DRAFT 6 September 2003

LSC Use Only No:	LSC Action-Date:	UWUCC USE Only No.	UWUCC Action-Date:	Senate Action Date:
		03-47	App- 4/6/04	App - 4/26/05

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person Thomas W. Simmons	Email Address tsimmons@iup.edu
Proposing Department/Unit Department of Biology	Phone (724) 357-4898

Check all appropriate lines and complete information as requested. Use a separate cover sheet for each course proposal and for each 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

BIOL 456 Ecological Toxicology BIOL 556 Ecological Toxicology ENVH 456 Ecological Toxicology	
Current Course prefix, number and full title	*Proposed course prefix, number and full title, if changing*

2. Additional Course Designations: check if appropriate

_____ This course is also proposed as a Liberal Studies Course.

_____ This course is also proposed as an Honors College Course.

_____ Other: (e.g., Women's Studies, Pan-African)

3. Program Proposals

_____Catalog Description Change _____Program Revision

_____New Degree Program _____Program Title Change _____Other

_____New Minor Program _____New Track

Current program name	*Proposed program name, if changing*

4. Approvals		Date
Department Curriculum Committee Chair(s)		11-23-03
Department Chair(s)		12/22/03
College Curriculum Committee Chair		03/29/04
College Dean		03/29/04
Director of Liberal Studies *		
Director of Honors College *		
Provost *		
Additional signatures as appropriate:		
(include title)		
UWUCC Co-Chairs	Gail Sechrist	4-6-04

* where applicable

21 February 2004

Syllabus of Record

I. Catalog Descriptions

BIOL 456 Ecological Toxicology

2 class hours
3 lab hours
3 credits
(2c-3l-3cr)

Prerequisites: BIOL 112, CHEM 112

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 will be conducted in the field and laboratory settings. (Also offered as ENVH 456; may not be taken for duplicate credit)

ENVH 456 Ecological Toxicology

2 class hours
3 lab hours
3 credits
(2c-3l-3cr)

Prerequisites: BIOL 112, CHEM 112

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 will be conducted in the field and laboratory settings. (Also offered as BIOL 456; may not be taken for duplicate credit)

BIOL 556 Ecological Toxicology

2 class hours
3 lab hours
3 credits
(2c-3l-3cr)

Prerequisites: One year biology, one year chemistry

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 will be conducted in the field and laboratory settings.

II. Course Objectives

Upon successful completion of the course students will be able to

1. recognize the major classes of pollutants.
2. identify the origins of pollutants.
3. define the nature and characteristics of pollutants.
4. illustrate the transport and fate of pollutants in the environment.
5. recognize and explain the ecological health effects of pollutants.
6. assess, analyze, evaluate, and report on the impact of pollutants.

III. Course Outline

A. Lecture

[Based on two one-hour lecture periods per week]

1. Introduction and Overview of Ecotoxicology (1 lecture)
2. Major Classes of Pollutants (1 lecture)
3. Origin and Sources of Pollutants (1 lecture)
4. Fate of Pollutants in the Environment (2 lectures)
5. Uptake of Pollutants (1 lecture)
6. Detoxification and Biotransformation of Pollutants (1 lecture)
7. Elimination of Pollutants (1 lecture)
8. Bioaccumulation of Pollutants (1 lecture)
9. Examination 1 (1 lecture)
10. Molecular Effects of Pollutants (2 lectures)
11. Cellular Effects of Pollutants (1 lecture)
12. Tissue & Organ Level Effects of Pollutants (1 lecture)
13. Sublethal Individual Effects of Pollutants (2 lectures)
14. Acute and Chronic Individual Effects (2 lectures)
15. Examination 2 (1 lecture)
16. Population Level Effects of Pollutants (2 lectures)
17. Community Level Effects of Pollutants (2 lectures)
18. Ecosystem Level Effects of Pollutants - Structure (2 lectures)
19. Ecosystem Level Effects of Pollutants - Function (2 lectures)
20. Biosphere Level Effects of Pollutants (1 lecture)
21. Examination 3 (during final examination period)

B. Laboratory

[Based on one three-hour laboratory period per week]

Students will conduct an ecological risk assessment following standard federal government guidelines by assessing the impact of pollution on an ecosystem. Initially this laboratory study will focus on acid coal mine drainage and a stream (i.e., aquatic ecosystem); but future plans are to also include the adjacent land (i.e., terrestrial ecosystem) as government guidance documents and available resources permit. The study will include a site characterization and a comprehensive physical, chemical and biological assessment. The study will require literature review, data collection, data analysis, and data evaluation. Findings will be reported, and conclusions and recommendations will be made in a final report. The weekly activities are as follows:

[Based on one three-hour laboratory period per week]

1. Site Reconnaissance (1 laboratory)

2. Geographic and Geologic Site Characterization (1 laboratory)
3. Physical Site Characterization (1 laboratory)
4. Chemical Site Characterization - Instrument Quality Assurance and Quality Control (1 laboratory)
5. Chemical Site Characterization - Field Sampling and Analysis (1 laboratory)
6. Habitat Assessment (1 laboratory)
7. Effluent Acute Toxicity Testing (2 laboratories)
8. Bioassessment - Macroinvertebrate (2 laboratories)
9. Bioassessment - Fish (1 laboratory)
10. Bioassessment - Chlorophyll Quantification (2 laboratories)
11. Bioassessment - Periphyton (1 laboratory)

IV. Evaluation Methods

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

Undergraduate Students

75% Tests. Three examinations (25% each). Examinations will cover all lecture, laboratory, text and supplemental reading materials. Undergraduate examinations will consist of fill-in-the blank, short answer and long essay.

25% Report. One ecological risk assessment. Students will work in teams to conduct an ecological risk assessment study. Laboratory grades will be based on the team's overall performance by evaluating the quality (e.g., professionalism, thoroughness and accuracy) of the final risk assessment report and supporting materials; and on the student's individual efforts and contributions by evaluating daily logs documenting their activities. Draft portions of the report will be due throughout the semester for review and revision. The final report will be due at the last lecture class meeting.

Graduate Students

75% Tests. Three examinations (25% each). Examinations will cover all lecture, laboratory, text and supplemental reading materials. Graduate examinations will consist of essay only.

15% Report. One ecological risk assessment. Students will work in teams to conduct an ecological risk assessment study. Laboratory grades will be based on the team's overall performance by evaluating the quality (e.g., professionalism, thoroughness and accuracy) of the final risk assessment report and supporting materials; and on the student's individual efforts and contributions by evaluating daily logs documenting their activities. Draft portions of the report will be due throughout the semester for review and revision. The final report will be due at the last lecture class meeting.

10% Review. One contaminant hazard review. Graduate students will conduct a literature review on the hazards of an environmental chemical to fish, wildlife, and invertebrates following U.S. Department of the Interior, U.S. Fish and Wildlife Service guidelines. The quality of the report will be evaluated based on writing style, grammar, thoroughness, quality of citations, and adherence to guidelines. The hazard review will be due at midterm.

V. Example Grading Scale

Undergraduate Grading Scale

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

Graduate Grading Scale

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

VI. Course Attendance Policy

The attendance policy for this course conforms to the University's Undergraduate Course Attendance Policy; in that all students are expected to attend and participate in class to enhance their learning.

VII. Required Textbooks and Supplemental Reading

Newman, M.C., Unger, M.A., Lawrence, C.A. (2002) Fundamentals of ecotoxicology. Lewis Publishers, NY. 512 pp.

Barbour, M.T., Gerritsen, J., Snyder, B.D., Stribling, J.B. (1999) Rapid bioassessment protocols for use in wadeable streams and rives: Periphyton, benthic macroinvertebrates and fish (2nd ed.) EPA 841-B-99-002. United States Environmental Protection Agency; Office of Water; Washington, D.C.

USEPA (1997) Ecological risk assessment guidance for superfund: Process for designing and conducting ecological risk assessments (Interim final). EPA 540-R-97-006. United States Environmental Protection Agency; Office of Solid Waste and Emergency Respose; Washington, D.C.

USEPA (1998) Guidelines for ecological risk assessment. USEPA EPA/630/R095/002F. 01 Apr 1998. U.S. Environmental Protection Agency, Risk Assessment Forum, Washington, DC, 175 pp.

VIII. Special Resource Requirements

None

IX. Bibliography

A. Textbooks

Clesceri, L.S., Greenberg, A.E., Eaton, A.D. (1998) Standard methods for the examination of water and wastewater. (20th ed.). American Public Health Association, American Water Works Association, Water Environment Federation. APHA, Washington, D.C.

Coler, R.A., Rockwood, J.P. (1989) Water pollution biology: A laboratory/field handbook. Technomic Publishing Company. Lancaster, PA. 107 pp.

Connell, D.W., Miller, G.J. (1984) Chemistry and ecotoxicology of pollution. John Wiley & Sons, NY. 444 pp.

Freedman, B. (1994) Environmental ecology: The ecological effects of pollution, disturbance, and other stresses, (2nd ed.). Academic Press, NY. 606 pp.

Landis, W.G., Ming-Ho, Y. (2003) Introduction to environmental toxicology: Impacts of chemicals upon ecological systems. (3rd Edition) Lewis Publishers, NY. 512 pp.

Moriarity, F. (1999) Ecotoxicology: The study of pollutants in ecosystems, (3rd ed.). Academic Press, NY. 347 pp.

Walker, C.H. (2000) Principles of Ecotoxicology. (2nd ed.) Taylor & Francis, Inc., NY. 360 pp.

B. Journals and Government Documents

American Society for Testing and Materials (1980) Standard practice for conducting toxicity tests with fishes, macroinvertebrates and amphibians. E 729-80. In Annual Book of ASTM Standards, Volume 11.4. Philadelphia, PA. pp. 272-296.

Eisler, R. (1989) Tin hazards to fish, wildlife, and invertebrates: A synoptic review. Biological Report 85 (1.15). Contaminant Hazard Reviews, Report No. 15. U.S. Department of the Interior; Fish and Wildlife Service. Patuxent Wildlife Research Center, Laurel, MD.

Journal of Environmental Toxicology and Chemistry

Palmer, M.C. (1977) Algae and water pollution. EPA-600/9-7-036. United States Environmental Protection Agency; Office of Research and Development, Cincinnati, OH.

Peltier, W.H., Weber, C.I. (1985) Methods for measuring acute toxicity of effluents to freshwater and marine organisms. EPA/600/4-85/013. United States Environmental Protection Agency; Office of Research and Development, Cincinnati, OH.

21 February 2004

Course Analysis Questionnaire

Section A: Details of the Course

.A1 This course will be a controlled elective for biology (B.A., B.S. & M.S.), biology education and environmental health science majors (B.S.). It will be cross-listed as both a BIOL and ENVH course.

A2 This course does not require changes in any other course in the department. A program revision of the BS in Environmental Health Science will include this course among the controlled electives.

A3 This course has not been taught before.

A4 This course is to be dual-listed.

A5 This course may not be taken for variable credit.

A6 Ecological toxicology or closely related environmental toxicology courses are offered at both the undergraduate and graduate levels by other universities. For example:

Graduate Level
Duke University (ENVIRON 212 Environmental Toxicology)
Iowa State University (Tox 513 Ecological Toxicology)
Portland State University (ESR 420/520 Ecological Toxicology)
University of Tennessee at Chattanoga (ESC 565 Ecological Toxicology and Risk Assessment)

Undergraduate Level
Johnson State College (BIO 336 Environmental Toxicology)
Portland State University (ESR 420/520 Ecological Toxicology)
University of Cincinnati (15-047-666 Ecological Toxicology)
University of Georgia (EHSC/ECOL 8630-8630L. Quantitative Ecological Toxicology)

A7 This course is not recommended or required by a professional society, accrediting authority, law or other external agency.

Section B: Interdisciplinary Implications

B1 This course will be taught by one professor.

B2 No similar course is offered at Indiana University of Pennsylvania. BIOL/ENVH 323 Introduction to Toxicology and Risk Assessment is being offered, but this course focuses on human health.

B3 This course will not be cross-listed with other departments.

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.

C2 This course will require a course budget allocation from the Department of Biology for laboratory supplies and other consumable goods. Environmental Health Science Program resources (i.e., instruments and equipment) will be used to teach this course. The laboratory section(s) of this course will be taught in the Environmental Health Teaching Laboratory. Electronic library resources along with interlibrary capabilities are adequate for this course. Library holdings are inadequate for this course.

C3 Resources for this course are not funded by a grant.

C4 This course will be offered in fall semesters as often as student demand and departmental resources permit.

C5 The number of sections offered will be determined by student demand and departmental resources.

C6 The laboratory section(s) will be limited to 24 students (each) due to classroom and van space restrictions.

C7 No professional society recommends enrollment limits or parameters for a course of this nature.

C8 This course is not a distance education course.

Section D: Miscellaneous

D1 No additional information presented.