

Contact: Diana Gonzalez

PROPOSED NEW PROGRAM AT IOWA STATE UNIVERSITY
BACHELOR OF SCIENCE IN SOFTWARE ENGINEERING

Action Requested: Consider recommending approval to the Board of the request by Iowa State University to establish a new Bachelor of Science in Software Engineering which will be jointly administered by the Departments of Electrical and Computer Engineering and Computer Science.

Executive Summary: Software engineering is “the application of a systematic, disciplined, quantifiable approach to the development, operations, and maintenance of software¹.” Software has become a critical infrastructure component for medical, energy, transportation, and financial applications. Industry is experiencing a shortage of qualified software engineers and the need is projected to grow. The proposed program will focus on engineering aspects of developing and evolving complex software to meet the shortage of qualified software engineers. The proposed program complements ISU’s Computer Engineering and Computer Science programs. 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:

- ◇ **Impetus for proposed program.** The two key professional organizations, the Institute of Electrical and Electronics Engineers (IEEE) and Association for Computing Machinery (ACM), have emphasized the need for degree programs in software engineering. In May 2004, ACM and IEEE issued a joint report on a model curriculum for developing undergraduate degree programs in software engineering.
- ◇ **Description of program.** The proposed program is a bachelor’s level program that will require 124.5 credit hours and will prepare graduates to apply a systematic, disciplined, quantifiable approach to the development, operations, and maintenance of software. Students will learn the principles, processes, techniques, and tools for producing, analyzing, specifying, designing, and evolving software.
- ◇ **Duplication.** This will be the first Bachelor of Science degree program in software engineering in Iowa. Computer science and computer engineering programs are available at the University of Iowa; computer science is available at the University of Northern Iowa. Iowa State University has indicated that unlike existing programs in computer engineering and computer science, the software engineering program will focus on engineering aspects of developing and evolving complex software. In 2001, there were 60 universities in 11 countries that offered software engineering programs². Six universities in the U.S. offer software engineering programs accredited by the Accrediting Board for Engineering and Technology (ABET)³.

¹ Source: “Testing Computer Survey,” Kaner et al.

² Source: ACM/IEEE 2001 Survey.

³ Clarkson University, Milwaukee School of Engineering, Florida Institute of Technology, Mississippi State University, Rochester Institute of Technology, and the University of Texas at Arlington.

- ◇ Cost/Resources. The program will be operated with eight faculty members, 10 teaching assistants, and two laboratories. The Departments of Electrical and Computer Engineering and Computer Science will contribute equal resources for six FTE faculty and six teaching assistants.

The total cost for the proposed program includes \$690,000 which will be reallocated by the two departments. The College of Engineering will reallocate \$300,000 for software engineering laboratories in the first year and \$310,000 for two new FTE faculty, four teaching assistants, and advising/computer support staff in the second year. The average annual cost for the proposed program for the next seven years is approximately \$1 million; new costs are projected during year 5 in the amount of \$100,000 for renovating the software engineering laboratories.

- ◇ Need/Demand. According to ISU, there is a shortage of qualified software engineers. The highest projected U.S. growth rates among occupational categories during the ten-year period ending in 2010 are in software engineering, with a projected growth of 95.4% for computer software engineers corresponding to an increase of 664,000 total positions in the U.S. in software engineering⁴.
- ◇ Projected Enrollment. ISU has indicated that it will have the resources to enroll 48 new students every year although, over time, there are likely to be more students interested in the program than can be accommodated. The projected enrollment for year 1 is 24 students; with an increase to 192 students by year 5 and beyond.
- ◇ Quality. ABET has recognized software engineering as a separate engineering discipline and established guidelines for its accreditation. ISU anticipates that the proposed program will be accredited by ABET and will follow a six-year accreditation cycle.
- ◇ Link to Strategic Plan. The proposed program addresses ISU's mission "to share knowledge through outstanding undergraduate programs and to increase interdisciplinary learning opportunities." A College of Engineering priority addressed by this proposed program is "to provide an excellent education coupled with experiential learning that recognizes the global leveling of the engineering profession and the rapid pace of innovation." Two priority areas identified in the Department of Electrical and Computer Engineering Strategic Plan are pervasive computing and infrastructure security, both of which involve significant software engineering elements.

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

⁴ Source: Bureau of Labor Statistics, vol. 124, no. 1, November 2001.