

Shepherd University Board of Governors
Meeting of April 13, 2006
Agenda Item No. 3

PROPOSED BACHELOR OF SCIENCE DEGREE IN COMPUTER ENGINEERING

A new Bachelor of Science Degree in Computer Engineering is proposed at Shepherd University. This degree will provide students with the knowledge to design and build computer systems that meet a wide range of information processing requirements.

Approval of a new degree program requires a two-phase process. The University is required to obtain Higher Education Policy Commission (HEPC) approval of the Intent to Plan a new degree program and then, at the conclusion of the planning process, the University must obtain HEPC approval of the final form of the new degree program. A description of the proposed new degree program is included on the following pages.

The following resolution is recommended for adoption by the Board:

RESOLVED, That the Shepherd University Board of Governors approves the Intent to Plan for a Bachelor of Science Degree in Computer Engineering and directs the President to file the Intent to Plan with the HEPC Chancellor for approval.

Shepherd University Intent to Plan Bachelor of Science in Computer Engineering

3.7.1 Educational Objectives

The Computer Engineering degree will provide students the knowledge to design and build computer systems that meet a wide range of information processing requirements. This could involve the analysis, design and implementation of hardware and/or software for business systems, medical information systems, scientific applications, research and development of prototype robotic systems and other emerging information technology solutions. The course of study includes hardware design and software systems, theory and applications of computers, mathematics, physics, chemistry, electrical signals and circuits, logic design, computer architecture, operating systems, database systems, data communications, microprocessors, computer programming, and artificial intelligence. The students will experience a collaborative learning environment that stresses good teamwork, leadership and life skills. Computer Engineering spans both the electrical engineering and computer science curriculum and draws heavily from each of these disciplines in addition to specialization in computer engineering. Courses that would serve as the specialization would also enhance the existing curriculums in all of the computer science concentrations.

Relationship of Objective to Mission of Institution

"Shepherd University is a student-centered, learning community meeting the changing needs of the people of the Eastern Panhandle of West Virginia and the surrounding communities through teaching, research, service, and technology."


The Computer Engineering program being proposed will support the mission of Shepherd University. In particular, it will:

- **Fulfill the duty to serve the community:** Make Shepherd's technological capabilities and knowledge bases more readily available to serve better the workforce and economic development of West Virginia's Eastern Panhandle and surrounding communities through collaborative arrangements with business, government, and labor.
- **Enhance research and publishing capabilities:** Propagate and maintain resources and tools necessary to support successfully research projects, faculty preparation and submission of papers to academic journals and other professional publications.

The current engineering program at Shepherd University is a two-year course of study to prepare students to transfer into the third year of a baccalaureate degree program in engineering. This pre-engineering concentration has been very successful in preparing students to complete their engineering baccalaureate degrees at West Virginia

University. Shepherd's existing program emphasizes a strong foundation in mathematical, physical, computer, and engineering sciences, which constitutes the core of all areas of engineering. The Computer Science, Mathematics and Engineering Department designed the pre-engineering curriculum for those students who were pursuing a computer engineering degree. In recent years, several computer engineering and electrical engineering courses have been added to Shepherd's catalog.

Special Features That Make Institution Desirable Place to Initiate Program

The strong foundation in the established areas of computer science, mathematics and engineering within the School of Natural Sciences & Mathematics supports the establishment of this new degree program.  It not only does the proposed Computer Engineering degree program strengthen the ability of the department to support the mission of Shepherd University, but it will also allow the University to better fulfill its duty to serve the community. Additionally, it will enhance the ability of the faculty to pursue research projects and submit papers in professional publications.


The business community in the Eastern Panhandle and the large number of Federal government agencies operating in this area have approached Shepherd and made known their desire to have Shepherd produce graduates that better meet their workforce needs. They are willing to collaborate with the University in developing and placing computer science and engineering students in their organizations.

Finally, this degree program will provide the homogeneity that would stress interdisciplinary education in the department. There is a high level of confidence that this degree will attract to Shepherd University students from the tri-state area who are interested in pursuing engineering careers.

3.7.3 The institution will assure high quality standards for the program and maintain a continuing assessment of quality.

High Quality Program

Three new faculty members joined the department in fall 2004 at the assistant professor level. Dr. Luiz Homem de Mello (Ph.D. in Computer Engineering) has an extensive teaching and research experience in computer science with a broad background in computer engineering. Dr. Osman Guzide has worked with industries and as a consultant for many years. Dr. Weidong Liao worked as a software engineer and recently completed his Ph.D. in computer science. Dr. Xiaoming Wu joined the department in 2002. Dr. Wu has taught many computer science related mathematics courses in the Computer Science, Mathematics and Engineering Department. Dr. Wu was a scientific programmer at Robot Technology Group, ABB Inc., before joining Shepherd University. Professor James Romano joined the faculty in 1972 and his contributions in programming are invaluable. In fall 2005, Dr. Rajeev Rajaram (Ph.D. in Applied Mathematics, M.S. in Electrical Engineering) joined the faculty. He has a background in engineering and mathematics and has taught several electrical engineering and mathematics courses at Iowa State University.

 department has researched and investigated the learning outcomes for a Bachelor of Science in Computer Engineering of many universities, in particular West Virginia University. The department is confident that it is exceeding the learning outcomes in all of these areas.

Assessment

The department is required by the Office of Teaching and Learning at Shepherd University to perform assessment in all areas of degree programs. The department is also in the process of establishing guidelines of assessing this new degree program. There is a commitment to this process, as it would measure Shepherd's effectiveness in preparing students for the field of engineering. In addition, a capstone course has been designed particularly for this major. This course will enhance all other areas of concentrations in computer science, mathematics and engineering.

3.7.4 Other Institutions Offering Similar Programs

West Virginia University has a computer engineering program similar to the one that is being proposed. Computer Engineering is a common engineering program offered by many of the state universities like Virginia Tech, University of Maryland-College Park and Pennsylvania State University. No university or college within 75 miles of Shepherd University offers this degree program.

3.7.5 Statement of societal, occupational, research, or public service needs that will be met, as well as anticipated student demand for the program.

Societal and Occupational Needs

There has been a strong demand for computer engineers in the IT industry of late. Latest trends indicate the integration of computers in a variety of applications which require a strong background in the principles of networking, computer architecture and organization and more fundamentally that of computer engineering design and logic. Moreover, the introduction of this program will serve to fulfill the recent call to attention by various civic and private groups like the Chamber of Commerce and the Gateway New Economic Council to increase the number of highly skilled workers in the Eastern Panhandle of West Virginia and the Tri-state region.

Student Demand for the Program

Given the affordable tuition rates at Shepherd University, growth and expanding in IT industry in this area, and the recent student interest in the Computer Engineering concentration, a high demand for this program is anticipated, as Shepherd is accessible to the residents of the Eastern Panhandle and Tri-State Area.

3.7.6 Additional Resources Needed to Offer Program

Faculty

No additional faculty will be required to offer the Computer Engineering degree program. The faculty in the Department of Computer and Information Sciences, Mathematics and Engineering and School of Natural Sciences and Mathematics are capable of teaching all of the upper-division courses necessary to offer this degree. As the program grows, new faculty will be added to meet student demand according to Shepherd's new policies for the creation of new positions.

Facilities Requirements

The requirement for new facilities to support the Computer Engineering program will be minimal. The Department of Computer and Information Sciences, Mathematics and Engineering currently has excellent, state-of-the-art laboratory and facilities. There are two engineering/mathematics laboratories, one Networking and Distributed Systems Laboratory (SN 29) and one general Computer and Information Sciences Laboratory (SN 27). These facilities can be easily adapted to teaching all courses necessary for this degree program. In addition, a new lab is being set up in SN 38 using existing resources, which will strengthen and expand the facilities.

Library

The Scarborough Library at Shepherd University has been strengthened considerably by the influx of money associated with the graduate programs. The School of Natural Sciences and Mathematics and Department of Computer and Information Sciences, Mathematics and Engineering will work with the Library staff to recommend resources and materials needed for this degree program.

In addition, it is recommended that the Library subscribe to ACM (Association for Computing Machinery) and IEEE (Institute of Electrical and Electronics Engineers) online digital library using group membership so that students and faculty members at Shepherd University can have access to publications from ACM and IEEE. This will benefit students and faculty members from other majors in the School of Natural Sciences and Mathematics.