

**TOPIC:                    PROPOSAL TO OFFER A BACHELOR OF SCIENCE IN  
APPLIED COMPUTING TECHNOLOGY WITH  
CONCENTRATIONS IN COMPUTING EDUCATION AND  
INFORMATION TECHNOLOGY.**

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## **I. SUMMARY**

The Board of Governors of the Colorado State University System has submitted a proposal for a Bachelor of Science degree in Applied Computing Technology with concentrations in computing education, and information technology. Both concentrations provide students with a strong background in computer programming and information technology, while preparing them to apply these skills in non-traditional information technology careers.

The secondary education concentration combines information technology skills with pedagogical training to produce licensed and highly qualified technology instructors. In addition, they will be prepared to teach AP computer science classes conforming to the College Board curriculum and content standards.

The Computing Technology concentration will create computer technologists with capabilities in programming, multi-media and the Internet, who will be able to develop new software for businesses and fields that do not currently fully exploit information technology. In addition, these students will have the organizational training needed to bring new technology to fruition within an organization. The new program expects enrollments of about 100 students after five years between the two concentrations.

The Applied Computing Technology (ACT) program serves three critical needs:

- 1) Improved retention of information technology students. Currently, almost 40% of computer science students leave the major.
- 2) Supplying Colorado High Schools with high qualified computer science and educational technology instructors. The State of Colorado and the College Board have recognized the need for improved information technology instruction at the High School level.
- 3) Providing Colorado organizations and businesses with professionals who combine information technology skills with organizational acumen.

The content of the degree plan includes general education coursework, course work for the concentration of either computer technology or information technology, and

professional education licensure courses. Whether a student is completing the computer technology or information technology concentration, the Bachelor of Science degree in Applied Computing Technology degree can be completed in 120 credit hours.

The degree proposal has been reviewed by CDE as an endorsement preparation program in Instructional Technology and has been recommended for approval ([Attachment A](#)). Department of Higher Education staff recommend approval of the proposed Bachelor of Arts degree in Applied Computing Technology with concentrations in computer technology and information technology.

## **II. BACKGROUND**

The following is summarized from the Colorado State University proposal for the Bachelor of Science Degree in Applied Computer Technology.

### **CSU ROLE AND MISSION:**

The proposed Applied Computing Technology degree supports the University's mission to offer a comprehensive array of undergraduate programs in the tradition of a land grant university. This program recognizes the rapidly changing technological and educational needs of the State's economy by making available a technologically-oriented education and training program accessible to deserving applicants from all classes and groups in response to the needs of the people of Colorado, the nation and the world constituencies. There is an existing and growing base of technology sophisticated businesses whose primary focus is not computer science, but who increasingly require IT skills. Examples include biotechnology and geographical information systems. Such industries will be well served by this program. In addition, the teacher training program will meet unmet demand in the Colorado public schools for teachers of technology.

### **EVIDENCE OF NEED FOR THE PROGRAM:**

The ACT program will provide a new major for students who seek careers in information technology but are not primarily interested in the traditional fields of computer science, computer engineering, and the more business-oriented computer information systems. It will also include a Teacher Training program for students desiring a career in K-12 education, leading to licensure in Instructional Technology.

Computer science requires students to be capable of extremely fine-grained problem solving, a high degree of patience, and unrelenting perseverance. Not all students who pursue the computer science major exhibit these characteristics, despite being very interested in and capable of using computers. The retention rate for computer science majors has traditionally been relatively low at about 60%. For students who find themselves unhappy with the computer science major the information technology major

alternatives are currently limited to computer information systems and computer engineering, or perhaps technical journalism, all controlled majors.

In the past, students changing their majors out of CS move to other majors in the following proportions: approximately one third change their majors to Open Option Seeking Business, one third change to majors in the liberal arts, and the remaining third spread themselves over a broad range of engineering, applied human sciences, and natural resource majors.

The new major will be attractive to those students and will aid overall student retention at CSU.

The teacher training program will provide public school expertise in computing technology that has not existed up to this point. Graduates of this program would be capable of teaching a broad range of computing technology: computer applications, web development, and programming, including AP computer science courses. Teaching AP computer science requires expertise existing in very few schools in the state, partly due to a lack of teacher licensure with a computer technology focus. The closest currently existing licensure area is the mathematics endorsement, but this requires very minimal computing technology skills (far below that needed to teach AP computer science). According to the American Association for Employment in Education, there is currently a shortage of technology education teachers from the Rocky Mountain region through the Eastern half of the country and computer science teachers particularly in the West. This program will help address this shortage.

While the computer science degree emphasizes professional competency in specialized sub-areas of computing, the applied computing technology program will emphasize the use of programming skills in a variety of computer application areas. The proposed program diverges from the existing computer science program at about the end of the sophomore year. The purpose of the existing computer science major is to expand basic programming skills learned in the first two years into more specific areas of software development and systems (e.g., operating systems, networks, compilers, databases) allowing graduates to pursue careers with organizations that develop large-scale software. In contrast, ACT students in the Computing Technology concentration will turn their attention to a study of organizational principles through a general business principles core, and advanced computer technology courses covering advanced programming, computer applications, and computer uses, with the goal of becoming computer professionals working in fields that use computer technology in solving subject-specific problems (e.g., business organizations, the biotechnology industry, GIS, atmospheric research, education, etc.). This makes the program very different from the existing computer science, computer information systems, and computer engineering degrees. Students who pursue the teacher training program will be licensed by the State of Colorado to teach computing technology in public schools, offer expert guidance to schools in the use of instructional technology, and to teach AP Computer Science courses.

**EVIDENCE OF STUDENT DEMAND**

This new program will provide new choices for undecided majors who may be interested in both traditional subjects and computing technology. Currently students interested in a career in computer technology can only choose from among three potential majors: computer science and computer engineering (both requiring interest and talent in mathematics and technical minutiae), and computer information systems (requiring a strong interest in business).

A recent poll of existing computer science majors indicated that if this new degree were available today, 5% of current CS majors (about 20 students) would consider moving to it. A survey of Open Option Students in the Center for Advising and Student Achievement resulted in approximately 75 students expressing an interest in the proposed programs. About 15 of these students expressed a *strong* interest, asserting that such a program would be perfect for them considering their goals, interests and talents. This shows evidence that not all students are happy with the options currently available to them. Each year approximately a half dozen students approach the CS Department to discuss public school teaching opportunities in computing technology, only to be disappointed to discover there has been no computing technology teacher endorsement area. Such students will find the teacher education concentration meeting their needs.

Following are expected enrollments based upon the survey data:

Enrollment Projections:		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Full Implementation
	In-state Headcount	25	35	50	75	100	125
	Out-of-State Headcount	5	8	10	10	10	10
	Program Headcount	30	43	60	85	110	135
	Program Graduates	0	5	10	20	25	35

The selection indices of the students in the program are expected to track the average range for the College of Natural Sciences. We also expect that greater numbers of minorities and women will be attracted to this program than the traditional computer science program, due to its broader application in the work place.

### **III. STAFF ANALYSIS**

Commission staff have reviewed this proposed program to ensure that it meets the State's performance measures outlined in C.R.S. 23-1-121. This program meets all performance measures.

#### **COURSE CONTENT AND SKILLS REQUIRED FOR LICENSURE**

Based on the complete syllabi received, and additional information, CDE has determined that all standards for the Colorado State University's Instructional Technology Teacher preparation program are being met.

### **IV. STAFF RECOMMENDATION**

**That the Commission approve the request of the Board of Governors of the Colorado State University System to offer a Bachelor of Science Degree in Applied Computer Technology with concentrations in Computing Education and Information Technology.**

#### **STATUTORY AUTHORITY**

C.R.S. 23-1-121