirements of Criteria 3.(a) through (k). In all cases, the program must demonstrate that graduates possess the knowledge, skills, and attitudes necessary to competently and ethically practice the applicable scientific, technical, and regulatory aspects of this discipline.

The basic level criteria as applied to the field of Environmental, Health, and Safety should be interpreted with respect to the following curricular content areas:

(a) environmental, health, and safety fundamentals;
(b) physiological and/or toxicological interactions of physical, chemical, biological, and ergonomic agents, factors, and/or stressors with the human body;
(c) anticipation, identification, and evaluation of potentially hazardous agents, conditions and practices;
(d) fundamental exposure assessment techniques (both qualitative and quantitative);
(e) environmental, health, and safety data interpretation including statistical and epidemiological principles;
(f) development of hazard control designs, methods, procedures and programs;
(g) accident/incident investigation and analysis;
(h) industrial and construction safety;
(i) legal aspects of environmental, health, and safety practices;
(j) environmental, health and safety program management;
(k) hazardous materials/waste recognition, control, and remediation;
(l) air pollution fundamentals and control technologies;
(m) water pollution fundamentals and control technologies;
(n) environmental regulations and permitting processes
(o) environmental sampling and measurement methodologies.

Note: In this context, the terms hazard and hazardous incorporate issues related to the broad context of occupational environmental, health, and safety. Environmental, Health, and Safety programs are

expected to provide breadth across the range of topics implied by the title. Thus, these curricular content areas are considered to be minimum requirements. Other areas may be added as dictated by the Mission and Program Educational Objectives of the specific
program. Additionally, the extent to which each content area is developed and emphasized in a given program must also be consistent with the program's mission and objectives. Depending on the program, a given area may be addressed in a devoted course, a portion of a course, or in an appropriate extracurricular experience. Based upon this content, program faculty are free to develop unique outcomes at appropriate functional levels that embrace Criterion 3.(a) through (k) of the General Criteria.

Baccalaureate-level Faculty

The majority of core Environmental, Health, and Safety and other supporting faculty must hold an earned doctorate. ("Core faculty" pertains to those who are teaching Environmental, Health, and Safety courses and does not include faculty members teaching courses such as epidemiology, statistics, etc.). The majority of core faculty should hold certifications issued by nationally accredited credentialing bodies such as Certified Industrial Hygienist or Certified Safety Professional. Faculty must also demonstrate external professional activity, including, but not limited to, participation on national, regional, state, and/or local committees and advisory boards, professional practice, and/or editorial reviews of professional publications. A full-time faculty member must be identified as administratively in charge of the program.

Appendix C: Proposed Catalog Description

SAFE 335 Industrial and Environmental Stressors **2c-0l-2cr**
Prerequisites: BIOL 155, CHEM 101

Focuses on understanding and applying safety, regulatory, toxicological, environmental, and epidemiological information, data and models to determine occupational risk from exposure to common industrial and environmental stressors. Also covers product safety risk from consumer exposure to manufactured products. Case studies act as important means for presenting and discussing information.