

Curriculum Proposal Cover Sheet – form is available on-line as an interactive PDF

13-36K

LSC Use Only Proposal No:	UWUCC Use Only Proposal No: 12-137K
LSC Action-Date:	UWUCC Action-Date: AP-8/27/13 State Action Date: APP-10/8/13

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person(s) Sandra Newell	Email Address snewell@iup.edu
Proposing Department/Unit Biology	Phone 7-2352

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)

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: **BIOL 201 Principles of Ecology & Evolution**

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 Technological Literacy

Received
APR 29 2013

3. Other Designations, as appropriate

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

Liberal Studies

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)	<i>Sandra Newell</i>	30 Nov 2012
Department Chairperson(s)	<i>[Signature]</i>	30 NOV 2012
College Curriculum Committee Chair	<i>[Signature]</i>	4/24/13
College Dean	<i>[Signature]</i>	4/29/13
Director of Liberal Studies (as needed)		
Director of Honors College (as needed)		
Provost (as needed)		
Additional signature (with title) as appropriate		
UWUCC Co-Chairs	<i>Gail Schuist</i>	9/25/13

Part II. Description of Curriculum Change

1. Syllabus of Record

I. Catalog Description

BIOL 201 Principles of Ecology & Evolution

3c-3l-4cr

Introduction to ecology, including physiological and behavioral ecology, population and community ecology, and ecosystem and landscape ecology, and to evolution, including natural selection and population genetics, speciation, and phylogenetic history and systematics of life. Develops skills in the use of the scientific method. For Science majors.

II. Course Outcomes

Students will be able to:

1. Explain important concepts in ecology relevant to the relationship between an organism and its environment at the level of an individual (physiological and behavioral ecology), a population, a community, an ecosystem, and a landscape.
2. Explain important concepts in evolution relevant to the creation and maintenance of the diversity of life, including natural selection, microevolution and population genetics, speciation and macroevolution, and phylogeny and systematics.
3. Discuss the role of humans within an ecological and evolutionary context.
3. Formulate hypotheses based on observations of natural phenomena, design experiments to test hypotheses, collect and analyze data, and interpret experimental results.
4. Communicate effectively in writing (prose, graphs and tables) their experimental methodology, results, and conclusions.

III. Detailed Course Outline

Lecture Schedule

A. Ecology

- | | |
|---|------|
| 1. Introduction & Scientific Method | 1 hr |
| 2. Physical Conditions & Organisms | 1 hr |
| a. Homeostasis, Thermal Energy Budget, and Temperature Regulation | |
| 3. Behavioral Ecology | 4 hr |
| a. Classical Ethology | |
| b. Genes and Behavior | |
| c. Cost/Benefit approaches: Optimal Foraging Theory | |

	d. Social Organization in Animals & Game Theory	
	e. Breeding Systems in Animals	
	4. Population Dynamics	4 hr
	a. Population Attributes	
	b. Life Tables & Survivorship Curves	
	c. Population Growth: Exponential & Logistic Models	
	d. Population Regulation: Density-dependent Mortality & Natality	
	e. Life History: Patterns and Trade-offs	
	f. Conservation Issues in Population Ecology	
Exam 1		1 hr
	5. Community Structure	4 hr
	a. Species Diversity: Measurement	
	b. Species Interactions: Predation & Food Webs	
	c. Species Interactions: Competition & Niche Structure	
	d. Species Interactions: Mutualism & Facilitation	
	e. Ecological Succession & Patch Dynamics	
	f. Species Diversity: Patterns & Island Biogeography Equilibrium	
	g. Conservation Issues in Community Ecology	
	6. Ecosystems	4 hr
	a. Energy Flow	
	b. Patterns in Productivity	
	c. Linking Diversity and Productivity	
	d. Nutrient Cycling	
	e. Ecosystem Services	
	f. Conservation Issues in Ecosystem Ecology	
	7. Landscapes	1 hr
	a. Conservation Issues in Landscape Ecology	
Exam 2		1 hr
B. Evolution		
	1. Evolution and Natural Selection	2 hr
	a. Darwin, Wallace, and Lamarck: Descent with Modification	
	b. Artificial Selection vs. Natural Selection	
	b. Directional, Stabilizing, and Diversifying Selection	
	2. Microevolution and Population Genetics	3 hr
	a. Basic Genetics and Mutation	
	b. Genetic Variation in a Population: Sources and Maintenance of Variation	
	c. Hardy-Weinberg Equilibrium	
	d. Genetic Drift	
	e. Gene Flow	
	f. Non-random Mating: Sexual Selection, Balancing Selection, Frequency-dependent Selection	
	3. Speciation	4 hr
	a. Species Concepts: Morphological, Biological, Ecological, Phylogenetic	

- b. Reproductive Isolation Mechanisms: Prezygotic and Postzygotic
- c. Allopatric Speciation
- d. Sympatric Speciation: Polyploidy, Habitat Differentiation, Sexual Selection
- e. Hybrid Zones and the Evolution of Reproductive Isolation
- f. Plate Tectonics and Biogeography
- g. Mass Extinctions and Adaptive Radiations

Exam 3 1 hr

4. Phylogeny and Systematics 2 hr

- a. Binomial Nomenclature and Hierarchical Classification
- b. Phylogenetic Trees: Homology vs. Analogy
- c. Data Used to Construct Trees: molecular, morphological and anatomical, developmental, fossil
- d. Cladistics
- e. Three Domains: Archaea, Bacteria, Eukarya

5. Origin of Life 2 hr

- a. Synthesis of Organic Compounds
- b. Self-replicating RNA and Protocells
- c. The Fossil Record and Radiometric Dating

6. Phylogenetic History of Living Organisms 7 hr

- a. Prokaryotes: Archaea and Bacteria
- b. Eukaryotes: Serial Endosymbiosis
- c. Evolution of Protistan Diversity
- c. Evolution of Multicellularity
- d. Evolution of Animal Diversity
- e. Evolution of Plant Diversity
- f. Evolution of Fungal Diversity

Exam 4 (Final Exam) 2 hr

Lab Schedule

- Week 1** **Observation and Hypothesis Testing in Ecology**
- Week 2** **Behavioral Ecology: Habitat Selection by Isopods**
- Week 3** **Physiological Ecology: Sun and Shade Leaves**
- Week 4** **Environmental Ecology and Stream Invertebrates I**
- Week 5** **Environmental Ecology and Stream Invertebrates II**
- Week 6** **Mystery in Alaska: Why Have All the Sea Lions Gone? A Case Study**
- Week 7** **Predation: Search Image and the Functional Response**

- Week 8** **Predatory Behavior of Fish**
- Week 9** **Simulating Natural Selection**
- Week 10** **Microevolution – Genetic Drift**
- Week 11** **Speciation**
- Week 12** **Classification and Evolution in Caminalcules**
- Week 13** **Cladistics**
- Week 14** **Bird Wing Shape: Evolution of Flight I**

IV. Evaluation Methods

- 25%** **Lab (100 points)** Lab grades will be based upon a mix of quizzes, lab reports, and lab exercise summaries. Lab instructors will determine the proportions of various assignments.
- 60%** **Exams (Exam 1 = 70 points; Exam 2 = 70 points; Exam 3 = 70 points; Exam 4 = 110 points in which 70 points cover new material and 40 points are from previous material)** Exams may include a variety of question types, depending on the lecture professor's choices.
- 15%** **In class assignments or Homework (50 points)** These may be variable among lecture professors. An example would be points associated with reading and answering questions on articles from the Science Times section of the New York Times. This segment also lends itself to case studies for small-group work.

V. Example Grading Scale

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

VI. Undergraduate Course Attendance Policy

The attendance policy will be in accordance with University guidelines as outlined in the undergraduate catalog.

VII. Required Textbook(s), Supplemental Books and Readings

Reece, J.B., Urry, L.A., M.L. Cain, S.A. Wasserman, P.V. Minorsky, R.B. Jackson. 2011. Campbell Biology, 9th edition. Benjamin Cummings, Boston, Massachusetts.

Individual instructors may require a non-textbook reading. Examples are:

Shubin, N. 2008. *Your Inner Fish. A Journey into the 3.5-Billion-Year History of the Human Body.* Pantheon Books, New York.

Weiner, J. 1994. *The Beak of the Finch. The Story of Evolution in Our Time.* Knopf, New York.

VIII. Special Resource Requirements

None.

IX. Bibliography

Bergstrom, C.T. and Dugatkin, L.A. 2011. *Evolution.* W.W. Norton Company, Inc.,
Cain, M.L., Bowman, W.D., and Hacker, S.D. 2011. *Ecology, 2nd edition.* Sinauer Associates, Inc. Sunderland, Massachusetts.

Dawkins, R. 2010. *The Greatest Show on Earth. The Evidence for Evolution.* Free Press,

Futuyma, D.J. 2009. *Evolution, 2nd edition.* Sinauer Associates, Inc. Sunderland, Massachusetts.

Krebs, C.J. 2009. *Ecology, 6th edition.* Benjamin Cummings/Pearson, Boston, Massachusetts.

Odum, E.P. and Barrett, G.W. 2005. *Fundamentals of Ecology, 5th edition.* Brooks/Cole, Thomson Learning, Inc., Belmont, California.

Ricklefs, R.E. 2008. *The Economy of Nature, 6th edition.* W.H. Freeman and Company, New York.

Smith, T.M. and Smith, R.L. 2012. *Elements of Ecology, 8th edition.* Benjamin Cummings/Pearson, Boston, Massachusetts.

Stearns, S.C. and Hoekstra, R.F. 2005. *Evolution. An Introduction.* Oxford University Press,

Stiling, P. 2012. *Ecology. Global Insights & Investigations.* McGraw-Hill, New York.

Zimmer, C. and Emlen, D. 2012. *Evolution. Making Sense of Life.* Roberts and Company, Publishers.

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.

We are revising our core curriculum to create three pillars of biology: BIOL 201 Principles of Ecology & Evolution, BIOL 202 Principles of Cell & Molecular Biology, and BIOL 203 Principles of Genetics & Development. The change in the core curriculum constitutes a shift in philosophy, moving away from a lengthy list of topics to a more integrated and focused cluster of courses. Also, we are shifting away from the old-fashioned botany-zoology dichotomy to a modern levels-of-organization approach. BIOL 201 Principles of Ecology & Evolution is designed to be the first biology course for freshman biology majors. It will replace BIOL 112 Principles of Biology II. BIOL 112 included evolution, ecology, and reproduction and development. The new course

will focus only on ecology and evolution. Developmental biology content is being shifted to another new course proposal, BIOL 203 Principles of Genetics & Development. As BIOL 201 Principles of Ecology & Evolution is proposed to be the first biology course for incoming students, the amount of content is being reduced to better serve the needs of students with diverse levels of preparation for college-level work. The numbering system follows the model of the Geoscience department, in which majors courses begin at the 200-level and the 100-level courses are designated for nonmajors and liberal studies courses.

A2. Does this course require changes in the content of existing courses or requirements for a program? If catalog descriptions of other courses or department programs must be changed as a result of the adoption of this course, please submit as separate proposals all other changes in courses and/or program requirements.

This course is part of the program revisions being submitted by the Biology Department. Relevant revisions to biology courses and programs accompany this course proposal.

Other departments affected by this change are listed in the Letters section of this proposal, and those departments are aware of the necessary changes in their programs.

A3. Has this course ever been offered at IUP on a trial basis (e.g., as a special topic)?

This course is replacing BIOL 112 Principles of Biology II, a course that has been taught routinely for many years. Currently BIOL 112 Principles of Biology II is the second course in the freshman sequence, and it is offered only in the spring semester.

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

This course is not dual-level.

A5. If this course may be taken for variable credit ...

This course is not offered for variable credit.

A6. Do other higher education institutions currently offer this course? If so, please list examples (institution, course title).

One reason we are changing the title of our introductory course is because it is difficult to identify content when the title is generic, e.g., principles of biology. Most schools still have the generic title for freshman courses, but ecology and evolution are fundamental topics in any introductory courses. Examples include:

Duquesne University: BIOL 112 or 117 Biology II and Lab 4 cr

University of Pittsburgh: BIOSCI 0160 Foundations of Biology II and lab 4cr

Robert Morris University: BIOL 2310 Principles of Biology II and lab 4 cr

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?

No external agency monitors the content or skills of this of this course.

Section B: Interdisciplinary Implications

B1. Will this course be taught by instructors from more than one department or team taught within the department? Is so, explain the teaching plan, its rationale, and how the team will adhere to the syllabus of record.

This course will be taught by biology professors only. Generally, there are two lecture professors, each teaching a separate lecture section, who both adhere to the syllabus of record. Both sections use the same textbook. Additional faculty members are usually involved in the labs. The philosophy is to maintain open lines of communication among all the instructors involved in the course. The lecture and lab professors meet regularly to coordinate activities. A laboratory manual containing one set of laboratory activities is used by all instructors, although we allow for some individual interpretations of the activities. The laboratory activities are routinely discussed and all faculty members participate in the preparation and clean-up of labs.

B2. What is the relationship between the content of this course and the content of courses offered by other departments? Summarize your discussions (with other departments) concerning the proposed changes and indicate how any conflicts have been resolved. Please attach relevant memoranda from these departments that clarify their attitudes toward the proposed change(s).

The content of this course is not offered by other departments. Letters of support or acknowledgment have been requested.

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

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

B4. Will seats in this course be made available to students in the School of Continuing Education?

This course is designed specifically for biology majors, but a student in the School of Continuing Education may register for the course.

Section C: Implementation

C1. Are faculty resources adequate? What will be taught less frequently or in fewer sections to make this possible?

This course replaces BIOL 112 Principles of Biology II. We expect the faculty load to be similar to the existing faculty load for the current course. There may be a slight increase

in student enrollment by offering this course in the first semester of the freshman year rather than the second semester of the freshman year. In the past, attrition slightly reduced the enrollment in spring. However, any attrition that occurs will simply be shifted to the new course being offered in the spring. Overall faculty load is unlikely to increase in the freshman year since CHEM 111 will be a prerequisite for the new course, BIOL 202 Principles of Cell & Molecular Biology, to be offered in spring semesters.

C2. What other resources will be needed to teach this course and how adequate are the current resources? If not adequate, what plans exist for achieving adequacy? Reply in terms of the following: space, equipment, laboratory supplies and other consumable goods, library materials, and travel funds.

Other resources are adequate. Space and equipment from the existing course, BIOL 112, will be used for the new course. We plan to move this course to the new science building when it is constructed. Laboratory supplies are budgeted each year within the biology department. Library materials are adequate. No travel funds are needed.

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

No resources for this course are funded by a grant.

C4. How frequently do you expect this course to be offered? Is this course particularly designed for or restricted to certain seasonal semesters?

We expect to offer the course every year in the fall semester for entering biology majors and other science majors. Certain of the laboratory exercises involve outdoor activities making fall semester the best time to offer this course. It would be feasible to teach the course in summer, but we do not expect sufficient enrollment to be able to offer the course in summer.

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

In spring semester of 2012, BIOL 112 was offered with two lecture sections and eight lab sections. In the future, we anticipate that departments and programs other than biology will likely want their students to take the two new biomedical/molecular biology courses, excluding BIOL 201 from their requirements, with the possible exception of Geoscience. Therefore, we expect only biology majors to enroll in BIOL 201 and plan to offer classes of comparable size to the current offerings.

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?

Each lab section will contain no more than 24 students since this is the maximum capacity of the lab room. Each lecture section will be in multiples of 24, with four or five lab sections associated with one lecture section.

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

No professional society recommends enrollment limits or parameters for this course.

C8. If this course is a distance education course, ...

This course is not a distance education course.

Section D: Miscellaneous

None

Part III. Letters of Support or Acknowledgment

**Allied Health Professions: Clinical Laboratory Science
Biochemistry
Chemistry
Geoscience
Natural Science
Psychology**



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September 7, 2013

This is to confirm that I have read the new curriculum proposals being put forth by the Biology Department in regards to changes in the core curriculum, and agree that they will not have any consequences to the Biochemistry program. Previously the Biochemistry students took BIOL 111, but the new course BIOL 202 will be an adequate substitution as an introductory biology course. I look forward to seeing the new courses being put into place.

A handwritten signature in black ink, appearing to read 'Robert Hinrichsen', with a long horizontal flourish extending to the right.

Robert Hinrichsen

Associate Professor

Coordinator- Biochemistry Program

Indiana University of Pennsylvania



College of Natural Sciences and Mathematics

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September 9, 2013

TO WHOM IT MAY CONCERN:

As indicated in the current IUP Undergraduate Catalog, students in the Natural Science B. S. program (all tracks) must take a total of 6 courses that are offered through the Biology Department, including BIOL 111, BIOL 112, BIOL 150, BIOL 151, BIOL 241, and BIOL 263. The multi-part proposal for revising the Biology Department's core curriculum that is now under consideration by the University Wide Undergraduate Curriculum Committee contains at least one provision that impacts the Natural Science program. That provision involves the elimination of the course BIOL 263 (Genetics). BIOL 263 is not only one of the courses required for students in the Natural Science program; it serves a second purpose in that it constitutes the writing intensive course in the major. Fortunately, the Biology Department has built into their proposal, a remedy to the problem created by the elimination of this critically important course. As part of their proposal, the Biology Department plans to create a new course, BIOL 203 (Principles of Biology: Genetics and Development), which will, like the old BIOL 263, be writing intensive. The course coverage for the proposed BIOL 203, as described in Dr. Hinrichsen's Curriculum Proposal, is consistent with the needs of the Natural Science students, as most in the major aspire to careers in the health care field. The Biology Department has indicated that BIOL 203 would be available to the Natural Science B.S. majors. If the Biology Department proposal is accepted and ultimately implemented, a curriculum revision would then need to be submitted, substituting BIOL 203 for BIOL 263 in the requirements for the Natural Science program. The change will result in an increase in the number of credits required for the Natural Science major from 40 to 41 as the proposed BIOL 203 course is 4 credits while BIOL 263 is a 3-credit offering.

In summary, I fully support the new course proposal for BIOL 203 as a replacement for BIOL 263.

Sincerely,

A handwritten signature in cursive script that reads "Lawrence Kupchella".

Lawrence Kupchella, Ph.D
Coordinator, Natural Science Baccalaureate Program
Department of Chemistry

Subject: Fw: psychology letter

From: "Sandra Newell" <sjnewell@iup.edu>

Date: 9/5/2013 9:29 AM

To: "Megan Knoch" <mknoch@iup.edu>, "Sechrist, Gail S" <Gail.Sechrist@iup.edu>

CC: "Carl Luciano" <luciano@iup.edu>

From: Dr. Susan Zimny

Sent: Wednesday, September 04, 2013 3:29 PM

To: Sandra Newell

4 September 2013

To Whom It May Concern:

The Undergraduate Committee of the Psychology Department reviewed the Biology Department's curriculum revisions and formally voted to support those revisions.

Susan T. Zimny, Ph.D. & Chair Undergraduate Committee
Psychology Department
Indiana University of Pennsylvania
Phone: 724.357.5554