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Senate App 1/28/03

CURRICULUM PROPOSAL COVER SHEET
University-Wide Undergraduate Curriculum Committee

I. CONTACT

Contact Person Dr. Thomas W. Simmons Phone 357-4898
Department Department of Biology

II. PROPOSAL TYPE (Check All Appropriate Lines)

COURSE Toxicology
Suggested 20 character title
 New Course* BIOL 323 Introduction to Toxicology and Risk Assessment
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 Full Title
____ _____
New Number and/or Full 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)

[Signature] Oct 23, 2002
Department Curriculum Committee
[Signature] 10/28/02
College Curriculum Committee

[Signature] 10/24/02
Department Chair
[Signature] 10/29/02
College Dean

+Director of Liberal Studies (where applicable)

*Provost (where applicable)



Rev.



Syllabus of Record

I. Catalog Descriptions

BIOL 323 Introduction to Toxicology and Risk Assessment 3 credits
3 lecture hours
0 laboratory hours
(3c-0l-3sh)

Prerequisites: BIOL 104 or 112, CHEM 102 or 112; or permission

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 will be applied to risk assessment procedures.

II. Course Objectives

Students will be able to

1. Identify and apply principles of toxicology as they relate to exposure, absorption, distribution, metabolism and excretion of environmental chemicals.
2. Understand the major classes of environmental chemicals and their toxic properties.
3. Comprehend the basic principles of risk assessment as they relate to data collection and evaluation, exposure assessment, toxicity assessment, and risk characterization.
4. Use the primary literature and appropriate web sites to write a toxicological profile for an environmental chemical.

III. Course Outline

A. Introduction and Overview (3 lectures)

1. Introduction
2. History
3. Toxicological Profile Computer Laboratory Exercise

B. General Principles (9 lectures)

1. Measurement and Testing
2. Exposure and Absorption
3. Distribution
4. Excretion
5. Toxicokinetics
6. Metabolism and Biotransformation
7. Toxicity Mechanisms
8. Mutagenesis and Mutagens
9. Carcinogenesis and Carcinogens

C. Target Organ Toxicity and Toxic Agents (16 lectures)

1. Hepatotoxicity
 2. Nephrotoxicity
 3. Pulmonary Toxicity
 4. Neurotoxicity
 5. Reproductive Toxicity
 6. Teratogenesis
 7. Immunotoxicity
 8. Cardiovascular Toxicity
- D. Toxic Agents (5 lectures)
1. Pesticides
 2. Metals and Metalloids
 3. Radioactive Materials
 4. Solvents and Vapors
 5. Natural Toxins
- E. Risk Assessment (7 lectures)
1. Hazard Identification
 2. Environmental Fate
 3. Exposure Assessment
 4. Dose-Response Assessment
 5. Risk Characterization
 6. Risk Perception
 7. Risk Communication & Management

IV. Evaluation Methods

The final grade for the course will be determined as follows:

- | | |
|-----|---|
| 75% | Tests. Two examinations during the semester and one during the final examination period; consisting of fill-in-the blank, short answer and long essay. |
| 20% | A Toxicological profile that will be based on Agency for Toxic Substances and Disease Registry (Centers for Disease Control) guidelines will be graded on the basis of content, format, quality of references, and English and grammar. |
| 5% | Take-home assignments. Take-home problem-solving assignments will periodically be given to aid in understanding challenging concepts (e.g., probit analysis, toxicokinetic calculations). |

The grading scale is as follows:

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

V. Attendance Policy

Although there is no formal attendance policy for this class, students are expected to attend class and participate in discussion to enhance their learning.

VI. Required textbooks and supplemental reading

- A. Kent, Chris (1998). *Basics of toxicology*. John Wiley & Sons: NY.
- B. Hatfield, Thomas (2002). *Risk analysis for environmental and occupational health professionals*. National Environmental Health Association: Denver, CO.

VII. Special Resource Requirements

None

VIII. Bibliography

A. Textbooks

Ballantyne, B., Marrs, T., Turner, P. (eds.) (1999). *General and applied toxicology*. 2nd ed. 2 Vols. Grove's Dictionaries, Inc.: N.Y.

Graham Roberts-Phelps (1998). *Risk assessment*. Ashgate Publishing Co.: New York.

Hans Marquardt (ed.) Roger O. McClellan (ed.) Seigfried Schafer (ed.) (1999). *Toxicology*. Academic Press, Inc.: N.Y.

Hodgson, E., Levi, P. (1997). *A textbook of modern toxicology*, 2nd ed. Applegate & Lange: N.Y.

Klassen, C.D. (ed.) (1996). *Casarett and Doull's toxicology*, 6th ed. McGraw-Hill Professional Publishing,: N.Y.

Molak, V. (ed.) (1996). *Fundamentals of risk analysis and risk management*. Lewis Publishers: N.Y.

Stine, K.E., Brown, T.M. (1996). *Principles of toxicology*. Lewis Publishers: N.Y.

Timbrell, J.A. (1993). *Introduction to toxicology*, 2nd Ed. Taylor & Francis: Philadelphia.

Williams, P.L., James, R.C., Roberts, S.M. (2000). *Principles of toxicology*, 2nd ed. Wiley, John & Sons: N.Y.

B. Journals and Government Documents

Annual Review of Toxicology and Pharmacology [Personal holdings]

Cohrrsen, J., Covello, V. (1989) *Risk Analysis: A Guide to Principles and Methods for Analyzing Health and Environmental Risks*. National Technical Information Service. [Personal holdings]

Toxicological Sciences - Oxford University Press [Personal holdings]

Toxicological Profiles - U.S. Dept. of Health and Human Services [Personal holdings]

Course Analysis Questionnaire

Section A: Details of the Course

- A1 This course will be a controlled elective for environmental health majors, and an elective for biology majors.
- A2 This course will need to be added as a controlled elective for environmental health majors in the catalog.
- A3 This course has been offered on a trial basis three times as BIOL 481 Special Topics.
- A4 This course is not a dual-level offering.
- A5 This course may not be taken for variable credit.
- A6 Schools offering an undergraduate toxicology course include:
Eastern Kentucky University (EHS 440 Environmental & Industrial Toxicology)
Western Carolina University (HSEH 375 Environmental Toxicology)
East Carolina University (EH 5020 Environmental Toxicology)
University of Georgia (EHS 449 Environmental Toxicology)
California State University (HS 456 Industrial Toxicology)
California State University (HS 160 Principles of Toxicology)
Illinois State University (HSC 249 Environmental Toxicology)
Old Dominion University (ENVH 443 Environmental Health Toxicology)
Colorado State University (EH 446 Environmental Toxicology)
University of Washington (ENVH 430 Toxic Chemicals & Environment)
Wright State University (BIO 415 Environmental Toxicology)
Ohio University (CHEM 330 Introduction to Toxicology)
East Tennessee State University (ENVH 4397 Toxicology)
Ferris State University (IEHM 375 Toxicology)
Oregon State University (AC 450 Introduction to Toxicology)
Oklahoma State University (EHS 3803 Environmental Toxicology)
- A7 The National Environmental Health Science and Protection Accreditation Council requires that a separate course in toxicology be offered as a Core Area, and that Risk Assessment be offered as a Related Area (but not prescribed as a separate unit). The proposed course will be cross-listed as ENVH 323 in a revised environmental health curriculum proposal that is being written for accreditation purposes. BIOL 323 is being submitted separately from the environmental health curriculum revision proposal to expedite its approval for offering to enrolled environmental health and biology majors.

Section B: Interdisciplinary Implications

- B1 This course will be taught by one professor.
- B2 There is no other IUP undergraduate course identified that is dedicated to toxicology and risk assessment. The only other IUP undergraduate course identified that covers some toxicological concepts is SAFE 301 Health Hazard Identification. However, according to the Syllabus of Record, this course focuses on the "the primary health hazards found in industry and their effects on the human body," and emphasizes "occupational disease, industrial toxicology, and the use of threshold limit values," and covers lung and skin exposures. In contrast, the proposed course emphasizes the basic principles of toxicology and risk assessment, provides a broader coverage of toxicology and risk assessment, and applies this knowledge to human environmental health.
- B3 Seats in this course will be made available to students in the School of Continuing Education provided they have the required prerequisites in biology and chemistry.

Section C: Implementation

- C1 Faculty resources are adequate to teach this course. The Contact Person for this course proposal was hired to develop a course in toxicology (i.e., specifically stated in the job advertisement) and has taught it three fall semesters without affecting other departmental course offerings.
- C2 Current resources are adequate. The Department of Biology's Instructional Technology Center (ITC) can support the computer laboratory exercise component of the course.
- C3 Resources for this course are not funded by a grant.
- C4 This course will be offered every year in the spring.
- C5 One section of this course will serve environmental health and biology majors, although additional sections could be added if necessary.
- C6 Enrollment for this course will be limited by the size of the room where the course is offered.
- C7 The National Environmental Health Science and Protection Accreditation Council does not in their guidelines address enrollment limits for a course of this nature.

Section D: Miscellaneous

- D1 No additional information is necessary.

Thomas Simmons

From: "Lon Ferguson" <ferguson@iup.edu>
To: <tsimmons@iup.edu>
Cc: <ferguson@iup.edu>
Sent: Friday, September 13, 2002 2:53 PM
Subject: BIOL 323

Hi Tom:

The Safety Sciences Undergraduate Curriculum Committee reviewed the BIOL 323 course during their Sept. 10th meeting. Dr. Soule and Mr. McClosky indicated there is overlap with SAFE 301 Identification of Health Hazards in the area of toxicology and risk assessment. However, the nature of the coverage of toxicology in BIOL 323 appears to be in the basic sciences which is different from the application of toxicology that we use in SAFE 301. The focus of risk assessment in SAFE 301 is on human health hazards as you indicate in Section B of the Course Analysis Questionnaire. We assume from the syllabus the focus of this risk assessment is on environmental issues and not human health.

That being said, the Safety Sciences Department supports the BIOL 323 course proposal!

Dr. Lon H. Ferguson, CSP
Chairperson, Safety Sciences Department
Indiana University of Pennsylvania
116 Johnson Hall, 1010 Oakland Avenue
Indiana, PA 15705

9/16/2002