

Engineering and Technology Industry Council Core Investment Plan Biennium from July 1, 2005 to June 30, 2007

Campus: Southern Oregon University

Contact Name: Joseph Graf, Dean of Sciences

Date of Submission: April 2, 2004

Summary of Proposal: SOU proposes a total project of \$530,000 that includes investing \$310,000 to continue improvements to our Computer Science programs and investing \$220,000 to continue the SOU portion of the cooperative Materials Science Bachelor's Degree program offered in partnership with the University of Oregon

Goals

SOU seeks to increase the number of undergraduate and graduate majors and degrees in Computer Science, to work with the University of Oregon to provide a materials science option for students at both campuses, and to increase the number of pre-engineering students at SOU. SOU's core funding proposal will ensure that we achieve the long-range metrics that were developed during proposal development and modification for the 2003-05 biennium, including at least a doubling of degrees granted by AY09 (see metrics table and Results section, below). This new investment will support the continued momentum we have achieved in Computer Science over the past two biennia and support the full implementation of the SOU portion of the cooperative Materials Science Bachelor's degree program with the University of Oregon. In addition to capacity building, our goal is to recruit a diverse population of ECS students to SOU and to help them to succeed in ECS programs. If the Materials Science program is successful as an option under the Physics degree, we plan to propose a stand-alone degree program to OUS.

Further, our goal is to be known throughout the State of Oregon and nationwide for our Computer Security and Information Assurance (CSIA) program and to be known throughout the State of Oregon as a top provider of high quality transfers to engineering programs. In order to provide a national context for our programs, we propose to rank our Computer Science Department, our Department of Physics and Engineering, our Chemistry Department, and the entire School of Sciences at SOU relative to our peer institutions as specified by OUS and to institutions in the Council of Public Liberal Arts Colleges (COPLAC). Members of these two groups are listed in SOU's Capacity proposal for 2003-05. Data already available show that SOU ranks number one among our peers in the number of Computer Science Bachelor's Degrees, number two in engineering enrollment, and number one in physical science enrollment. In addition to enrollment and degree data, we propose to gather data on program budgets, faculty size and qualifications, and external funding. Our goal is to rank in the top third in all categories and in the top two or three in several.

SOU's Core ETIC programs are directly applicable to three or four of the potential opportunity areas as defined by the Academic Excellence and Economic Development (AEED) working group of the OUS Board. With past and continuing support, our Computer Science program now has the capacity to make contributions in the areas of Information to knowledge (making sense of complex data) and analog mixed

signal (wireless products and services). We also have strengths in the areas of bioinformatics and computer security that have several health-related applications. The increased teaching and research activities in materials science and SOU's internationally known ferroelectrics research program support both workforce development and research in the area of nanotechnology.

Investment Description

Computer Science

In order to preserve the growth in Computer Science that began in the 1999-01 biennium and continued in the 2001-03 biennia, we propose to invest \$310,000 during the 2005-07 biennium, \$10,000 below the level of funding provided during the 2003-05 biennium. Past ETIC funding has built a critical mass of faculty so that the department has been able to develop new degree options in Computer Science and Multimedia (CMM) and Computer Security and Information Assurance (CSIA) and to develop more stand-alone graduate courses. In addition, the Computer Science Department held its first annual computer science contest involving local high schools to promote the field and recruit students. Continued funding will allow SOU to further develop and refine its CSIA curriculum, further develop and upgrade the security and research labs, continue the current medical project and target it to the local medical community, and sustain, and possibly expand, the computer science contest. The proposed funding will sustain our efforts to develop curriculum aligned with the economic development goals for higher education in Oregon. Our Data Mining course will teach students to how to make sense of complex corporate data. These techniques also work on scientific datasets such as those used in our research associated with the Canadian Space Agency. Our Bioinformatics course will teach methods of searching through complex genetic data for patterns useful in biotechnology, forensic, and health-related applications.

Specific use of this funding during 2005-07 will include support for faculty positions, including visiting positions for practicing professionals (\$202,000 for the biennium), the Instructor/Computer Lab Administrator position (\$64,000 for the biennium), scholarships for undergraduate student recruitment and retention (\$10,000 for the biennium), a modest amount of equipment (\$9,500 for the biennium), continued support for the computer science contest (\$8,000 for the biennium), and continued support for graduate assistantships (\$10,600 for the biennium). Funding at the \$310,000 level will allow us to retain most of the capacity that has been built over the past two biennia.

Materials Science

In order to finalize the development and full implementation of SOU's portion of the joint Materials Science degree program, we propose to invest \$220,000 during the 2005-07 biennium, the same level of funding provided during the 2003-05 biennium. A key component of the proposal will be scholarships to recruit students and assist them with the cost of commuting to the other campus, an essential investment to ensure adequate enrollment in the program as soon as possible. SOU is devoting the 2003-04 academic year to recruiting students and faculty to the program. We are currently searching to fill the Materials Science faculty position described in the proposal for 2003-05, a person with expertise in composites, ceramics, nanomaterials, metallurgy, polymers, or biomaterials. We received over 70 applications and expect to fill the position shortly. New materials science courses have been approved this year and will be offered during 2004-05. Most of the other courses in the curriculum are currently offered at SOU and U of O, although the proposed new degree option will require that they be offered more frequently.

A strong laboratory experience is a hallmark of SOU's physics and chemistry programs and ensures the marketability of the graduates. Some SOU students will have the opportunity to participate in SOU's

internationally known research into ferroelectric materials. This project that has been regularly funded by NSF and has already produced at least 16 publications, several co-authored by SOU students. Program graduates will be prepared to meet anticipated industrial needs for effective researchers/problem solvers in the microelectronics and the polymer/coatings industry and in the growing nanotechnology sector. Many of them will enter the Materials Science master's program at the University of Oregon, and we plan to market the B.S. program as the initial component of a 4+1 Master's degree in which students who earn their undergraduate degree with the necessary GPA and recommendations from faculty could complete the Master's component at the University of Oregon in one additional year.

Specific use of the proposed funding during 2005-07 will include support for the 1.0 FTE faculty position in Materials Science (\$120,000 for the biennium), support to hire a practicing professional engineer to teach engineering orientation (\$26,000 for the biennium), scholarship funds for undergraduate student recruitment and retention and to support summer studies at the other campus (\$38,000 for the biennium), and purchase of additional equipment for teaching and research (\$35,000 for the biennium).

As further evidence of SOU's commitment to materials science, the School of Sciences staffing plan projects the hiring of a condensed matter theoretical physicist for the 2006-07 academic year from the School's base budget. Because of a retirement in the Physics and Engineering Department, we have an unmet need for a theoretical physicist. Our plan is to hire an individual specializing in areas such as clusters, layered compounds, nanostructures such as quantum dots, and Micro-Electro-Mechanical Systems (MEMS), who will complement the current expertise in the Physics Department and can contribute directly to the Materials Science Degree and the nanotechnology initiative. At 1-10nm scale, materials behave differently due to large surface effects and quantum confinements of electrons in nanoscales. For practical technological applications, it is crucial to develop proper design tools that include atomistic and quantum mechanical modeling of nanomaterials.

Results

The proposed investments will maintain the momentum that was begun in 1999-01 and 2001-03. Computer Science Bachelor's Degrees increased from 34 in 1998-99 to 57 in 2001-02. The number dropped for 2002-03, but we see signs of a rebound this year and admitted students for next year are up 26% over the same time last year. The number of graduate students has increased significantly this year over last year as well. By AY09, we anticipate producing 62 B.S. degrees and 12 M.S. degrees in Computer Science, assuming continued support through that year.

Continued ETIC support will allow us to build a first rate undergraduate materials program in partnership with the University of Oregon. The new materials faculty at SOU will be expected to develop nationally competitive research programs and synergistically aid the already strong research efforts within MSI at the U of O. We anticipate a program with approximately 20-30 majors graduating a year between the two institutions (10 to 15 per year at SOU and 15 to 20 at the University of Oregon) by AY09, assuming continued support through that year. The program will be very efficient, producing 10-15 additional graduates per additional faculty member hired, because it is a blending of the existing physics and chemistry curricula and because of the collaboration between SOU and U of O.

Detailed metrics for this core proposal are given in the table, below. We still expect to attain at least 2.3X for total degrees (combining BS and MS in Computer Science and Materials Science degrees) by AY09, assuming continued support through that year. Undergraduate data are for a combination of Computer

Science and Materials Science, but individual AY09 goals are given above. Graduate data are only for Computer Science students. As we prepare our 2003-05 scorecards, we will determine the best way to treat SCH numbers for undergraduates in order to distinguish Materials Science students from other Chemistry and Physics majors. Because of targeted recruiting activities, we expect to do a better job of attracting women and minorities to our programs. Our ability to offer high quality science and mathematics programs in a small school setting will ensure the successful preparation of our students for ECS degrees and careers.

SOU Proposed Investment and Private Support Forecast (\$M)

	7/1/05-6/30/06	7/1/06-6/30/07	Total
Proposed OUS Investment (\$M)			
Support of existing CS faculty (1)	0.132	0.132	0.264
Funds tied to existing CS programs (2)	0.022	0.023	0.045
Support of existing Mat. Sci. faculty (1)	0.074	0.074	0.148
Funds for existing Mat. Sci. programs (2)	0.045	0.028	0.073
Subtotal	0.273	0.257	0.530
Expected private support (\$M) (4)	0.137	0.129	0.265
Total (\$M)	0.409	0.386	0.795
Faculty Supported (FTE)			
Existing (1)	4.00	4.00	4.00
New (5)	0.45	0.45	0.45
Total	4.45	4.45	4.45
Notes:			
(1) Hired with ETIC funds through June 2005.			
(2) Programs started with ETIC funds through June 2005.			
(3) Use as many lines as you need to describe your programs			
(4) Consistent with ETIC Private Support Policy dated 1-23-02.			
(5) To be hired with ETIC funds during 2005-2007 biennium.			

SOU Metrics Forecast:

	Baseline	Projected			
	AY 99	AY06	AY07	AY08	AY09
Average SAT/ACT percentile of incoming freshmen (1)	61	64	68	70	72
Average GRE percentile of incoming grad. students (2)	59	80	80	83	85
Women graduating from ECS programs (3)	21%	30%	30%	30%	30%
Minorities graduating from ECS programs (3)(4)	15.40%	13%	13%	13%	13%
ECS undergraduate student credit hours	6406	8000	8200	8400	8500
ECS bachelors degrees granted (CS plus Mat. Sci.)	33	65	68	72	77
ECS graduate student credit hours	128	450	500	500	550
ECS graduate degrees granted (CS Only)	5	10	10	11	12
Pre-college contact hours (5)					
Total research expenditures per year (6)	\$45,000	\$150K	\$150K	\$175K	\$200K
National ranking of <program or department> (7)	?	top 3	top 2	top 2	top 2
National ranking of SOU School of Sciences (See note 7)	top 1/2	top 3	top 3	top 3	top 3
Licenses sold (8)					
(9)					

Notes:

(1) If your applicants are required to submit SAT scores, use the percentile corresponding to the average composite SAT score of those submitting them. If they have the choice of SAT and ACT, use the average composite SAT score and the average composite ACT score, convert them to percentiles, and compute a weighted average of the two.

(2) Percentile based on the average quantitative score over those submitting such scores; ignore verbal and analytic scores.

(3) As a percent of all those graduating

(4) Racial and ethnic minorities who are US citizens or permanent residents

(5) Pre-college students participating in pre-college engineering, technology, computer science, math, and science programs

(6) Total dollars spent by ETIC-related departments towards research during academic year.

(7) For SOU this will be a combination of Chemistry, Physics and Engineering, and Computer Science. See Goals section for methodology.

(8) Patent licenses or other royalty-generating intellectual property licenses granted to commercial entities

(9) Add additional metrics as appropriate