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PROPOSAL TO THE SENATE COMMITTEE ON EDUCATIONAL POLICY

TITLE OF THE PROPOSAL:

Addition of an Honors Option to the Integrative Biology major, College of LAS

SPONSOR:

School of Integrative Biology

Contact person: Carol K. Augspurger, Associate Director for Academic Affairs, School of Integrative Biology, phone 333-1298

BRIEF DESCRIPTION:

We propose to create an Honors Option within the Integrative Biology major. The option is designed for superior students who wish to pursue an intensive biology program and, concurrently, to gain a strong background in the physical sciences, mathematics, and statistics. An intense laboratory and field component emphasizes first-hand experience with the processes of science and their investigative framework. Research projects will be required of all Honors students.

JUSTIFICATION:

With the division of the School of Life Sciences (SOLS) into a School of Molecular and Cellular Biology (SMCB) and a School of Integrative Biology (SIB), the Honors Biology Program that was housed in SOLS was phased out. We propose a new Honors option within the Integrative Biology major that will provide an exceptional foundation for further study for superior students majoring in integrative biology. Among the hundreds of freshmen expressing interest in the biological sciences, a select few desire an intensive experience in their major that will serve as a highly suitable preparation for graduate and professional training in biology. These students often have taken AP Biology in high school and seek a comprehensive curriculum that will challenge them to the fullest and allow them to interact directly with faculty and other students who have similar academic goals. Students in the honors option will take a common curriculum in biology, physical sciences, and math and hence will share a common academic experience to bind them closely together. Faculty commitment to the students will be high and involve interaction with students in both lecture and laboratory settings. Some labs will be open-ended with the students generating ideas to explore over several weeks as independent research projects. Emphasis will be placed on the development of verbal and writing skills by having students deliver oral presentations and writing reports in scientific format. One over-arching theme through the proposed three-semester integrative biology honors sequence will be the integration of biology at multiple levels of organization. Concepts developed in the first course will be carried over to the subsequent courses so that students appreciate the continuity of and relationships among the concepts of the multiple sub-disciplines that comprise biology today. A second theme of all three courses will be evolution, the unifying theory that underpins all of biology, from molecules and cells to entire ecosystems.

BUDGETARY AND STAFF IMPLICATIONS:

- a. *Additional staff and dollars needed.* We expect to be able to teach the integrative biology honors courses with our current faculty. Faculty from SIB have expertise in all the areas to be treated in depth in the three proposed honors courses. The time required to teach these new courses will come from two sources. First, SIB faculty at present teach two of the three courses currently in place for the Honors Biology program that is being phased out. These courses will not be taught after this year, freeing faculty time. Second, SIB is currently and quite independently of this proposal evaluating its course offerings for overlap and expects to drop some courses that duplicate other existing courses. This reduction in course offerings will free faculty for new teaching assignments, including the new honors courses.

We expect to support the Integrative Biology (IB) Honors option with resources that will be available next year. The current honors biology option is supported by funds sequestered for that purpose from the disbanded SOLS. With the termination of honors biology, the funds and teaching assistant lines dedicated to it will be released and divided between SMCB and SIB. We will apply our share of those resources to the IB Honors option. Further, we will supplement these resources with additional funds as needed. The Executive Committee of the School of Integrative Biology, which includes the Heads of the three departments in the School, fully support this proposal and the staff and dollar commitments that it represents.

- b. *Internal reallocations.* We anticipate that about 25-30 students will enroll in the IB Honors option each year. These students will be drawn from the pool of students who have already expressed an interest in the biological sciences. Some will likely have elected to be IB majors even without an honors option. Others may select IB specifically because of the availability of this option. Compared to the large numbers of students who express an interest in biological science each year, the small number who enroll in this honors option will have no significant impact in enrollments in either the MCB or IB curricula.
- c. *Effect on course enrollment in other departments.* After they have completed their three course core sequence in IB Honors, some students will likely wish to take courses in SMCB as their electives. Relative to the very large total enrollments in SMCB courses, the addition of these students will have no significant impact; indeed, without the IB Honors options, some of these students might well have elected to be SMCB majors anyway, further mitigating their net impact on SMCB courses. We have discussed this matter with SMCB; neither School anticipates any difficulty.
- d. *Impact on other resources.* We will use existing SIB laboratory teaching space for the proposed new courses. By physically relocating several laboratory courses, we will be able to free laboratory space that can be dedicated to the honors courses. Some of the equipment we expect to use in these courses is at present used in the Honors Biology courses and will be transferred to SIB upon the termination of that program. We will allocate additional resources to update equipment as needed. The IB Honors option will have not likely have any impact on the library because all of these students would have been majors in either IB or MCB in any case.

Laboratory Equipment and Computers

Computer needs will be met in two ways. First, some computers (Mac and Windows) with internet connection, spreadsheets, and statistical packages will be available in the honors classroom area. Students will have access to these at all times. Second, the dedicated tech classrooms in 164 Burrill, equipped for major computer use by any IB course, will be reserved for exclusive use during lab periods designed for heavy use of computers.

Laboratory equipment needs overlap a great deal in the three core honors courses so their use will be coordinated. The equipment needs include: refrigerator, incubators, growth chamber, dissecting and compound microscopes and illuminators, digital video camera with computer interface and adaptable to the scopes and a display monitor, microscope with camera/computer interface and polarizer, fluorescence microscope with camera, balances, gels, gel boxes and power supplies for protein and DNA gels, PCR thermocycler, centrifuges (macro and micro), ultramicrotome with glass knives, spectrophotometer with computer interface, and aquaria.

Supplies and specimens will be ordered from scientific vendors. These include live plants, preserved animals specimens for dissection, live protozoa and brine shrimp, a human physiology lab package (muscular, cardiovascular, pulmonary function), fish for aquaria, supplies for embedding tissue for in situ hybridization lab, buffers for protein and mRNA extraction, RT-PCR supplies, fluorescent DNA probes, and oligonucleotide primers. The labs also will take advantage of existing resources on campus, including the Plant Biology Conservatory, the Biotech Center to do real time PCR, and natural areas owned by the University for field ecology projects.

GUIDELINES FOR UNDERGRADUATE EDUCATION

The guidelines for undergraduate education require that undergraduate programs should promote critical reading, writing, and reasoning, an understanding of our heterogeneous culture, and where applicable, prepare a student for a professional career.

Although critical reading, writing, and reasoning are an integral part of the biological science majors currently offered on campus, there is no question that with hundreds of students to instruct, faculty are limited in the extent to which they can require their students to demonstrate their mastery of these skills. However, this proposed IB Honors option will admit only a small (25-30 students) cohort each year. The resulting high faculty-to-student ratio will allow daily interactions between faculty and students that will challenge the students to think clearly, critically, and creatively. The open-ended laboratory classes will emphasize the process of investigative science, from the generation of ideas to the completion of the investigation with intensive writing and speaking experience. Students will read and discuss critically the scientific literature underpinning their investigations and will be required to use the quantitative experiences gained from their required math and statistics courses to analyze the results of their laboratory experiments. In evaluating their results, they will acquire a respect for evidence needed to support their hypotheses. In short, students in this option will have the kind of intensive and in depth exposure to the discipline of integrative biology that even some graduate programs would be hard pressed to match. We will strive to ensure that there will be no better program on campus that will better meet the educational needs of students in the sciences.

No aspect of the option specifically addresses our heterogeneous culture. However, historically, the honors biology students have been a very heterogeneous group that interacts

extensively and forges long-lasting friendships between people with quite diverse cultural backgrounds. We have every reason to think this trend will continue in the IB Honors option.

The option is not intended to and does not explicitly prepare students for a specific professional pathway. However, the intensive nature of the proposed curriculum in science and math with its strong emphasis on critical thinking and clear written and oral expression of thought will provide an unparalleled background for any student intending to go on to graduate school and professional training in biology.

CLEARANCES:

Sponsor: Carol K. Augspurger Carol K. Augspurger Date 15 May 2005

School Director: Fred Delcomyn Fred Delcomyn Date 5/16/05

College of LAS: Ann Wynn Date 5/18/2005

Office of the Provost: _____ Date _____

PROPOSED EFFECTIVE DATE: Fall Semester 2006

STATEMENT FOR PROGRAMS OF STUDY CATALOG:
Integrative Biology Honors option

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.

E-mail: sib@life.uiuc.edu

Web address for School: www.life.uiuc.edu/sib

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 Option will automatically complete the Chemistry minor.

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/Distinct%20Require.htm.

HOURS	REQUIREMENTS ¹
4	IB 150 – Organismal & Evolutionary Biol
4	MCB 150 – Molecular & Cellular Basis of Life
5	IB 270 – Evolution of Molecules and Cells
5	IB 271 – Organismal Biology
5	IB 372 – Ecology and Evolution ²
12	MATH 220 – Calculus I, and MATH 230 – Calculus II, and MATH 243 – Calculus III Plus
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 102³ – 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 Biochemistry, 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 statistics⁴
- 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 program.

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1. Students must consult with their integrative biology honors adviser at least once each semester.
 2. Continuation in the integrative biology honors option requires a grade of B or better in each of IB 270, 271, and 372 and a 3.0 GPA.
 3. The former sequence is recommended, and preference will be given on admission to students following it. Introductory chemistry should be completed prior to enrolling in IB 270.
 4. 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 A: Additional information on admission to IB Honors option.

Freshmen students in a Biological Science curriculum will be informed of this option by email. The honors option will also be announced both fall and spring semesters in the IB 150 course. An information meeting will be held in mid-February. Instructors and former Honors students will be present to answer questions.

Students will be selected by interview. Interview teams will be composed of instructors, past students in the Biology Honors program, and, once the program is running, students currently in Integrative Biology Honors. An overall 3.0 GPA is a requirement for applying for admission. (Rationale: We wish to select from a pool of students who are likely to be successful in the rigorous Honors option. The students apply in the second semester of their freshman year. Prospective students will have taken a wide variety of math, chemistry, and biology courses in their first semester. Therefore, we will base admission on their overall GPA rather than specific math and science courses.) Students must have a good academic background and evidence of success in math and science courses. Students should show a strong interest in biology and have career goals that depend on a rigorous biology and science background. Students will be expected to have finished general chemistry before beginning IB 270.

Students will be notified of their admission into the option in the spring prior to registration for the first semester of their sophomore year. Students will be expected to maintain a 3.0 GPA and to obtain a grade of B in each of the three IB honors courses to remain in the program. An SIB faculty member will serve as a special advisor to these students who will be expected to meet with the advisor once each semester. They will also have access to the professional biology advisors.

Appendix B: Quitting the program.

Students who drop out of the Honors option will be able to transfer readily into the regular IB major. The three core courses in the Honors option match well with the three core courses in the major. Each specific Honors course will serve as a substitute for one of the regular core courses. Furthermore, the Honors requirements in math, statistics, chemistry, and physics exceed those for the IB major, so students that transfer into the regular IB major should not be behind in their associated courses either.