EP.08.16

PROPOSAL TO THE SENATE COMMITTEE ON EDUCATIONAL POLICY

TITLE OF THE PROPOSAL: REVISION OF THE INTEGRATIVE BIOLOGY CONCENTRATION OF THE MAJOR IN SCIENCES AND LETTERS CURRICULUM IN INTEGRATIVE BIOLOGY, COLLEGE OF LAS.

COLLEGE SPONSOR: Ann Mester, Assoc. Dean, College of LAS, 294 Lincoln Hall, 3-1350; mester@uiuc.edu.

SPONSOR: School of Integrative Biology (SIB), Fred Delcomyn, Director, (3-3044); Carol Augspurger, Associate Director for Academic Affairs, SIB (3-1298).

BRIEF DESCRIPTION: The IB major for undergraduates currently requires students to take three core courses: IB 201 (Genetics and Evolution), IB 202 (Structure and Function) and IB 203 (Ecology). We propose to discontinue teaching IB 201 and to replace it with two new courses: IB 204 (genetics) and IB 302 (evolution), both of which will be required. IB 202 and IB 203 will remain unchanged and will still be required. We will drop IB 301 (Evolutionary Biology) and replace it with an advanced course in Evolution. The proposed change would increase the number of required hours in the major by four, bringing the total to 68-78 hours. There is still adequate room for General Education and elective courses in the curriculum.
The section involving 14-18 hours of additional courses is being re-written to make the requirements clearer for students.
We are also making minor changes in the IB Honors Concentration- revising footnotes and adding some additional career information.

JUSTIFICATION: The SIB major was originally implemented with only three required core courses (12 hours) to give students the opportunity to explore advanced topics of their own choosing. Since our curriculum was initiated in 2000, it has become apparent that devoting just one course to the two topics of genetics and evolution does not serve the best interests of our students because there is not sufficient time in half a semester to explore either topic in appropriate depth. A thorough introduction to genetics for our majors should include not only classical transmission (Mendelian) genetics, but also population genetics, the modern basis of evolutionary studies. Evolution also requires a course of its own in order for students to be given a thorough analysis of modern evolutionary theory all the way from the molecular level to the holistic population level. A published survey of 26 comparable undergraduate majors at other public institutions granting the Ph.D. showed that all offer an entire course in genetics and 46% a whole course in evolution. Our informal surveys of 15 comparable schools showed that 13/15 require genetics and 7/15 require evolution. Genetics and evolution are one of a choice of additional requirements in the remaining schools. No other major that we explored offers a single course that attempts to cover both genetics and evolution.

BUDGETARY AND STAFF IMPLICATIONS:

The addition of one laboratory course to our core of required courses will require additional resources, both for laboratory supplies/equipment, and for Teaching Assistantships to run the laboratory sections. An analysis of the budget of the School of Integrative Biology has shown that the School can provide the necessary resources out of its current operating budget or other sources of funds that are used for instruction without incurring cost overruns.

The splitting of one course into two will also mean more teaching for our faculty. SIB has been fortunate to be able to grow modestly over the past few years, so we will be able to staff the two new courses adequately with our current faculty. The Heads of all three departments in SIB, the SIB Executive Committee, and a faculty study group have extensively considered the staffing implications of this proposal and endorse it wholeheartedly.

In addition to budgetary and staff implications for SIB, the availability of a new genetics course may have an impact in the School of Molecular and Cellular Biology. At present, MCB students receive extensive instruction in molecular genetics but very little in classical transmission (Mendelian) genetics. As detailed in the course proposal, our intent is to make the proposed new genetics course attractive to MCB majors, hence having the course serve a dual purpose. If we do attract substantial numbers of MCB students, there may be some slight reduction in student demand for other MCB courses. Our discussions with MCB faculty (detailed in the course proposal) suggest they will welcome a genetics course of the type we are proposing to offer. The genetics course will be available to non-IB majors for 3 hr credit with no lab.

GUIDELINES FOR UNDERGRADUATE EDUCATION: The proposed change in the requirements for our major will strengthen the education of our students by providing them with an in-depth introduction to the twin areas of genetics and evolution. It will better prepare our majors for advanced courses related to each of these fundamental disciplines that underpin the whole of biology. Of the guidelines for undergraduate education, the goals most relevant to the IB major are: to think clearly, critically, and creatively in both quantitative and qualitative analysis and problem solving; and to acquire an attitude which reflects curiosity and a respect for evidence. The coursework will instruct students in oral and written scientific communication.

CLEARANCES:

Fred Delcomyn _____

Director, School of Integrative Biology — Date

_____ 9/21/07

Dean, College of Liberal Arts and Sciences — Date

Provost Date

PROPOSED EFFECTIVE DATE: upon approval

PROGRAMS OF STUDY ENTRY:

Integrative Biology

Integrative Biology, School of
Director of School: Fred Delcomyn
School Office: 286 Morrill Hall, 505 South Goodwin Avenue, Urbana, 333-3044

Major in Sciences and Letters Curriculum

Integrative Biology

www.life.uiuc.edu/sib

Integrative Biology Concentration

E-mail: ibhonors@life.uiuc.edu

The Integrative Biology Concentration provides students with a solid preparation in genetics and evolution, structure and function, ecology and behavior, and comparative physiology and molecular biology. After completion of the core 100- and four 200-300-level core courses in IB, students may complete the required additional coursework by taking a variety of IB and other courses or focus on a limited area of IB. Plans for the student's combination of additional courses are developed in consultation with an adviser.

All undergraduates in this field are required to have a strong background in the biological and physical sciences. Students who do not begin mathematics, chemistry, and biology in their freshman year generally will be at a disadvantage.

Students pursuing a degree in Integrative Biology will be allowed to earn a second degree in the Specialized Curriculum in Biochemistry. Students pursuing a degree in Integrative Biology will not be allowed to double major in Molecular and Cellular Biology.

Degree title: Bachelor of Science in Liberal Arts and Sciences

Minimum Required Courses normally equate to 68-78 hours.

General Education: The LAS General Education requirements are set up so students automatically complete the Campus General Education requirements.

Minimum Hours Required for Graduation: 120 hours

Integrative Biology Distinction: To be eligible for distinction a student must graduate with a grade-point average of at least 3.0 and submit a report of an

independent student project (IB 490) one month prior to graduation for approval by the Integrative Biology Distinction Committee.

Hours	Requirements
4-5	MATH 220–Calculus or MATH 221–Calculus I
3	Statistics (an approved introductory statistics course)
8-10	Select one group of courses:
	CHEM 102–General Chemistry I and
	CHEM 103–General Chemistry Lab I, and
	CHEM 104–General Chemistry II and
	CHEM 105–General Chemistry Lab II
	or
	CHEM 202–Accelerated Chemistry I, and
	CHEM 203–Accelerated Chemistry Lab I, and
	CHEM 204–Accelerated Chemistry II, and
	CHEM 205–Accelerated Chemistry Lab II
5-6	Select one group of courses:
	CHEM 232–Elementary Organic Chemistry I, and
	CHEM 233–Elementary Organic Chem Lab I
	or
	CHEM 236–Fundamental Organic Chem I, and
	CHEM 237–Structure and Synthesis
10-12	Select one group of courses:
	PHYS 101–College Physics, Mech & Heat, and
	PHYS 102– College Physics, E&M & Modern
	or
	PHYS 211– Univ Physics, Mechanics, and
	PHYS 212– Univ Physics, Elec & Mag, and
	PHYS 213– Univ Physics, Thermal Physics, and
	PHYS 214–Univ Physics, Quantum Phys
4	IB 150–Organismal & Evolutionary Biol
4	MCB 150–Molec & Cellular Basis of Life
4	IB 202–Structure and Function[1]
4	IB 203–Ecology
4	IB 204- Genetics
4	IB 302- Evolution[1]
14-18	At least four additional courses at the 200- to 400-level are required as follows:
	At least one course in each of two of the following three areas: Area I: Organismal and Evolutionary Biology Area II: Behavior, Ecology, and the Environment Area III: Integrative Anatomy, Physiology, and Molecular Biology
	One course chosen from either the Area Courses or the Approved List of Additional IB Courses
	One course from the Area Courses, the Approved List of Additional IB Courses, or MCB 240, or MCB 250, or MCB 252. (NOTE: MCB 240, MCB 250, and MCB 252 **DO NOT** count towards the 21 advanced hours required by LAS).

	One of the four courses selected above must have a laboratory and/or field component.

Integrative Biology Honors Concentration

Integrative Biology Honors is designed for superior students wishing to pursue an intensive program in integrative biology and, concurrently, to gain a strong background in the physical sciences and mathematics. Admission is by interview in spring of the freshman year prior to registration for fall. An overall 3.0 GPA is required to apply for admission. Integrative Biology Honors provides preparation suitable for graduate and professional training in biology, as well as for biology careers in the private and public sectors.

E-mail: ibhonors@life.uiuc.edu

Degree title: Bachelor of Science in Liberal Arts and Sciences

Minimum required courses normally equate to 83-85 hours including 25 hours of 300- and 400-level courses.

Students earning the Integrative Biology Honors Concentration will automatically complete the Chemistry minor.

Students pursuing a degree in Integrative Biology Honors will be allowed to earn a second degree in the Specialized Curriculum in Biochemistry. Students pursuing a degree in Integrative Biology Honors will not be allowed to double major in Molecular and Cellular Biology.

General education: The LAS General Education requirements are set up so students automatically complete the Campus General Education requirements.

Minimum hours required for graduation: 120 hours

Departmental distinction: In addition to the above requirements, candidates for distinction must:
1. Consult with an IB Honors adviser no later than the beginning of their junior year to discuss their proposed research plan.
2. Present an acceptable written report on the research to the Integrative Biology Distinction Committee about a month prior to graduation. The research must have been an in-depth experience and produced substantial results to be considered eligible for distinction. Additional details on requirements, procedures, and deadlines are available at www.life.uiuc.edu/sib.

Students must consult with their Integrative Biology honors adviser at least once each semester.

Hours	Requirements
4	IB 150–Organismal and Evolutionary Biol
4	MCB 150–Molecular and Cellular Basis of Life
5	IB 270–Evolution of Molecules and Cells
5	IB 271–Organismal Biology
5	IB 372–Ecology and Evolution[1]
11-12	MATH 220–Calculus, or MATH 221–Calculus I, and MATH 231–Calculus II, and MATH 241–Calculus III
14-16	Select one group of courses:
	CHEM 202–Accelerated Chemistry I and CHEM 203 – Accelerated Chemistry Lab I, and CHEM 204 – Accelerated Chemistry II, and CHEM 205 – Accelerated Chemistry Lab II, and CHEM 236 – Fundamental Organic Chem I, and CHEM 237 – Structure and Synthesis Or CHEM 102[2] – General Chemistry I, CHEM 103 – General Chemistry Lab I, and CHEM 104 – General Chemistry II CHEM 105 – General Chemistry Lab II, and CHEM 236 – Fundamental Organic Chem I, and CHEM 237 – Structure and Synthesis
3	MCB 450–Introductory Biochemsitry, and
4	BIOC 455–Technqs Biochem & Biotech
4	PHYS 211–Univ Physics, Mechanics
4	PHYS 212–Univ Physics, Elec & Mag
3	An approved 300- or 400- level course in statistics[3]
6	IB 490–Independent Research (2 semesters)
10	300- or 400- level courses in the biological sciences

Twelve hours 300- and 400-level courses in the major must be taken on this campus.

All foreign language requirements must be satisfied.

No more than 8 hours of credit in 100-level courses in SIB or SMCB may be counted toward graduation.

Students may count toward graduation no more than a combined maximum of 10 hours of IB 390 and IB 490 credit offered for independent study.

Substitutions or other changes in the requirements given above may be made only by petition to and approval of the director of the Integrative Biology Honors Concentration.

1. Continuation in the Integrative Biology Honors Concentration requires a grade of B or better in each of IB 270, 271, and 372 and a 3.0 GPA.

2. Introductory chemistry should be completed prior to enrolling in IB 270.

3. MATH 461/STAT 451 or STAT 400 are recommended, as is additional training in statistics. Suitable courses for those taking more than one course are CPSC 440 and MATH 464/STAT 410.

APPENDIX I

IMPLEMENTATION SCHEDULE
COURSES IN REVISED CURRICULUM

Academic Year	Fall Semester		Spring Semester	
	Current Course	New Course	Current Course	New Course
2007-2008	203	204	202 201	302
2008-2009	203	204	202	302
2009-2010	203	204	202	302

Bold items: first time course will be offered

Assumptions during the overlap period:

1. Prior to re gistration in Spring 07 for Fall 07 courses, announce to all students in General Curriculum, Biology, and IB that Spring 08 will be the last semester IB 201 will be offered.
2. Freshmen and sophomores who have not yet declared an IB major and have not taken IB 201 will be encouraged to take IB 204 and IB 302.
2. IB 201 will be phased out after Spring 07.
3. Students declaring an IB major after spring 2007 will be required to take IB 204 and IB 302.
4. IB 201 can substitute as prerequisite for 300-400 level courses having IB 204 and IB 302 as prerequisite.

APPENDIX 2

Area Courses and Additional Approved Courses for the IB Major

Area Courses

* = course with laboratory and/or field component
** = course may be taken with or without laboratory

Course No.	Title
Area I: Organismal and Evolutionary Biology	
IB 301	Evolutionary Biology
IB 335	Systematics of Plants*
MCB 300	Microbiology
IB 406	Evolution of Adaptive Systems
IB 433	Comparative Vertebrate Anatomy* (involves vertebrate dissection in some labs)
IB 460	Introduction to Entomology*
IB 461	Ornithology*
IB 462	Mammalogy* (involves vertebrate dissection in some labs)
IB 463	Ichthyology*
IB 464	Herpetology*
IB 466	Invertebrate Zoology*
IB 469	Evolutionary Survey of Plants*
IB 470	Field Botany*
IB 471	General Mycology*
Area II: Behavior, Ecology, and the Environment	
IB 405	Ecological Genetics
IB 429	Animal Behavior
IB 432	Genes and Behavior
IB 440	Plants and Global Change
IB 441	Plant Ecology*
IB 443	Evolutionary Ecology
IB 444	Insect Ecology**
IB 445	Chemical Ecology
IB 446	Tropical Ecology
IB 449	Limnology*
IB 451	Conservation Biology*
IB 452	Ecosystem Ecology
IB 453	Community Ecology
IB 481	Biology of Disease Vectors*
IB 482	Insect Pest Management*

IB 483	Insect Pathology*
IB 484	Biological Control*
IB 485	Environmental Toxicology
IB 486	Pesticide Toxicology

Area III: Integrative Anatomy, Physiology, and Molecular Biology

IB 334	Organismal Biology of Plants
MCB 334	Functional Human Anatomy*
IB 402	Molecular Evolution
IB 420	Plant Physiology
IB 423	Plant Anatomy*
IB 424	Plant Development
IB 426	Env and Evol Physl of Animals
IB 427	Insect Physiology*
MCB 402	Sys & Integrative Physiology
NEUR 404	Introduction to Neurobiology

Additional Approved Courses

* = course with laboratory and/or field component

IB 348	Fish and Wildlife Ecology
MCB 354	Biochem & Phys Basis of Life
IB 421	Photosynthesis
IB 425	Plant Secondary Metabolism
IB 431	Behavioral Ecology
IB 467	Principles of Systematics*
IB 468	Insect Classification and Evol*
IB 480	Ecological Parasitology
IB 496	Plant Molecular Biology
IB 496	Plant Genomics
IB 496	Plant Metabolomics
IB 496	Plant Proteomics
MCB 450	Introductory Biochemistry