

Contact: Diana Gonzalez

PROPOSED NEW PROGRAM AT IOWA STATE UNIVERSITY
B.S. IN BIOINFORMATICS AND COMPUTATIONAL BIOLOGY

Action Requested: Consider approval of the request by Iowa State University to establish a new B.S. Program in Bioinformatics and Computational Biology (BCB) which will be administered by the Department of Genetics, Development, and Cell Biology (in the College of Liberal Arts and Sciences) with faculty participation from the Departments of Mathematics and Computer Science.

Executive Summary: The proposed undergraduate major in bioinformatics and computational biology will prepare students for careers at the interfaces of biological, informational, and computational sciences. Participation in this field requires that students achieve a high level of competence in biology, mathematics, computer science, computer engineering, and statistics. Resources for the proposed program, including faculty, staff, and facilities, will be reallocated by the department. This proposal was reviewed by the Board Office and the Council of Provosts and is recommended for approval. No concerns were raised when it was presented to the Iowa Coordinating Council for Post-High School Education.

Background:

- ◇ Definition of bioinformatics and computational biology. “Bioinformatics is a new discipline that deals with the research, development, or application of computational tools and approaches for expanding the use of biological, medical, behavioral, or health data, including those to acquire, store, organize, archive, analyze, or visualize such data. Computational biology refers to hypothesis-driven investigation of a specific biological problem using computers, carried out with experimental or simulated data, with the primary goal of discovery and the advancement of knowledge.”¹ Major research efforts include sequence alignment, gene finding, genome assembly, protein structure alignment, protein structure prediction, prediction of gene expression and protein-protein interactions, and the modeling of evolution.²
- ◇ Description of program. The proposed program is a bachelor’s level program that will require 120-130 credit hours and will prepare graduates in the use of techniques including applied mathematics, informatics, statistics, computer science, artificial intelligence, chemistry, and biochemistry to solve biological problems, usually on the molecular level.
- ◇ Relationship to existing programs at ISU. The proposed program will offer opportunities for undergraduate participation in cutting-edge research through partnerships with ISU’s L. H. Baker Center for Bioinformatics and Biological Statistics, Center for Integrated Animal Genomics (CIA), U.S.D.A. Maize Genome Data Base, and the Computational Intelligence, Learning, and Design Center. The proposed program will build on the strengths of ISU’s BCB Ph.D. program which was established in 1999. The BCB Ph.D. program will offer unique opportunities for BCB undergraduate majors to participate in faculty research programs and will provide a faculty base from which to draw instructors, mentors, and advisors.

¹ Source: Biomedical Information Science and Technology Initiative Consortium.

² Source: National Institutes of Health.

- ◇ Duplication. The University of Northern Iowa offers a B.S. Bioinformatics Program. ISU's proposed program differs from UNI's program because it emphasizes the discovery and application of biological knowledge while UNI's program emphasizes the discovery and implementation of algorithms and tools. The University of Iowa will request approval of a B.A./B.S. Program in Informatics at the June 2007 Board of Regents meeting (Agenda Item 10j). SU's program will differ from UNI's and ISU's programs because it will not focus on bioinformatics. ISU's proposed undergraduate program in bioinformatics and computational biology will be one of only a few in the country.
- ◇ Cost/Resources. The University projects that no new faculty positions will be required to establish the major; all staff, faculty, and space resources required to implement the proposed program will be provided through reallocation by the Department of Genetics, Development, and Cell Biology. The elimination of the Zoology program in 2004 will contribute to the reallocation for the proposed program. The total cost of the proposed program will be \$100,000 in year 1 and \$300,000 by year 7.
- ◇ Need/Demand. Because of the paucity of undergraduate programs in bioinformatics, there are relatively few graduates prepared to work in the biological R & D field in the country, especially in Iowa. According to the Bureau of Labor Statistics, demand for B.S. and M.S. bioscience graduates will grow more rapidly than for Ph.D.s. According to the Iowa Department of Economic Development, Iowa has a solid bioscience foundation upon which to launch new initiatives for growth.
- ◇ Projected Enrollment. The projected enrollment for year 1 is 10-15 students; the enrollment is projected to increase to 100-150 students by year 7.
- ◇ Articulation. Kirkwood Community College (KCC) intends to implement a two-year program in bioinformatics. ISU plans to explore an articulation agreement with KCC in the future.
- ◇ Link to Strategic Plan. The proposed program addresses ISU's mission "to share knowledge through outstanding undergraduate programs and to increase interdisciplinary learning opportunities." The Strategic Plan identifies the Biological and Informational Sciences as central to the strengths and future of the University. The Battelle Report identifies bioscience as a key to the economic future of Iowa. The proposed program also addresses the Board's Strategic Plan priority (1.0) to "ensure high-quality educational opportunities for students."

Responses to the Board of Regents' program approval questions are on file in the Board Office.