

CCHE Agenda  
June 7, 2001  
Colorado School of Mines  
Golden, Colorado  
9:00 a.m.

I. Approval of Minutes

II. Reports

- A. Chair's Report – Nagel
- B. Commissioners' Reports
- C. Advisory Committee Reports
- D. Public Comment

III. Special Presentation

- A. Colorado Mentor Presentation - Foster and Adkins

IV. Consent Items

- A. Proposals for New Academic Degree Programs:
  - 1. Bachelor of Arts (B.A.) in Computer Information Science at Western State College - Kuepper
  - 2. Bachelor of Science (B.S.) in Computer Engineering at Colorado State University - Kuepper
  - 3. Bachelor of Science (B.S.) in Liberal Studies at the University of Southern Colorado - Kuepper/Evans
- B. CCHE-Capitol Assets Policy Sections Repeals, Revisions - Adkins
- C. Teacher Education Authorization:
  - 1. Mesa State College - Lindner
  - 2. University of Colorado at Boulder - Samson
  - 3. Secondary Endorsements and Special Service Licensure - Lindner

V. Action Items

- A. Programs of Excellence - Evans
- B. 2001-2002 Financial Aid Allocations - Samson
- C. CCHE-Technology Advancement Group Program Funding for Fiscal Year 2001/2002 - Adkins/Hum

VI Items for Discussion and Possible Action

- A. Teacher Education Appeals (TBA) -Samson

VII. Written Reports for Possible Discussion

- A. Teacher Education Statewide Report - Lindner
- B. Degree Program Name Change University of Northern Colorado - Samson
- C. Programs of Excellence Report - Evans
- D. Report on Out-of-State Instruction - Breckel
- E. Concept Paper:
  - 1. Masters Degree in Applied Geography at the University of Colorado at Colorado Springs - Samson

Colorado Commission on Higher Education (CCHE)  
June 7, 2001  
Agenda Item II, A

**TOPIC: CHAIR'S REPORT**

**PREPARED BY: RALPH NAGEL**

This item will be a regular monthly discussion of items that he feels will be of interest to the Commission.

Colorado Commission on Higher Education (CCHE)  
June 7, 2001  
Agenda Item II, B

**TOPIC: COMMISSIONERS' REPORT**

**PREPARED BY: COMMISSIONERS**

This item provides an opportunity for Commissioners to report on their activities of the past month.

Colorado Commission on Higher Education (CCHE)

June 7, 2001

Agenda Item II, C

**TOPIC:                   ADVISORY COMMITTEE REPORTS**

**PREPARED BY:       ADVISORY COMMITTEE MEMBERS**

This item provides an opportunity for Commission Advisory Committee members to report on items of interest to the Commission.

Colorado Commission on Higher Education (CCHE)  
June 7, 2001  
Agenda Item II, D

**TOPIC: PUBLIC COMMENT**

**PREPARED BY: TIM FOSTER**

This item provides an opportunity for public comment on any item unrelated to the meeting agenda. A sign-up sheet is provided on the day of the meeting for all persons wishing to address the Commission on issues not on the agenda. Speakers are called in the order in which they sign up. Each participant begins by stating his/her name, address and organization. Participants are asked to keep their comments brief and not repeat what others have said.

**TOPIC: COLORADOMENTOR PRESENTATION**

**PREPARED BY: TIM FOSTER AND JEANNE ADKINS**

**I. SUMMARY**

The Department of Higher Education will leverage cash-funding from the Federal Department of Education through the Colorado Student Loan Program to implement an integrated, direct access web-based application and consumer information service for higher education consumer services.

The system is a one-stop Internet portal with internal links to databases and models of information. "ColoradoMentor" serves the critical constituencies of postsecondary education: students, employers and institutions. It will connect high school students, employers and institutions through a series of linked databases, all centrally located on one website. Students will be able to locate highly specific information regarding post-secondary institutions in one location, as well as apply to multiple institutions online and file a financial aid application. Postsecondary institutions can increase their applicant pool by streamlining the application and financial aid process and providing easy access to their information.

An online catalogue will contain key college-selection and application information, as well as profiles specific to each Colorado public higher education institution. The ColoradoMentor website will serve a broader purpose than simply a fulfillment of the needs of students, employers and institutions. Through improved communication among the three major interested parties in higher education (students, institutions and employers), ColoradoMentor increases access to and improves the usefulness of higher education for more Coloradans.

The Colorado Higher Education Quality Assurance Act (HEQAA) mandates that the state's citizens receive significant consumer information concerning Colorado's postsecondary opportunities. ColoradoMentor will help meet that need by improving the delivery of the information that already exists and providing a convenient, easily-accessible way for consumers to locate it. The initial development costs and the first five years of maintenance for the system have been provided by the department through cash-funded resources. Institutions will not be assessed development costs for participation, although should an institution choose customized elements, it would be responsible for those fees.

The project centralizes on-line consumer information, eliminating the present need for prospective students to visit more than 200 sites for higher education information and conversely cuts back on the need for colleges to send out mass-mailings of their materials.

On the consumer side, students need only visit the Mentor website to obtain the necessary information for occupational information, institutional data, applications and financial aid. While links will exist to each school's website, the essential information will be located on the ColoradoMentor server. The interactive applications that contain this data are user-friendly. They enable students to explore various information databases and career path options. The Mentor site design encourages student exploration. It provides them with many options to browse different areas of interest. Students can use the Mentor to select an institution, plan their high school courses to meet specific academic admission requirements, apply on-line for admission and financial aid, learn about aid options, including loans and debt management or plan a career.

Currently, many students must request paper applications from each school to which they seek admission, obtain them from their high schools' guidance offices, or if they are fortunate, download them from the web or apply on-line.

With ColoradoMentor, students can fill out one form that has data common to most Colorado public institution applications. The common information flows into the specific applications for each school that the student selects. This ease of use will encourage more students to apply by increasing the productivity of their effort. While Mentor's one-time application principle is similar to that employed by the Common Application® (the common admission form most frequently accepted by private higher education institutions), the ColoradoMentor system retains the customization of each school's individual form. Mentor saves valuable time for prospective students while retaining the original nature of the application forms.

ColoradoMentor will let students know that they are in control of the cost of their postsecondary education. The portal will achieve this by providing financial aid instructions, models and fill-in charts to track their own financial situations. Our web developer has obtained license to recreate the FAFSA form on the Mentor website. Unlike most independent financial aid websites, which typically contain only instructions and links to FAFSA, ColoradoMentor will give students the ability to complete the application in the same location as every other component of the higher education entrance process.

As an added feature, ColoradoMentor will give students the tools and information to be financially responsible. In addition to learning the process of financial aid application, students will garner basic budget-management skills and an understanding of how to effectively manage their student loan repayment to prevent default and bad credit ratings later in their lives.

The Mentor website will contain the on-line version of the Consumer Guide to Colorado's Higher Education Institutions. This resource provides campus, academic, cost, demographic and financial aid profiles for each of Colorado's public higher education institutions. The

guide details student services and special study options, and walks the student through tutorials regarding the admission and financial aid application process. It covers two-year and four-year colleges, and incorporates a post-collegiate perspective with its labor information and high growth occupations chart.

**TOPIC: PROPOSALS FOR NEW ACADEMIC DEGREE PROGRAMS**

**PREPARED BY: WILLIAM G. KUEPPER**

**I. SUMMARY**

The Commission considers new proposals for academic degree programs at its June and January meetings. This is intended to provide the Commission an opportunity to see the proposals in a broader context in such matters as the scope of new degree activity in the state system, governing board priorities, and statewide need.

This agenda item presents the academic degree proposals that were submitted to the Commission by April 1, 2001, for action at the June Commission meeting. They are:

1. *B.A. in Computer Information Science at Western State College*
2. *B.S. in Computer Engineering at Colorado State University*
3. *B.S. in Liberal Studies at the University of Southern Colorado*

**II. BACKGROUND**

Approval by the Commission of a new degree program proposal is a two-stage process. The governing boards submit a concept paper to the Commission that provides an opportunity for the Commission to identify potential state issues prior to developing the full proposal. In contrast, the full proposal includes details about curriculum, financing, capital construction needs, and other implementation details.

**The Full Degree Proposal**

The full proposal for a new degree program reaches the Commission after undergoing review by, and receiving approval from, the governing board. The request for new degree approval must include:

- A complete degree program proposal as defined by the governing board policy.
- The institution's responses to the peer review comments.
- Tables of enrollment projections, physical capacity estimates, and projected expense and revenue estimates.
- An analysis by the governing board of the potential quality, capacity, and cost-effectiveness of the proposed degree program.
- The governing board's response to the issues identified in the Commission's review of the concept paper.

Graduate degree programs require review by an external consultant. The Commission staff selects and contacts the external consultant after the governing board staff reviews the list of potential reviewers.

**Appendix A**

**STATUTORY AUTHORITY**

23-1-107. Duties and powers of the commission with respect to program approval, review, reduction, and discontinuance. (1) The commission shall review and approve, consistent with the role and mission and statewide educational needs, the proposal for any new program before its establishment in an institution. No institution shall establish a new program without first receiving the approval of the commission. As used in this subsection (1), "new program" includes any new curriculum which would lead to a new vocational or academic degree. The commission shall further define what constitutes an academic or vocational program and shall establish criteria or guidelines which define programs and procedures for approval of new academic or vocational program offerings.



4. Graduates will be immediately employable as industry professionals. The program will incorporate significant and current paradigms of industry.
5. Graduates will have the ability to communicate effectively with others.
6. The program will require a broad education in the liberal arts, with special emphasis on written and oral communication at all levels of the program.
7. Graduates will have an education that suits their needs and interests through selecting one of the two program tracks—Information Science and Information Systems.

The Computer Information Science major is integral to the implementation of the *1999-2004 Strategic Plan*. Moderately selective admissions standards, the College's small size, the emphasis on quality undergraduate teaching, and a residential learning environment, make Computer Information Science at Western an attractive alternative to computer science programs at larger, more selective institutions where faculty are often less accessible to students. The major will improve recruitment and retention. Students interested in computing or information systems often transfer from Western because there is currently no option to graduate with a major in these areas. Graduates from the major will provide a valuable resource for the technology-based workforce demands in the region and the state.

### **Program Design**

The Computer Information Science major consists of two emphases: Information Science and Information Systems. Both emphases have strengths in applications analysis, design, and programming and prepare graduates for positions in applications programming. Both emphases incorporate networking theory and practice, which prepares graduates for positions in network management and system administration. Both programs emphasize web applications development, preparing graduates to design and maintain highly sophisticated client-server web sites.

#### The Information Science Emphasis

This emphasis provides additional strength in programming, network management and system administration beyond the core of common courses within the major. The Information Science Emphasis has a stronger mathematics requirement and also requires an internship or applications project as a capstone experience.

The Information Science Emphasis requires an 18-hour Professional Concentration in addition to the required Computer Information Science and mathematics coursework. The objective of the professional concentration is to allow students to gain some depth of knowledge in an area of applied information science. Students may design their own concentrations with approval from their advisors, the Computer Information Science faculty, and the faculty members from the disciplines represented by their individualized concentrations. In some cases they may use existing minors as professional concentrations. The flexibility offered by the professional concentration allows students, with faculty guidance, to develop a plan of study fitting their needs, capabilities and interests. Suggested professional concentrations have been developed in collaboration with the Art, Business and Accounting, and Communications faculty.

#### The Information Systems Emphasis

This emphasis is based on the curriculum guidelines developed by the Association of Information Technology Professionals (AITP) and the curricula of the University of Minnesota, the University of Texas, and Arizona State University. The Information Systems Emphasis parallels the AITP model and the successful programs established by the three mentioned universities.

The Information Systems Emphasis builds on the common Computer Information Science core, requiring significant additional coursework in business administration, accounting and economics to develop knowledge of applications of information technology to the business environment.

**Coursework Required by the Computer Information Science (CIS) Major**

The Computer Information Science (CIS) major curriculum provides discipline breadth through a 27-credit CIS Core, which introduces students to the fundamentals of computer programming, networking, and applications analysis. Students then complete 42 credits of course work in one of two emphases: Information Science or Information Systems.

**CIS Core 27 Credits**

**Required Courses for both Emphases**

- CIS 190 Computer Science I
- CIS 191 Computer Science II
- CIS 210 Web Applications Development I
- CIS 235 Computer Networks I
- CIS 310 Visual Programming
- CIS 350 Web Applications Development II
- CIS 410 Systems Analysis
- CIS 415 Systems Design
- CIS 420 Database & File Management Systems

**Additional Required Courses 42 credits**

**Information Science Emphasis**

- MATH 161 Calculus 1
  - MATH 200 Discrete Mathematics
- Or*
- MATH 213 Probability and Statistics
- ENG 302 Technical Writing
- Or*
- SCI 202 Scientific Writing
- CIS 280 Data Structures
  - CIS 300 Introduction to Computer Architecture
  - CIS 330 Operating Systems with UNIX System Administration
  - CIS 335 Computer Networks II
  - CIS 480 CIS Application Project
- or*
- CIS 499 CIS Internship

**Information Systems Emphasis**

- MATH 131 Mathematics for the Managerial and Social Sciences
  - MATH 213 Probability and Statistics
- Or*
- ECON 216 Statistics for Business and Economics
  - BUAC 201 Introduction to Financial Accounting
  - BUAC 202 Introduction to Managerial Accounting
  - BUAC 340 Accounting Information Systems
  - BUAD 210 Legal Environment of Business
  - BUAD 270 Principles of Marketing
  - BUAD 309 Business Communications
  - BUAD 325 Information Systems in Business
  - BUAD 329 E-Commerce
  - BUAD 350 Human Resource Management
  - BUAD 360 Managerial Finance
  - BUAD 491 Strategic Management
  - ECON 202 Microeconomics

***Professional Concentration – 18 credits***

Three examples of professional concentrations:

- Art Graphic Design
- ART 119 Foundation Drawing I
- ART 171 Design and Color Theory Concepts
- ART 222 Art History I
- *Or*
- ART 223 Art History II
- ART 270 Graphic Design and Illustration
- ART 371 Intermediate Graphic Design
- ART 471 Advanced Design and Illustration

Business

- BUAC 201 Principles of Financial Accounting
- BUAD 325 Business Information Systems
- BUAD 329 E-Commerce
- BUAC 340 Accounting Information Systems
- BUAD 360 Managerial Finance
- BUAD 491 Strategic Management

Communications

- COTH 219 Visual Communication
- COTH 222 Analysis and Interpretation in Communication
- COTH 251 Telecommunications
- COTH 304 Human Communications
- COTH 346 Multimedia Communications
- COTH 376 Organizational Communications

**III. STAFF ANALYSIS**

In reviewing the concept paper and the program proposal, the Commission staff considers role and mission, program duplication, program need and demand, and quality issues including curriculum and resources, either currently available or committed to the program. The concept paper and proposal were submitted to the other governing boards for peer review.

**Role and Mission and Program Duplication**

The mission of Western State College includes providing “a limited number of professional programs, and traditional arts and sciences.” The college’s Vision Statement further notes that its “programs encourage a breadth and depth of knowledge which will serve as a foundation for a professional career.” Staff find this proposal, with its integration of arts and sciences into a professionally oriented program, to be consistent with the institutional mission and the college’s vision statement.

Computer-related degree programs are found at all institutions in Colorado. The proposed degree at Western State College has some characteristics, including the selection of professional concentrations, which may distinguish it from other such programs. However, the overriding argument which the institution makes, and with which staff agrees, is not the uniqueness of the program, but rather its importance to attracting and retaining students at Western. Further, because of the student demographics at the college, staff believes that the implementation of this program would have only a minimal impact, if any at all, on enrollment in existing programs elsewhere.

**Program Need and Demand**

The need, nationally and in Colorado, for graduates of computer-related programs has been well documented. Three of the five occupational areas projected to have the greatest growth in Colorado through 2005 are in computer fields. Recent down-turns in employment in the technology industries may have softened that demand, but state educational priorities, such as the Governor’s initiatives in technology, suggest that Colorado will continue to face shortages of appropriately trained people in computer fields. Regionally, the high-tech industries of the Gunnison Valley and the Western Slope have current shortages of appropriately trained workers. In addition, as the proposal notes, the range of computer applications keeps expanding into areas not “traditionally associated” with computing, for example the arts and humanities.

To determine student interest in, a computer major, the college has conducted several surveys over the past few years. These have supported the development of the new program proposal. In 2000 and 2001, the surveys have shown that approximately 45 students would be interested in a computing-related major, a figure which is supported by similar numbers for students already enrolled in the computer science minor. The institution also reports that about 100 inquiries each year come from students interested in studying computer science in some form at the college. Many do not apply when learning of the absence of a major at Western State College.

The institution projects an initial enrollment for the program of 28 students producing 25.2 FTE (see Attachment B). Ten (10) of those students are projected to come from the existing computer-related emphases and the other 18 will be “primarily” students who will be making their initial declaration of a major. At full implementation, the headcount enrollment is projected to increase to 79 (46.2 FTEs) and the program is projected to produce eleven graduates per year. Approximately 65 percent of the enrollment in the program is projected to be in-state students, a figure consistent with the overall demographics of the college. Staff believes these enrollments to be achievable.

### **Program Quality and Resources**

The Commission staff rely substantially on the governing board in assessing the quality of the proposed program, the capacity of the institution to offer it, and the cost effectiveness of offering the program. The Trustees of the State Colleges in Colorado have considered these matters prior to their action on the proposal and have concluded that the proposed program has the appropriate quality and cost-effectiveness, and that Western State College has the capacity to offer it (see Attachment A).

The development of this program was a lengthy institution-wide process. Commission staff were pleased to note the voluntary use of an external reviewer to assist in the planning of the program (external reviewers are currently required only of proposals for graduate programs). The institution also took the important step of forming an advisory group of professionals to advise on the appropriate curriculum to meet business and industry requirements. While there are no accreditation or licensure requirements for the proposed program, the governing board notes that Western State has incorporated curriculum content from models suggested by the Association of Information Technology Professionals (ATIP).

At the concept paper stage, resources were an issue for the governing board and the Commission. Staff looked with special care at that matter. The shift away from a traditional computer science degree has broadened the base of faculty at Western who will participate in the program. Presently ten faculty have the appropriate credentials to teach in the program. With the encouragement and support of the Trustees, Western will emphasize further professional development of existing faculty. This process, along with the hiring of additional faculty will be necessary if the program is to grow.

Phase II of the Hurst Hall construction project will be completed by fall 2001. The space needs of the proposed program were included in the plans for the renovation. No additional space will be needed.

Faculty and administrative costs projected for the program appear to be appropriate. Start-up costs include funds to equip the new networking laboratory and expand the capability of the CIS teaching laboratory in Hurst Hall. It is useful to note that these costs are in addition to the funds for computing equipment included in the Hurst Hall project. The Western State College Foundation has committed \$25,000 to fund start-up costs.

Careful program review and assessment of learning outcomes will be important to assure program quality. The program is to be applauded for the inclusion of a senior capstone course, which can be a particularly useful way of assessing what students have learned and their ability to apply that learning. A variety of other assessment methods also will be employed including survey of graduates and employers.

#### **IV. STAFF RECOMMENDATION**

**That the Commission approve the Trustees of The State Colleges in Colorado’s request for a Bachelor of Arts in Computer Information Science at Western State College.**

**Attachment A**

March 19, 2001

Dr. Sharon Samson  
Director of Academic Programs  
Colorado Commission on Higher Education  
1380 Lawrence St, Ste. 1200  
Denver, CO 80204-2059

Dear Dr. Samson:

Enclosed is the proposal for a Bachelor of Arts degree in Computer Information Science at Western State College. An electronic copy of the proposal and tables is also being transmitted to you by the State Colleges office. The Trustees of The State Colleges in Colorado approved this proposal at their March 16, 2001 meeting. The agenda write-up for the proposal and the minutes for the February and March meetings at which the proposal was discussed are also enclosed. These documents address the governing board review of the proposal.

This proposal has been developed utilizing the format outlined in the CCHE Policy Manual. The Office of State Colleges has been involved in the development and review of this proposal for the past several years. The approval of this program by the Trustees reflects their belief that Western State College will implement a Computer Information Science program that meets the quality standards of CCHE and similar programs at peer institutions. Their approval also indicates that appropriate assessment measures will be put in place to measure the effectiveness of the program and provide information for any needed changes and improvements.

We look forward to working with you and the Commission during this next phase of the review process. Please let me know if any additional information or clarification is necessary.

Very truly yours,

Lee A. Halgren  
Vice President for Academic and Student Affairs

cc: Jay Helman, Vice President for Academic Affairs, WSC

Attachments

**Excerpt from the February 9, 2001 Board of Trustees of the State Colleges Academic Affairs Committee Meeting Minutes**

**IX. APPROVAL OF A COMPUTER INFORMATION SCIENCE (B.A.) AT WESTERN STATE COLLEGE (WSC)**

Vice President Halgren indicated that this was the first reading for a proposal from Western State College for a new major program in Computer Information Science. He described the history of the proposal and the extensive work that has been done by WSC in getting this major to the proposal stage. He indicated that an external consultant had been utilized to review and suggest improvements to the proposal. Many of those have been incorporated in the current version. He also indicated that both Mesa State and Adams State have the potential to be involved in a collaborative fashion in future aspects relating to the proposal. Vice President Helman elaborated on some of the changes in the proposal since the Concept Paper approval in 1999. He highlighted how WSC was dealing with the issue of continuing faculty development for those teaching within the program. Professor Hyams of WSC gave a brief history of some of the significant changes in the proposal since the Concept Paper. Faculty Trustee Slauson indicated that this proposal had evolved significantly since when it was first introduced in 1999 and would likely meet the needs of WSC students. Trustee Mingilton pointed out the significant role that the WSC Foundation was playing in providing start-up funding for the program. He also questioned what enrollment level would necessitate the addition of more faculty. Vice President Helman indicated that this was addressed within the proposal. Trustee Rice moved that the proposal be accepted for first reading. The motion was seconded and approved. Action will occur at the March meeting.

**Excerpt from the March 16, 2001 Board of Trustees of the State Colleges Academic Affairs Committee Meeting Minutes**

**VI. APPROVAL OF A PROPOSAL FOR A NEW MAJOR IN COMPUTER INFORMATION SCIENCE (B.A.) AT WESTERN STATE COLLEGE (WSC)**

Trustee Rice moved that the Academic Affairs Committee approve the proposal for the Computer Information Science (B.A.) degree at Western State College (WSC) and forward it to the Board of Trustees for its review and possible approval. The motion was seconded. Vice President Halgren indicated that the technical review of the proposal had been accomplished with CCHE staff. The motion was approved.

**Attachment B**

**ENROLLMENT PROJECTIONS**

Name of Program: Bachelor of Arts in Computer Information Science

Institution: Western State College of Colorado

|     |                        | Yr1  | Yr2  | Yr3  | Yr4  | Yr5  | Full Implementation |
|-----|------------------------|------|------|------|------|------|---------------------|
| 1-a | In-State Headcount     | 18   | 37   | 51   | 62   | 68   | 72                  |
| 1-b | Out of State Headcount | 10   | 20   | 28   | 34   | 36   | 38                  |
| 2   | Headcount              | 28   | 57   | 79   | 96   | 104  | 110                 |
| 3-a | In-State FTE           | 16.4 | 33.4 | 46.3 | 56.0 | 60.8 | 64.2                |
| 3-b | Out of State FTE       | 8.8  | 18.0 | 25.0 | 30.2 | 32.7 | 34.6                |
| 4   | Program FTE            | 25.2 | 51.4 | 71.3 | 86.2 | 93.5 | 98.8                |
| 5   | Graduates              | 0    | 2    | 6    | 13   | 15   | 18                  |

Enrollment projections are based on the following assumptions:

- The average retention and graduation rates for Western State College (Freshman to Sophomore, 55%; Sophomore to Junior, 69%; Junior to Senior, 90%; and Senior to Graduation, 94%).
- 65% of the majors will be resident students (the current average for Western State College).
- In year one, 28 continuing students will enroll in the program; 18 will be freshmen, 7 will be sophomores, and 3 will be juniors. 10 of these will be students switching from existing computer-related emphases to the CIS major and the other 18 will be primarily students who had previously not declared a major. (This is a *very* conservative estimate. It is worth noting student surveys in computer science and business classes have indicated much higher interest on the Western campus.)
- Freshman entering the program will increase from 30 in year two to 41 in year five and will remain constant thereafter. This is the predicted impact of the CIS program on freshman recruitment.
- After year one, of the approximately 150 transfers that come to Western each year, 2 sophomores and 1 junior will transfer to the program from another school.

Note that as recruiting reaches full effect, freshman enrollment is expected to stabilize in year four with yearly graduation expected to stabilize in year seven.

It is anticipated that current majors with computer-related emphases will be impacted as continuing students adopt the new CIS major. The most popular of these emphases, the computer-science emphasis in mathematics, will likely see the largest reduction, an estimated 10 students in the first year. It is also anticipated that the CIS Information Systems emphasis will draw students from the Business program, but with over 400 students as declared majors in Business, this impact will be slight. With time, however, the CIS degree program will result in enhanced visibility of all computing-related, business, and accounting programs on campus and the increased recruitment of students interested in computer technology will positively affect these programs, particularly mathematics.

The projections were developed with the assistance of the College's Director of Institutional Research, and with the input of the faculty in Computer Science, Mathematics, Business, Accounting and Economics. This model does not depend on any institutional growth and only modest success in recruitment efforts, although we think that the Computer Information Science major will make Western more attractive to potential students and help improve institutional retention rates. We believe these estimates are conservative.

**Attachment C**

PROJECTED EXPENSE AND REVENUE ESTIMATES

| Estimated Amount in Dollars             |                  |                  |                  |                  |                  |
|---|------------------|------------------|------------------|------------------|------------------|
|   | Year 1           | Year 2           | Year 3           | Year 4           | Year 5           |
| <b>Operating Expenses</b>               |                  |                  |                  |                  |                  |
| 1 Faculty                               | \$141,362        | \$145,603        | \$149,971        | \$154,470        | \$159,105        |
| 2 Financial Aid Specific to the Program |                  |                  |                  |                  |                  |
| 3 Instructional Materials               | \$1,580          | \$6,393          | \$1,000          | \$1,000          | \$1,000          |
| 4 Program Administration                | \$6,632          | \$6,632          | \$6,632          | \$6,632          | \$6,632          |
| 5 Rent/Lease                            |                  |                  |                  |                  |                  |
| 6 Other Operating Costs                 | \$5,000          | \$5,000          | \$5,000          |                  |                  |
| 7 Total Operating Expenses              | \$154,574        | \$163,628        | \$162,603        | \$162,102        | \$166,736        |
| <b>Program Start-Up Expenses</b>        |                  |                  |                  |                  |                  |
| 8 Capital Construction                  |                  |                  |                  |                  |                  |
| 9 Equipment Acquisition                 | \$22,255         | \$13,598         |                  |                  |                  |
| 10 Library Acquisition                  | \$750            | \$1,200          | \$750            | \$750            | \$750            |
| 11 Total Program Start-Up Expenses      | \$23,005         | \$14,798         | \$750            | \$750            | \$750            |
| <b>TOTAL PROGRAM EXPENSES</b>           | <b>\$177,579</b> | <b>\$178,426</b> | <b>\$163,353</b> | <b>\$162,852</b> | <b>\$167,486</b> |
| <b>Enrollment Revenue</b>               |                  |                  |                  |                  |                  |
| 12 General Fund: State Support          | \$69,618         | \$141,783        | \$196,544        | \$237,720        | \$258,096        |
| 13 Cash Revenue: Tuition                | \$101,170        | \$203,900        | \$284,212        | \$345,226        | \$369,204        |
| 14 Cash Revenue: Fees                   |                  |                  |                  |                  |                  |
| <b>Other Revenue</b>                    |                  |                  |                  |                  |                  |
| 15 Federal Grants                       |                  |                  |                  |                  |                  |
| 16 Corporate Grants/Donations           |                  |                  |                  |                  |                  |
| 17 Other Fund Sources*                  | \$25,000         | \$0              | \$0              | \$0              | \$0              |
| 18 Institutional Reallocation*          |                  |                  |                  |                  |                  |
| <b>TOTAL PROGRAM REVENUE</b>            | <b>\$195,788</b> | <b>\$345,683</b> | <b>\$480,756</b> | <b>\$582,946</b> | <b>\$627,300</b> |

\*If revenues are projected in this line, please attach an explanation of the specific source of the funds. If reallocated, the specific departments and the impact the dollars will have on the departments that will provide the reallocated dollars.

(17) The Western State College Foundation has committed \$25,000 to fund start-up expenses.

There will be revenue growth from the increase in the number of students enrolled.

The line items in the table above were calculated using the following assumptions.

1. Faculty expenses include the average salaries and benefits for the current faculty members whose primary teaching responsibilities will be in CIS, multiplied by the FTE-F for those faculty members (2.375 FTE-F).
2. There is no financial aid specific to the program. Institutional work-study is awarded directly to the departments delivering this program.
3. Additional software will be needed in years one and two which will allow expanded instruction in operating systems and web applications.

4. CIS is administered as part of the Department of Computer Science, Mathematics, and Physics. The administration expenses on line four include a portion of the stipend for the department chair and a portion of the salary of the department administrative assistant, plus a small travel allowance for the department chair.
5. There will be no additional space needed beyond what is currently planned, and therefore no rental expenses.
6. Western is committed to affording CIS faculty the professional development opportunities necessary to deliver an outstanding curriculum. These funds will be available for travel and educational costs associated with training in both academic and industry settings.
7. Total Operating Expenses
8. With the completion of the Hurst Hall renovation in Spring 2001, there will be no additional space needed and therefore no capital construction expenses.
9. In year one, hardware is needed to equip the new networking laboratory in Hurst Hall. This includes servers, workstations, routers, cabling, and peripherals. Purchases in year two will provide expanded utility to the CIS teaching laboratory in Hurst Hall with the addition of a server, more workstations, and peripherals. The equipment acquisition budgeted here is in addition to \$81,498 of computing equipment provided by the Hurst Hall renovation capital construction project to be completed in Spring 2001. CIS equipment will be placed on a periodic replacement cycle, as is other computing hardware on campus. Upgrading of this equipment is anticipated in year six and thus is not reflected as an operating cost in this five-year expense table.
10. A modest increase in requests for library materials is anticipated above normal funding levels in year two.
11. Total Program Start-up Expenses
12. The general fund support was calculated using the in-state FTE, found in the enrollment table, times Western's per student support for the 00-01 academic year (\$4,245 per FTE).
13. Cash revenue was calculated from the in-state tuition (\$1,560) times resident student headcount plus non-resident tuition (\$7,309) times non-resident headcount. This is the tuition charged at Western for Academic Year 00-01.
14. There are no student fees associated with the program.
15. There are no federal grants used to start up or operate this program.
16. No private funds will be used to start up or operate this program.
17. The Western State College Foundation has committed \$25,000 to fund start-up expenses.
18. Institutional reallocations will not be needed.

**TOPIC: BACHELOR OF SCIENCE (B.S.) IN COMPUTER ENGINEERING AT  
COLORADO STATE UNIVERSITY**

**PREPARED BY: WILLIAM G. KUEPPER**

**I. SUMMARY**

The Board of Agriculture requests Commission approval of a Bachelor of Science (B.S.) in Computer Engineering at Colorado State University. Computer engineering addresses the broad area of the design, implementation, networking, application of computers, and components of networks. The degree grows out of and will replace the existing Computer Engineering concentration in Electrical Engineering. It is designed as a four-year program requiring 131 credits for graduation. If the Commission approves the degree, the program intends to admit its first students in fall 2001. The institution estimates that 45 students per year will graduate from the program at full implementation.

The Commission examines institutional mission, program duplication, the demand and need for the program, and quality issues such as the institution's ability to initiate and sustain the program. The factors that support the approval include (1) compatibility with the institution's statutory mission, i.e., CSU already has a broad range of engineering programs characteristic of a land-grant university, (2) the growing demand for engineers knowledgeable in the design, manufacture, and use of computers continues in Colorado, (3) the proposed curriculum is designed to meet the new engineering accreditation requirements; (4) the Electrical and Computer Engineering department in which the degree would be housed is a strong one with sufficient resources to implement the new degree, and (5) equipment grants from local firms are providing additional resources that are available to the program.

Several institutions, including CU-Boulder, CU-Denver, CU-Colorado Springs and the University of Denver, offer baccalaureate programs that are similar to the one being proposed. Commission staff believes that the proposed program will have relatively minor impact on the others because a significant number of the students who are projected to enroll are currently served by CSU under the Electrical Engineering B.S. degree.

Staff recommends approval of the B.S. in Computer Engineering at Colorado State University.

**II. BACKGROUND**

The concept paper for the proposed degree was on the Commission agenda at its meeting of November 4, 1999. The full proposal was approved by the State Board of Agriculture on November 29, 2000, and submitted to the Commission by the Board on December 7, 2000 (Attachment A). The background that follows is excerpted from materials submitted as part of CSU's proposal.

**Goals of the Program**

The proposed degree is designed to prepare students for careers in the rapidly expanding field of computer engineering. Students graduating with this qualification will be well prepared for employment in the high-tech and information technology companies along the front range including Hewlett-Packard, Storage-Tek, Celestica, Agilent, Lockheed Martin, Hughes, Sun Microsystems, and LSI Logic. Principle attributes of this new degree will be:

- o A strong emphasis on fundamentals of calculus, physics, electrical engineering, and computer science.

- A solid core of computer engineering courses together with a broad selection of technical electives.
- Close attention to the long-term needs of the computer industry in providing graduates well qualified to adapt to the 21st century high-tech workplace.
- Development of students with the critical skills needed to communicate in both written and oral form, to work effectively in team settings, and to be able to adapt and function in the rapidly changing international and multi-cultural work environment.
- Preparation of students qualified to enter M.S. and Ph.D. programs in the computer engineering field.

CSU's Department of Electrical Engineering (EE) has offered undergraduate computer engineering since 1986 when it introduced a concentration in computer engineering. The concentration shares a common freshman year curriculum with the other concentrations within the Department, but more strongly emphasizes computer-based courses in the final three years of the program. The popularity of this concentration has grown significantly in recent years with being 13%, 23%, 28%, 35%, and 40% of the graduating seniors in electrical engineering enrolled in the concentration.

This increase in interest is reflective of the demand in industry for graduates with strong computer knowledge. Surveys of existing employment demands and projections of future demand rank computer engineering and computer science as very strong employment areas.

The request to offer this degree is driven by the institution's desire to strengthen its computer engineering curriculum and increase the visibility of the computer engineering program. The stand-alone degree would offer a more concentrated exposure of students to the skills and knowledge required of graduates entering the computer industry workforce. For example, Hewlett-Packard's Fort Collins workstation division is primarily, although not exclusively, interested in hiring computer engineering graduates.

#### **Program Design**

The proposed curriculum (see Attachment B for the entire course listing) covers the multiple facets of the broad field of computer engineering. The curriculum is intended to provide the optimal educational experience as well as to meet the requirements for accreditation under the new Accreditation Board for Engineering and Technology (ABET) EC 2000 criteria.

The graduation requirements total 131 credit hours, which means that a full-time student will be able to complete the program in four years. Communications, both oral and written, and team skills are included throughout the curriculum. Starting in the freshman year, students are introduced to the critical importance of developing these skills in preparation for functioning in the industrial work place. This is followed in the second semester of the freshman year by a heavy emphasis on writing in the laboratory section of EE 102. This continues in subsequent years of the curriculum culminating in the capstone design sequence in the senior year where all students write two full length technical reports and make two oral presentations in front of their peers. The technical electives in the senior year must be chosen from a list of approved ECE

and CS courses (Appendix B). These electives are designed to allow the student to somewhat customize the degree within the context of computer engineering.

### **Admission, Transfer, and Graduation Standards**

Students admitted to the BS degree program in Computer Engineering will be required to meet the general admission requirements of Colorado State University as well as the specific requirements of the College of Engineering. If this proposal is approved, students already enrolled in the computer engineering concentration will be given the option of either continuing to graduation with an EE degree in the concentration or transitioning into the new computer engineering degree program. The computer engineering concentration offered under the Electrical Engineering degree will no longer be offered.

### **Impact on Other Programs**

Since this degree is being developed from an existing concentration, its approval and implementation will not initially create any significant impact on existing resources or other programs at Colorado State. If enrollments grow as anticipated, however, this degree will eventually place increasing demands on internal resources including faculty, and equipment such as workstations. To accommodate the projected growth, two new faculty slots will need to be assigned to the department within the first 3 years of the program. The other academic unit that will be most impacted is Computer Science. That department has expressed support for the new degree and does not believe it will adversely impact the CS program.

Four other institutions in Colorado currently offer programs in computer engineering: the University of Denver, and three campuses of the University of Colorado---Boulder, Colorado Springs, and Denver. At other institutions, both Denver University and CU-Colorado Springs offer programs in computer engineering stand-alone degrees in Computer Engineering. In addition, CU-Boulder and CU-Denver offer combined degrees in Electrical and Computer Engineering, and Computer Science and Engineering respectively. CSU believes that the proposed degree, evolving as it does out of an existing track, will have negligible impact on program enrollments at these other institutions. CSU contends that prospective students will likely continue to make selections based on such factors as location, reputation of the school, costs, scholarships awarded, and size and focus of the program in which they wish to major.

### **Enrollment Projections**

Since 1986, the department has offered a Computer engineering concentration within its EE degree program so has the enrollment history on which to base its projections for the proposed degree. Despite decreasing enrollments in electrical engineering at CSU through the mid-nineties, the number of graduates in the computer engineering track had risen from 7 in 1995 to 17 in 1998. As of fall 1997 the overall enrollment decline in the department was turning around with an increased enrollment in its freshman class. Subsequent years have seen larger increases in freshman enrollments. Projected enrollment increases are based on both the increasing proportion of Electrical and Computer Engineering students pursuing the Computer Engineering track, as well as the likelihood of increasing enrollments overall in the department. The projections are shown in Attachment C.

## **III. STAFF ANALYSIS**

In its analysis of concept papers and program proposals, Commission staff consider role and mission, program duplication, program need and demand, and quality issues such as

curriculum design and resources available. Concept papers and full proposals are submitted to the other governing boards for peer review.

### **Role and Mission and Program Duplication**

Commission staff sees no role and mission issues with the proposed degree. If approved, it would be added to the comprehensive program offerings of CSU's engineering school.

In the matter of program duplication, as noted above, four other institutions in Colorado (three public and one private) offer baccalaureate programs in the field of computer engineering. The University of Denver and the University of Colorado at Colorado Springs offer stand-alone degree programs in computer engineering. UC-Boulder offers a combined degree called Electrical and Computer Engineering, while UC-Denver's degree is in Computer Science and Engineering.

Commission staff does not believe the presence of these programs presents unnecessary duplication in a field where demand is great. It is useful moreover, to point out that some differences do exist between programs. Computer engineering can be viewed as falling between computer science and electrical engineering. On this continuum, for example, the program most recently approved by the Commission, the program at Colorado Springs, is closer in its curriculum to computer science, while the proposed one at CSU is closer to electrical engineering. This is demonstrated by the heavier CSU curricular emphasis on such topics as systems, electromagnetics, electronics, and circuits.

### **Program Demand and Need**

It is not unusual for a new degree to evolve from a track in an existing degree program. This process is a logical way to see if an appropriate demand exists for a new degree, as well as to begin to assemble the necessary faculty resources to offer it. Commission staff believes that the most compelling evidence of the interest in, or demand for, the program are the increasing enrollments at CSU in the existing Computer engineering track. Given those enrollments, there is little doubt that the new program would be viable.

To further encourage enrollment in the program, and to provide the greatest access to it, Commission staff recommends that the Department of Electrical and Computer Engineering work with the appropriate two-year institutions to establish the necessary articulation agreements.

### **Program Quality and Resources**

The Commission staff depends substantially on the governing board in the matter of program quality, the cost effectiveness of the program, and the institution's ability to implement and sustain the program. The Board of Agriculture has analyzed the quality, cost effectiveness and ability to deliver the proposed degree program as designed.

All engineering curricula are undergoing reevaluation and possible modification in light of the new engineering accreditation criteria (EC 2000). The curriculum designed for the proposed program is designed to meet the requirements of EC 2000 and hence positions us for early program accreditation. Accreditation will be sought as soon as the program becomes eligible by graduating its first students. All Colorado State University undergraduate engineering degrees are currently accredited by ABET.

Two factors contribute to the potential cost effectiveness of the program. First, its students will share a first year curriculum with other students in the Department of Electrical and Computer Engineering. The department currently offers one undergraduate degree, the BSEE, which includes concentrations in electrical, computer, and optoelectronic engineering. All three concentrations share a common freshman year curriculum. Computer Engineering will follow the same curriculum model if it is approved as a self-standing degree. Secondly, the proposed program is evolving out of an existing track. Thus, a substantial part of the curriculum and resources are already in place.

At present there is no intention to limit enrollments in this proposed degree program. If the popularity of Computer Engineering continues to increase at the present rate, however, the College of Engineering and the university will eventually need to reexamine priorities and its physical resources to serve this number of students.

### **Assessment**

The institution reports that assessment is a large part of the EC 2000 accreditation process which is typical of both regional and program accreditation. The department plans to implement the same assessment processes for this degree as employed in the existing electrical engineering program. This assessment of learning outcomes includes:

- Exit interviews with graduating seniors.
- Graduating seniors assessment questionnaires.
- Job placement results for program graduates.
- Satisfaction surveys of graduates 1 year and 3 years after graduation.
- Employer satisfaction surveys.

The external program review through accreditation, the internal review in the university's regular program review processes, and the specific assessment procedures planned for the program create a solid combination of methods to help maintain program quality and to assure that students are achieving the desired learning outcomes. Commission staff suggests that the capstone courses also be employed as part of the assessment process.

## **IV. STAFF RECOMMENDATION**

**That the Commission approve the State Board of Agriculture's request to offer a Bachelor of Science degree in Computer Engineering at Colorado State University.**

**Attachment A**

110 Sixteenth Street, Suite 640  
Denver, CO 80202  
Telephone: (303) 534-6920  
Fax: (303) 534-6298

December 7, 2000

Dr. Sharon Samson  
Senior Academic Officer  
Colorado Commission of Higher Education  
1380 Lawrence Street, Suite 1200  
Denver, CO 80204-2059

Dear Dr. Samson:

This is to certify that at its regular meeting on November 29, 2000, the State Board of Agriculture approved CSU Agenda Item 1-5: New Degree Program: B.S. in Computer Engineering, Department of Electrical and Computer Engineering, the College of Engineering. In approving the proposal the Board agreed that the degree program to be offered by the Department of Electrical Engineering would provide a quality education experience. The Department has long been recognized as outstanding in Colorado and the U.S. Evidence of that recognition is contained in support letters attached to the proposal, such as the one from TRW indicating that CSU is one of eight strong engineering programs from which that company actively recruits graduates. The Board also recognized that CSU has the capacity to offer a quality program efficiently, as demonstrated by tables showing the amount of internal reallocations the University will devote to financial support and by evidence that the program is completable in four years. The Board also is aware the potential economic impact of the program is substantial and that the proposal is based on defined need. Evidence of the economic impact and need for the program is highlighted in the executive summary.

In compliance with CCHE policy, the agenda item is being forwarded for CCHE approval. The agenda item as approved by the Board with Board certifications is attached. An electronic version of the degree program proposal and one copy of the proposal is enclosed, as required.

If you require additional information, please contact Dave Clark at (303) 534-6290.

Sincerely,

Albert C. Yates  
Secretary/Treasurer

cc: Bill Kuepper  
Dave Clark  
Beverly Michoski  
Loren Crabtree  
Derek Lile

bm  
Attachments

Colorado State University  
SBA Meeting - November 29, 2000

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Approved

MATTERS FOR ACTION:

New Degree Program: B.S. in Computer Engineering - Department of Electrical and Computer Engineering - The College of Engineering

RECOMMENDED ACTION:

MOVED, that the State Board of Agriculture approve the request from the Department of Electrical and Computer Engineering to add the new degree program B.S. in Computer Engineering.

EXPLANATION:

Presented by Loren W. Crabtree, Provost/Academic Vice President.

The Department of Electrical and Computer Engineering is requesting a new B.S. degree program in Computer Engineering because the computer engineering concentration has increased significantly to the point where 40 percent of the graduating seniors in 1999 were in the computer engineering concentration. Also, the employment opportunities in computer engineering and computer science are projected to grow as technology and knowledge expand in the private sector. The new degree will allow the department to offer a more concentrated exposure of the skills and knowledge sets required of graduates entering the computer industry work force. The major also will enhance Colorado State University's visibility as a leader in information technology education and will attract quality students and faculty to the institution.

**Attachment B**

**Curriculum for the Proposed Computer engineering Degree Program**

**COMPUTER ENGINEERING DEGREE  
STANDARD SCHEDULE OF COURSE WORK**

| <b>Fall Semester</b>                                    |                | <b>Spring Semester</b>   |                |
|---|----------------|--|----------------|
| <b><u>Freshman Year</u></b>                             |                | <b><u>Freshman Year</u></b>                                    |                |
|   | <b>Credits</b> |  | <b>Credits</b> |
| COCC150 College Composition                             | 3              | EE102 Digital Circuit Logic                                    | 4              |
| CSCC153 Java Programming                                | 4              | MCC161 Calculus for Physical<br>Scientists II                  | 4              |
| EECC192 Elec Engr Fundamentals                          | 3              | PHCC141 Physics for Scientists<br>and Engineers I              | 5              |
| M CC160 Calculus for Physical<br>Scientists I           | 4              | SPCC200 Speech   | 3              |
| Univ Core (Health & Wellness)                           | 2              |  |                |
|   | 16             |  | 16             |
| <b><u>Sophomore Year</u></b>                            |                | <b><u>Sophomore Year</u></b>                                   |                |
| Computer Eng. Elective                                  | 4              | CS200 Algorithms & Data Structures                             | 4              |
| EE201 Circuit Theory                                    | 3              | EE202 Circuit Theory Application                               | 4              |
| M 261 Calculus for Physical<br>Scientists III           | 4              | EE251 Introduction to Microprocessors                          | 4              |
| PHCC142 Physics for Scientists<br>and Engineers         | 5              | M 340 Intro to Ordinary Differential<br>Equations<br><b>or</b> |                |
|   | 16             | M 345 Differential Equations *                                 | 4              |
|   |                |  | 16             |
| <b><u>Junior Year</u></b>                               |                | <b><u>Junior Year</u></b>                                      |                |
| (CO150 must be passed before the Junior Year)           |                |  |                |
| EE311 Linear Systems Analysis I                         | 3              | CS370 System Architecture                                      | 4              |
| EE331 Electronics Principles I                          | 4              | ECCC202 Microeconomics   | 3              |
| EE343 Electrodynamics                                   | 4              | EE312 Linear Systems Analysis II                               | 3              |
| EE450 Digital Systems Design Lab                        | 1              | EE332 Electronics Principles II                                | 4              |
| EE451 Digital Systems Design                            | 3              | EE452 Computer Architecture                                    | 3              |
| Univ Core (Historical Perspectives)                     | 3              |  |                |
|   | 18             |  | 17             |
| <b><u>Senior Year</u></b>                               |                | <b><u>Senior Year</u></b>                                      |                |
| (EE312 and 332 must be completed before starting EE401) |                |  |                |
| EE/ST303 Intro to Communications<br>Principles          | 3              | EE402 Senior Design Project II                                 | 3              |
| EE401 Senior Design Project I                           | 3              | EE456 Computer Networking                                      | 4              |
| Technical Electives in Computers**                      | 4              | Technical Electives in Computers**                             | 6              |
| Univ Core (Arts & Humanities)                           | 3              | Univ Core (Global & Cultural Awareness)                        | 3              |
| University Core (Public Values)                         | 3              |  |                |
|   | 16             |  | 16             |

**Grand Total: 131 Credits**

Prepared by the Undergraduate Curriculum Committee; approved by the ECE faculty.

\*Students taking M 345 **MUST** take the prerequisite, M 229.

\*\*At least 6 of the 10 credits in computer electives must be ECE courses.

**SOPHOMORE COMPUTER ENGINEERING ELECTIVES**

Computer Engineering Electives

|                               |   |   |
|-------------------------------|---|---|
| C 111 - Chemistry             | M 166 - Discrete Structures               | ME 237 - Thermo Dynamics                |
|                               | 229 - Linear Equations                    |   |
| CS253 - Computer Prog Lang    | 366 - Abstract Algebra                    |   |
| 301 - Found. Comp Science     | 419 - Complex Variables                   | PH 314 - Modern Physics                 |
| 314 - Software Devel. Methods | 470 - Euclidean & Non-Euclid.<br>Geometry | 341 - Mechanics<br>353 - Optics & Waves |

**SENIOR TECHNICAL ELECTIVES**

10 credits in Computers. A minimum of 6 credits must be in EE courses.

Computers

EE453 Digital Systems Testing I  
EE454 Database Computers  
EE472 MOS Integrated Circuits  
EE550 Microprocessors Based Systems  
EE553 Digital Systems Testing II  
EE554 Computer Architecture  
EE557 Digital Optical Computing  
EE571 VLSI System Design

CS410 Introduction-Computer Graphics  
CS440 Introduction to Artificial Intelligence  
CS451 Operating Systems  
CS457 Data Communications  
CS510 Computer Graphics  
CS551 Principles-Operating Systems  
CS557 Distributed Systems

## **Attachment C**

### **Year 1 Assumptions**

At present we have ~ 320 students in the Department with approximately 40% (~128 students) in the computer engineering concentration. This year's 30% growth in the freshman class corresponds to ~26 students, which, assuming a 50% retention rate, will translate into at least an additional 13 students in the program each of the next two years even with no further growth in admitted students. Assuming year 1 for this new degree to be 2002 this means we will have ~346 students overall with potentially 138 in Computer engineering on its introduction even if the percentage enrolled in computer engineering grows no further and we see no further growth in freshman enrollments. We base Table 1 on these very conservative assumptions. In all likelihood, the freshman class will continue to grow beyond the present level and freshman enrollments will increase.

We will assume 80% of students presently in the Computer engineering concentration will elect to transfer into the degree and that the other 20% will linearly reduce to zero over the next 3 years due to graduation. We are also assuming that all students will be pursuing the degree on a full time basis and will complete the program in 4 years. Based on 131 credits for graduation this translates to an average of 32.75 credits/year.

Graduation rates are based on present data for the EE program which indicates that ~20% of students enrolled in the degree graduate in any given year. We also are assuming that 20% of the students will be out of state.

### **Subsequent Years**

For the remainder of the Table we assumed a modest 10% growth/year with a full implementation estimate, consistent with the Department's 5-year goal, of a total of 450 students in the program [Electrical plus Computer Engineering]. We conservatively estimate that at full implementation 50% of our majors will be in the Computer engineering degree program.

## ENROLLMENT PROJECTIONS

Name of Program: Computer Engineering

Name of Institution: Colorado State University

### DEFINITIONS:

Academic year is the period beginning July 1 and concluding June 30.

Headcount projections represent an unduplicated count of those students officially admitted to the program and enrolled at the institution during the academic year.

FTE is defined as the full-time equivalent number of those students majoring in the program, regardless of the classes enrolled during the academic year.

Program graduate is defined as a student who finishes all academic program requirements and graduates with a formal award within a particular academic year.

### SPECIAL NOTES:

To calculate the annual headcount enrollment, add new enrollees to the previous year headcount and subtract the number who graduated in the preceding year. Adjust by the anticipated attrition rate.

To calculate the FTE, multiply the number of students times the projected number of credit hours students will be typically enrolled in per year and divide by 30.

The data in each column is the annual **unduplicated** number of declared program majors. Since this table documents program demand, course enrollments are not relevant and shall not be included in the headcount or FTE data.

|     |                        | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Full Implementation |
|-----|------------------------|--------|--------|--------|--------|--------|---------------------|
| 1-a | In-state Headcount     | 88     | 106    | 126    | 148    | 162    | 180                 |
| 1-b | Out-of-state Headcount | 22     | 27     | 32     | 36     | 40     | 45                  |
| 2   | Program Headcount      | 110    | 133    | 158    | 184    | 202    | 225                 |
| 3-a | In-state FTE           | 96     | 116    | 138    | 162    | 177    | 197                 |
| 3-b | Out-of-state FTE       | 24     | 29     | 35     | 39     | 44     | 49                  |
| 4   | Program FTE            | 120    | 145    | 173    | 201    | 221    | 246                 |
| 5   | Program Graduates      | 22     | 27     | 32     | 37     | 40     | 45                  |

Attach a brief description explaining the specific source data for projecting the program headcount (e.g., actual enrollment in a similar program at a comparable college).

**Attachment D**

**PROJECTED EXPENSE AND REVENUE ESTIMATES:**

Line 1. For year 1 we use a figure of 16 ECE courses needing to be taught to deliver the Computer engineering degree with four courses being taught by each faculty. In years 2 and 3 we are assuming the addition of one additional faculty each year, consistent with the discussion in section VIII of the proposal. The average 9 month faculty cost (salary plus fringe) is \$96,920.

Line 4. We have prorated our administrative costs over all our degree programs [2 B.S., 3 Masters, 1 Ph.D.]

Line 6. We have prorated our typical 9 TA's over all our degree programs [2 B.S., 3 Masters, 1 Ph.D.]

Line 12. Calculated from in-state FTE student count times \$5,067 (1997/98 figure).

Line 13. Calculated from full time in-state tuition of \$2,340 and \$10,026 for non-resident students (1998/99 figures).

Line 14. Calculated based on the College of Engineering Technology Fee of \$134/semester.

Line 16. We are assuming an average annual industrial equipment donation of \$500K and taking 50% of the amount based on ~half of our students being in the Computer engineering degree.

Line 18. All reallocations will occur initially from within the Department of Electrical and Computer Engineering.

**PROJECTED EXPENSE AND REVENUE ESTIMATES:**

This table documents what the program will cost and how the institution plans to cover the costs.

All cost and revenue projections should be in constant dollars (do not include an inflation factor).

|                                  |                                    | <b>ESTIMATED AMOUNT in DOLLARS</b> |                    |                    |                    |                    |
|----------------------------------|------------------------------------|------------------------------------|--------------------|--------------------|--------------------|--------------------|
|                                  |                                    | <b>Year 1</b>                      | <b>Year 2</b>      | <b>Year 3</b>      | <b>Year 4</b>      | <b>Year 5</b>      |
| <b>Operating Expenses:</b>       |                                    |                                    |                    |                    |                    |                    |
| 1                                | Faculty                            | \$387,680                          | \$484,600          | \$581,520          | \$581,520          | \$581,520          |
| 2                                | Financial Aid specific to program  | \$0                                | \$0                | \$0                | \$0                | \$0                |
| 3                                | Instructional Materials            | \$25,000                           | \$25,000           | \$25,000           | \$25,000           | \$25,000           |
| 4                                | Program Administration             | \$63,000                           | \$63,000           | \$63,000           | \$63,000           | \$63,000           |
| 5                                | Rent/Lease                         | \$0                                | \$0                | \$0                | \$0                | \$0                |
| 6                                | Other Operating Cost               | \$0                                | \$0                | \$0                | \$0                | \$0                |
| 7                                | <b>Total Operating Expenses</b>    | <b>\$475,680</b>                   | <b>\$572,600</b>   | <b>\$669,520</b>   | <b>\$669,520</b>   | <b>\$669,520</b>   |
| <b>Program Start-Up Expenses</b> |                                    |                                    |                    |                    |                    |                    |
| 8                                | Capital Construction               | \$0                                | \$0                | \$0                | \$0                | \$0                |
| 9                                | Equipment Acquisitions             | \$0                                | \$0                | \$0                | \$0                | \$0                |
| 10                               | Library Acquisitions               | \$0                                | \$0                | \$0                | \$0                | \$0                |
| 11                               | <b>Total Program Start-Up Exp.</b> | <b>\$0</b>                         | <b>\$0</b>         | <b>\$0</b>         | <b>\$0</b>         | <b>\$0</b>         |
| <b>TOTAL PROGRAM EXPENSES</b>    |                                    | <b>\$475,680</b>                   | <b>\$572,600</b>   | <b>\$669,520</b>   | <b>\$669,520</b>   | <b>\$669,520</b>   |
| <b>Enrollment Revenue</b>        |                                    |                                    |                    |                    |                    |                    |
| 12                               | General Fund: State Support        | \$486,432                          | \$587,772          | \$699,246          | \$820,854          | \$896,859          |
| 13                               | Cash Revenue: Tuition              | \$426,492                          | \$518,742          | \$615,672          | \$707,256          | \$780,120          |
| 14                               | Cash Revenue: Fees                 | \$29,480                           | \$35,644           | \$42,344           | \$49,312           | \$54,136           |
| <b>Other Revenue</b>             |                                    |                                    |                    |                    |                    |                    |
| 15                               | Federal Grants                     | \$0                                | \$0                | \$0                | \$0                | \$0                |
| 16                               | Corporate Grants/Donations         | \$250,000                          | \$250,000          | \$250,000          | \$250,000          | \$250,000          |
| 17                               | Other fund sources*                | \$0                                | \$0                | \$0                | \$0                | \$0                |
| 18                               | Institutional Reallocation*        | \$0                                | \$0                | \$0                | \$0                | \$0                |
| <b>TOTAL PROGRAM REVENUE</b>     |                                    | <b>\$1,195,404</b>                 | <b>\$1,392,158</b> | <b>\$1,607,262</b> | <b>\$1,827,422</b> | <b>\$1,981,115</b> |

\*If revenues are projected in this line, please attach an explanation of the specific source of the funds. If reallocated, the specific departments and the impact the dollars will have on the departments that will provide the reallocated dollars.

June 7, 2001

Consent

**TOPIC:**

**BACHELOR OF SCIENCE IN LIBERAL STUDIES AT THE UNIVERSITY  
SOUTHERN COLORADO**

**PREPARED BY: JOANN EVANS AND WILLIAM G. KUEPPER**

**I. SUMMARY**

The State Board of Agriculture requests approval of a Bachelor of Science (B.S.) degree in Liberal Studies at the University of Southern Colorado. The proposed degree is designed to meet Colorado's new standards for elementary licensure, requires 120 credits, and can be completed in four years. It will be the only USC program leading to licensure in elementary education. The curriculum design requires 38 credits of general education, 39 credits in a liberal studies core, and 40 credits in elementary education.

The proposed degree program supports USC's mission to "emphasize career-oriented, technological and applied programs, while maintaining strong programs in the liberal arts." It is designed to take advantage of the resources available at the institution and is responsive to the needs of Southern Colorado in teacher education.

The Commission approved the teacher education licensure component at its meeting of May 3, 2001, pending Commission approval of the degree program. Commission staff recommend approval of the Bachelor of Science in Liberal Studies at the University of Southern Colorado for students pursuing elementary education.

**II. BACKGROUND**

The concept paper for the proposed program was on the Commission agenda at its meeting of March 1, 2001. The full proposal was approved by the Board of Agriculture on May 1, 2001, and subsequently submitted to the Commission. The description of the program in this section is excerpted from the material submitted by the university.

**Program goals**

The Liberal Studies major is designed to address the needs of elementary education preservice teachers. Students completing this program will acquire a foundation of knowledge in the liberal arts, a deep understanding in an area of concentration, and the skills to apply strong content knowledge to design curriculum and instruction for elementary students.

At USC, teacher education is a campus wide responsibility, and overall program goals reflect components both the Liberal Studies major and Elementary Education minor. Four program goals have been established for the Liberal Studies degree:

1. Acquisition of Knowledge. Graduates are broadly educated in the liberal arts and sciences.
2. Construction of Knowledge. Graduates demonstrate habits of thinking, including analytical independent thinking, reasoned judgment, mature values, and imagination.
3. Communication of Knowledge. Graduates communicate effectively in writing, speaking, and in the use of technology for communicating.
4. Application of Knowledge. Graduates create standards-based learning experiences that make knowledge accessible, exciting, and meaningful for all students.

### **Relationship of Program to Institutional Role and Mission**

The Liberal Studies program both provides a liberal arts component and addresses the need for quality elementary teachers, the program is seen as supporting the institutional mission:

- 1) to emphasize career-oriented, technological and applied programs, while maintaining strong programs in the liberal arts;
- 2) to engage in basic and applied research for the benefit of society; and
- 3) to function as the major education resource for cultural, industrial, and economic growth throughout the southeastern Colorado region.

USC has a long tradition of collaboration with K-12 schools and has provided leadership in educational reform in the region. Southeastern Colorado, like the rest of the state, is experiencing teacher shortages and is predicting ever greater needs in the near future. To meet the third element of its mission, USC must be sensitive to K-6 needs for well-qualified classroom teachers.

### **Program Design**

The proposed Liberal Studies degree will allow students to complete their program in 120 hours. The curriculum (see Attachment 1) is aligned with the following documents: *Colorado Model Content Standards (K-6)*, *Rules for the Administration of the Educator Licensing Act of 1991 (Section 8.01)*, *Senate Bill 99-154*, and the *Performance-Based Standards for Colorado Teachers*. In addition, the national professional standards for teachers of the National Council of Teachers of Mathematics, International Reading Association, National Association for the Education of Young Children, and the Interstate New Teacher Assessment and Support Consortium (INTASC) Core Standards were consulted in formulating the curriculum.

The Liberal Studies program has three components:

#### General Education (38 hours)

The General Education courses form the foundation of knowledge for all students with this major. These courses fulfill USC graduation requirements and provide the breadth of knowledge needed by elementary teachers. The general education core includes courses in the arts and humanities, English, math, sciences, and social sciences.

#### Liberal Studies Core (39 hours)

Liberal Studies Core requirements are intended to build upon students' experiences in General Education providing both depth to the student. K-12 content standards were central to the specific courses selected. Two new courses have been designed for the core, an interdisciplinary course in the Science block and an upper division composition, rhetoric, and grammar course in the English block.

### Elementary Education or Disciplinary Minor (Elementary Education – 43 hours)

All students are required to complete a “minor” of forty credits in Elementary Education or in a discipline. The Elementary Education minor, which has been developed to coordinate with the Liberal Studies major detailed below. Detail on the curriculum is included in Attachment B.

#### **Demand and Need for the Program**

The Liberal Studies program is designed to meet the needs of Elementary Education Students and has been developed to meet all mandates of *SB 99-154* and the *Performance-Based Standards for Colorado Teachers*. During 1999-2000, 182 students were admitted and taking classes in elementary teacher education at USC; most of these students were juniors and seniors. Projected numbers for the future indicate that within five years, approximately 218 students would be enrolled in the elementary education program.

Southeastern Colorado is experiencing a need for new teachers especially in rural areas, which is projected to grow in the near future. USC produces about 100 teachers a year. The Liberal Studies, if approved, would be the only program at that institution preparing elementary teachers.

### **III. STAFF ANALYSIS**

#### **Analysis of the Degree Program**

In reviewing the concept paper and the program proposal, the Commission staff considered the role and mission, program duplication, program need and demand, resources, and quality issues, including the curriculum.

The concept paper and the full proposal were shared with the other governing boards for peer review.

#### **Role and Mission and Program Duplication**

The University of Southern Colorado is defined in statute as a general baccalaureate and polytechnic institution offering a limited number of professional and engineering technology programs, education programs, and traditional liberal arts and sciences. Four other Colorado public institutions (Adams State College, University of Northern Colorado, Ft. Lewis College, and Western State College) offer a similar liberal arts program.

Because of the need for elementary teachers, and because of USC's role in providing elementary teacher education in southern Colorado, a Liberal Studies program at that institution does not create unnecessary duplication.

#### **Program Need and Demand**

The proposal notes that southeastern Colorado, like the rest of the state, is experiencing teacher shortages. USC graduates make up over sixty percent of the current teachers in local schools in Pueblo County and USC has a long tradition of collaboration with K-12 schools to provide leadership in educational reform in the region.

The proposed degree program replaces the fifteen degree programs that students formerly have used for elementary education licensure.

If the program is approved at this meeting, it will be implemented in fall 2001 at which time the institution expects the program to enroll 177 students.

At full implementation enrollment is projected to reach 218 students and produce 60 graduates per year. The enrollment projections provided by the institution (Attachment C) appear realistic, given the previous enrollment history.

The proposed program will be the only one leading to elementary education licensure at USC and it is replacing, for that purpose, fifteen degree programs that have been used for elementary education licensure.

#### **Program Quality and Resources**

Commission staff relies on the governing board for assurances of program quality, the cost effectiveness of

the program, and the institution's ability to implement and sustain it. The governing board has provided assurances that these matters were considered when the board approved the degree proposal (Attachment A).

This program was developed to meet the teacher education performance standards through a liberal education. The entire program is new and not merely a reconfiguration of an existing program.

USC designed the proposed Liberal Studies degree program to address the content requirements for elementary education candidates.

Commission staff have identified three characteristics of this program which are particularly strong. First, the program has been designed specifically around the six statutory performance standards. Second, the broadly based curriculum, illustrated in Table 1 meets the full range of elementary education content standards. Third, the program has exemplary technology integrated into the curriculum. USC has received several grants to develop and support the technology utilized in this program as well as numerous other programs at the institution.

**TABLE I**

| <b>Minimum Number<br/>of Credits<br/>Required</b> | <b>Major and<br/>Elementary<br/>Teaching License</b> |
|---|--|
| GENERAL EDUCATION                                 |  |
| Math  | 3  |
| Language arts                                     | 9  |
| Humanities  | 6  |
| Social Science                                    | 9  |
| Science & Technology                              | 8  |
| Computer Technology                               | 3  |
| General Ed TOTAL                                  | 38   |
| Major   |  |
| Math  | 9  |
| Science   | 10   |
| Social studies                                    | 12   |
| Language arts                                     | 8  |
| MAJOR TOTAL                                       | 39   |
| Teacher licensure                                 | 43   |
|   | TOTAL: 120   |

No additional faculty are required to support the proposed program, although curricular changes resulting from its implementation will result in some faculty reassignments. Three new courses have been proposed for the major: ENG 303, CHEM 150/PHYS 150, and an integrated science course required in the 12-hour science concentration.

Development of these courses is being funded by faculty development resources available through USC's Title II grant.

The institution has provided assurances that no additional equipment or facilities resources are required to implement the Liberal Studies program.

Projected revenues more than meet the projected program expenses. No reallocation from other units within the institution will be necessary (Attachment D).

**Teacher Education Licensure Authorization**

When a degree program requests teacher authorization, the program review analyzes content, field experience, and assessment.

The May 2001 Commission agenda contains the full analysis of the three factors. The site review recommended Commission approval of the authorization for elementary education. The material is summarized briefly in this agenda item.

**Field Experience**

Interviews with faculty and administrators from partner and professional development schools indicated that a significant training effort has been made in the K-12 partner schools to assure consistent supervision of teacher candidates in the field, teacher work sample development and CDE performance-measures for teachers.

USC elementary teacher candidates spend 880 hours in the field, including 590 hours of student teaching and 80 hours of Literacy and Language Arts in the semester prior to student teaching

## **Program Assessment**

The curriculum of the proposed program addresses the assessment of student content mastery. The assessment is student-centered and, although still in pilot testing, demonstrates the commitment of the institution to a performance-based program.

Student evaluations will occur at three “check points” (admission to education, admission to student teaching, and program completion), as well as follow-up assessments at the end of one and three years after completion. Student outcomes will be evaluated through: a) formal assessments at the sophomore (e.g., *Academic Profile*) and senior levels (*PLACE Elementary Education Exam*), b) faculty recommendations of student progress, c) portfolio assessment, and d) assessment of the application of knowledge in students’ field experiences and student teaching. The contents of the electronic portfolio required of all students will include representative work from courses, as well as student-directed evaluations of progress. Students will be required to complete a major curriculum project based on the goals of their concentration area during the senior year of study.

The Teacher Education Board, consisting of faculty from each Liberal Studies discipline, will have responsibility for evaluation.

This group will evaluate student portfolios, and the Associate Dean for Education will assume responsibility for gathering program evaluation information on a semester basis and reporting to the Board. In addition, USC is establishing a formal interdisciplinary review process for all programs in teacher education based on a successful model at Auburn University. The Liberal Studies major will be reviewed through this process.

## **The areas that need development**

CCHE staff encourages the institution to continue its development of assessment practices and incorporate assessment results. The PLACE pass rates will be critical performance indicators of the new program design. A recent change in leadership means that USC has a new Provost. To implement the new integrated program design, USC will need the full support of the institution for its students to master content knowledge and apply it in the K-12 classroom.

## **IV. STAFF RECOMMENDATION**

**That the Commission approve the State Board of Agriculture request to offer a Bachelor of Science (B.S.) in Liberal Studies at the University of Southern Colorado for students pursuing elementary education.**

**Attachment A - Letter of Transmittal**

**Attachment B - Content**

**Attachment C - Enrollment**

**Attachment D - Revenue**

110 Sixteenth Street, Suite 640  
Denver, CO 80202  
Telephone: (303) 534-6290  
Fax: (303) 534-6298  
May 4, 2001

Dr. Sharon Samson  
Director of Academic and Student Affairs  
Colorado Commission on Higher Education  
1380 Lawrence Street, Suite 1200  
Denver, CO 80204-2059

Dear Dr. Samson:

At its regular meeting on May 1, 2001, the State Board of Agriculture approved USC Agenda Item 1-4: Proposal to Offer Bachelor of Science in Liberal Studies. I am pleased to submit the agenda item and one full copy of the University of Southern Colorado's proposal for a B.S. in Liberal Studies. The Board was assured, through its examination of the agenda item and testimony of the USC Provost, that the proposed program would offer a quality education experience for students interested in qualifying for K-12 teaching under USC's totally restructured teacher licensure programs. Moreover, this new degree program, since it would be the sole teacher preparatory degree program recognized by CCHE and the Colorado Department of Education, would be highly efficient. When this program comes on line, teacher preparation options that have heretofore been used at USC will be discontinued. The content courses have been developed cooperatively by discipline specialists and teacher education professors to assure that the new K-12 content standards are fully met. Students, in turn, can be assured that the courses they complete will well prepare them to teach those subjects in Colorado schools. The proposal is based on clearly defined need, as demonstrated in the enclosed tables estimating enrollment. Those estimates are based upon current teacher preparation program enrollments.

It is my understanding you have already received an electronic version of this proposal. If you have questions, please contact Dr. David Clark, Vice Chancellor for Academic Affairs, (303) 534-6290.

Sincerely,

Albert C. Yates  
Secretary/Treasurer

cc: David Clark, CSUS  
Beverly Michoski, SBA  
Bill Kuepper, CCHE  
Tito Guerrero, USC  
Barbara Montgomery, USC

bm

Attachment

## USC LIBERAL STUDIES, B.A.

## Elementary Education

| CURRICULUM                     | Credits    |
|--------------------------------|------------|
| General Education              | 38         |
| Liberal Studies Major          | 39         |
| Minor/Electives                | 0          |
| Professional Knowledge         | 43         |
| <b>GRADUATION REQUIREMENTS</b> | <b>120</b> |

Students who complete a Liberal Studies degree at USC are required to do the following liberal studies core.

|  |   |                   |
|--|---|-------------------|
| <b>Arts</b>  |   | <b>3 credits</b>  |
| MUS 118  | Music Appreciation                      | 3                 |
| <b>English</b>   |   | <b>8 credits</b>  |
| ENG 351  | Children's Literature                   | 2                 |
| ENG 303  | Advanced Composition Rhetoric & Grammar | 3                 |
| ENG 422  | Contemporary Literature                 | 3                 |
| Or other upper division English literature or writing course |   |                   |
| <b>Social Studies</b>  |   | <b>12 credits</b> |
| GEOG 103   | World Regional Geography                | 3                 |
| One of the following courses                                 |   |                   |
| HIST 101   | World Civilization to 1100              | 3                 |
| HIST 102   | World Civilization 1100 to 1800         | 3                 |
| HIST 103   | World Civilization Since 1800           | 3                 |
| One of the following courses:                                |   |                   |
| HIST 201   | U.S. History I                          | 3                 |
| HIST 202   | U.S. History II                         | 3                 |
| HIST 211   | Colorado History                        | 3                 |
| <b>Mathematics</b>   |   | <b>9 credits</b>  |
| MATH 156   | Intro to Statistics                     | 3                 |
| MATH 360   | Elementary Concepts of Mathematics I    | 3                 |
| MATH 361   | Elementary Concepts of Mathematics II   | 3                 |
| <b>Science</b>   |   | <b>10 credits</b> |
| PSYCH 151  | Human Development                       | 3                 |
| CHEM 150   | Concepts in Physics & Chemistry         | 4                 |

## ELEMENTARY EDUCATION REQUIREMENTS

|        |   |
|--------|---|
| ED 202 | Foundations of Education (3 credit hours)<br><i>Field Experiences:</i> * 30 hours   |
| ED 280 | Educational Media and Technology (3 credit hours)**   |
| ED 301 | Frameworks of Teaching (3 credit hours)<br><i>Prerequisite:</i> Completion of 45 college hours and a cumulative GPA of 2.6<br><i>Field Experiences:</i> * 30 hours<br>Admission to Education is completed in this course; ED 280 is also required for admission after Spring or Summer 2001 |

- ED 380 Integrated Methods in Elementary School (3 credit hours)  
*Prerequisite:* Admission to Education; GPA of 2.6; Completion of Arts Block; *Field Experiences:*\* 30 hours
- RDG 410 Teaching Reading and Language Arts (4 credit hours)  
*Prerequisite:* Admission to Education; GPA of 2.6  
*Field Experiences:*\* 40 hours
- ED 412 Teaching Diverse Learners (3 credit hours)  
*Prerequisite:* Admission to Education; GPA of 2.6  
*Field Experiences:*\* 30 hours
- ED 413 Teaching Social Studies (3 credit hours)  
*Prerequisite:* Admission to Education; GPA of 2.6  
*Field Experiences:*\* 30 hours
- ED 414 Teaching Elementary Science and Health (3 credit hours)  
*Prerequisite:* Admission to Education; GPA of 2.6  
*Field Experiences:*\* 30 hours
- ED 417 Teaching Mathematics in the Elementary School (3 credit hours)  
*Prerequisite:* Admission to Education; GPA of 2.6; Completion of Math Block; *Field Experiences:*\* 30 hours
- ED 485 Capstone Seminar (2 credit hours)  
*Prerequisite:* Admission to Student Teaching
- ED 487 Student Teaching in the Elementary School (12 credit hours)  
*Prerequisite:* Admission to Student Teaching  
 590 hours in an Elementary Classroom

\*All hours in field experiences are completed during the semester in which the student is enrolled in the course are part of course requirements.

\*\*The course hours are included in the General Education requirements.

**Program Requirement Total: 120**

Table 1. ENROLLMENT PROJECTIONS

|     |                        | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Full Implementation |
|-----|------------------------|--------|--------|--------|--------|--------|---------------------|
| 1-a | In-State Headcount     | 177    | 183    | 192    | 204    | 218    | 218                 |
| 1-b | Out-of State Headcount | 0      | 0      | 0      | 0      | 0      | 0                   |
| 2   | Program Headcount      | 177    | 183    | 192    | 204    | 218    | 218                 |
| 3-a | In-State FTE           | 177    | 183    | 192    | 204    | 228    | 228                 |
| 3-b | Out-of-State FTE       | 0      | 0      | 0      | 0      | 0      | 0                   |
| 4   | Program FTE            | 177    | 183    | 192    | 204    | 218    | 218                 |
| 5   | Program Graduates      | 0      | 21     | 51     | 55     | 60     | 60                  |

\_\_\_\_\_  
Signature of Person Title

\_\_\_\_\_  
Signature of Governing Board Information Officer Date

## Explanation of Data in Table 1

1-a.

All future elementary education students would be required to complete the Liberal Studies major. Projections for Year 1 of the program are based on the following estimates:

In the 1999-2000 school year, 182 elementary education students were enrolled in teacher education; 47 students completed the program (135 remaining). Of the group 77 were freshmen or sophomores.

52 elementary education students will complete the admission to education process Spring 2001 and 30 in May 2001 (based on current preenrollment data). These 82 students would be juniors and seniors in Liberal Studies in Year 1. Approximately 24% of juniors transfer to USC their junior years (estimated 14 additional students for Year 1).

Some increase in new freshmen and transfer students in elementary education is estimated because of the strong job market for teachers and USC efforts to recruit students into education through future teacher groups in regional school districts and recruitment scholarships (see reference to federal Title II grant program in revenues). For Year 1, 4 additional students are added to the total estimate.

Total projection for Year 1 = 177

Numbers for Years 2-5 were calculated by

Using the USC 2000 retention rate statistics for freshman returning their sophomore year (66%).

Estimating a retention rate for sophomores at 85%; this calculation is based on better retention resulting from earlier admission to education in the new program.

Using the one-year retention rate based on retention of juniors and seniors enrolled in education at USC Fall 1999 to Fall 2000 ( $292/308 = 94.8\%$ ).

Using numbers for new incoming freshman and transfer students used (above) in Year 1.

Estimating an increase in new freshmen and transfer students in elementary education because of the strong job market for teachers and USC efforts to recruit students into education through future teacher groups in regional school districts and recruitment scholarships (see reference to federal Title II grant program in revenues). Growth in Year 2 is estimated at 6 additional new students; for Year 3 - 7, Year 4 - 8; and Year 5 - 9.

Small numbers of non-elementary education students have been added to Years 3 (2), 4 (4), and 5 (5).

1-b

During the 1999 - 2000 and 2000 - 2001 school years, all elementary education students were in-state, and projections for Years 1 - 5 are based on this pattern.

3-a

The Liberal Studies program is a 120 credit hour degree, with students averaging 15 credit hours per semester. Each headcount = 1 FTE.

5.

USC students beginning the new program requiring a Liberal Studies major are currently in the process of admission to education; no students will complete the program in Year 1. The number of program graduates in Year 2 is based upon the long term plans for these students.

Table 2: PHYSICAL CAPACITY ESTIMATES

Name of Program: Liberal Studies  
Name of Institution: University of Southern Colorado

I certify that this proposed degree program can be fully implemented and accommodate the enrollment projections provided in this proposal without requiring additional space or renovating existing space during the first five years.

---

Signature of Governing Board Capital Construction Officer

---

Date

Table 3: PROJECTED EXPENSE AND REVENUE ESTIMATES

|                                  |                                       | Estimated Amount in Dollars |                  |                  |                  |                  |
|----------------------------------|---------------------------------------|-----------------------------|------------------|------------------|------------------|------------------|
|                                  |                                       | Year 1                      | Year 2           | Year 3           | Year 4           | Year 5           |
| <b>Operating Expenses:</b>       |                                       |                             |                  |                  |                  |                  |
| 1                                | Faculty                               | 651,649                     | 673,741          | 706,879          | 751,063          | 802,611          |
| 2                                | Financial Aid specific to program     | 0                           | 0                | 0                | 0                | 0                |
| 3                                | Instructional Materials               | 11,549                      | 11,940           | 12,525           | 13,305           | 14,215           |
| 4                                | Program Administration                | 47,115                      | 47,115           | 47,115           | 47,115           | 47,115           |
| 5                                | Rent/Lease                            | 0                           | 0                | 0                | 0                | 0                |
| 6                                | Other Operating Costs                 | 0                           | 0                | 0                | 0                | 0                |
| 7                                | <b>Total Operating Expenses</b>       | <b>710,313</b>              | <b>732,796</b>   | <b>766,519</b>   | <b>811,483</b>   | <b>863,941</b>   |
| <i>Program Start-up Expenses</i> |                                       |                             |                  |                  |                  |                  |
| 8                                | Capital Construction                  | 0                           | 0                | 0                | 0                | 0                |
| 9                                | Equipment Acquisitions                | 0                           | 0                | 0                | 0                | 0                |
| 10                               | Library Acquisitions                  | 0                           | 0                | 0                | 0                | 0                |
| 11                               | <b>Total Program Start-up Expense</b> | <b>0</b>                    | <b>0</b>         | <b>0</b>         | <b>0</b>         | <b>0</b>         |
| <b>TOTAL PROGRAM EXPENSES</b>    |                                       | <b>710,313</b>              | <b>732,796</b>   | <b>766,519</b>   | <b>811,483</b>   | <b>863,941</b>   |
|                                  |                                       | Year 1                      | Year 2           | Year 3           | Year 4           | Year 5           |
| <i>Enrollment Revenue</i>        |                                       |                             |                  |                  |                  |                  |
| 12                               | General Fund: State Support           | 962,408                     | 995,030          | 1,043,963        | 1,109,207        | 1,185,325        |
| 13                               | Cash Revenue: Tuition                 | 164,610                     | 170,190          | 178,560          | 189,720          | 202,740          |
| 14                               | Cash Revenue: Fees                    | 0                           | 0                | 0                | 0                | 0                |
| <i>Other Revenue</i>             |                                       |                             |                  |                  |                  |                  |
| 15                               | Federal Grants                        | 0                           | 0                | 0                | 0                | 0                |
| 16                               | Corporate Grants/Donations            | 0                           | 0                | 0                | 0                | 0                |
| 17                               | Other Fund Sources                    | 0                           | 0                | 0                | 0                | 0                |
| 18                               | Institutional Reallocations           | 0                           | 0                | 0                | 0                | 0                |
| <b>TOTAL PROGRAM REVENUE</b>     |                                       | <b>1,127,018</b>            | <b>1,165,220</b> | <b>1,222,523</b> | <b>1,298,927</b> | <b>1,388,065</b> |

### Explanation of Data in Table 3

#### Expenses

1. Faculty cost allocations were calculated using the following data from the Office of Finance and Administration:

· Average compensation (salary and fringe) for all faculty (full time and part time ) = \$47,754.

·

Average student/faculty ratios (calculated based on FTE's) for Liberal Studies areas from the Office of Finance and Budget = Humanities (14.4), Science and Math (17.3), Social Science (20.6).

·

Average faculty cost per 1 FTE = average compensation divided by student/faculty ratio or Humanities (\$3,316), Science and Math (\$2,760), and Social Science (\$2,318).

·

Average number of credit hours completed in each area in total program based on number of credit hours required in core courses -- Humanities (23), Math and Science (24), Social Sciences (21) -- x number of students in the program in a year (Year 1 = 177) for each area, plus

credit hours required in the discipline emphasis areas (12 credit hours) calculated by estimating the percentage of students completing various emphasis areas. Of elementary students in 1999 – 2000, 70% completed majors in the Social Sciences, 20% in areas in the Humanities, and 10% in Math and Science. Therefore, of 177 students estimated in the program in Year 1, 124 would complete 12 additional hours in the Social Sciences; 35 would complete 12 hours in the Humanities, and 18 would complete 12 hours in Math and Science.

For students in Year 1, total credit hours generated in each major area for their total program would be: Humanities (4071 + 420 = 4437), Math and Science (4248 + 216 = 4464), and Social Science (3717 + 1488 = 5205).

An estimate of the FTE credit hours per year for each area = Humanities (4437 divided by 15 = 295.8 divided by 4 years = 73.95), Math and Science (4464 divided by 15 = 297.6 divided by 4 years = 74.4), and Social Sciences (5205 divided by 15 = 347 divided by 4 years = 86.75). Total FTE's generated in one year in the program are 235.1.

·

Average cost of instruction for each area for one year = Humanities (73.95 x \$3,316 = \$245,218), Science and Math (74.4 x \$2,760 = \$205,344), and Social Science (86.75 x \$2,318 = \$201,087) = \$651,648 (this is \$3682 per year per student based on 177 students in Year 1).

Year 2 – 5 calculations are based on the \$3682 per student per year.

3.

Instructional Materials calculated using costs for instructional equipment (technology, software), materials, and supplies for classes in the program based on 6 major departmental budgets for instructional materials and technology x .2 (the percent of total majors in these departments who will be Liberal Studies majors completing emphasis areas for Year 1). Increases in Years 2-5 are based on proportional costs of increases in students in these years.

4.

Program Administration costs estimated at costs of department chairs (.2 of costs for 6 chairs based on 6 hours release per chair), secretarial support (10%/.1 x support in 6 departments), and faculty travel (.2 x 13 full time faculty teaching Liberal Studies Core Courses x average of \$650 per faculty); .2 (or 20%) estimate is based on the percent of total majors in these departments who will be Liberal Studies majors completing emphasis areas in the department for Year 1. Increases in number of students in Years 2 – 5 are not projected to increase administrative costs.

#### Revenue

1.

Average State Appropriation per FTE student at USC, from the Office of Finance and Budget = \$4,078. Total FTE's generated by students in the Liberal Studies program in Year 1 are 236 (average of 20 hours per year x 177 students divided by 15) total state support = \$4,078 x 236 = \$962,408; appropriation for each additional student is \$5437 per year.

2.

Tuition, calculated (Year 1) at \$930 for resident tuition for 10 hours (80 hours divided by 4 years) x 177 students

= \$164,610

**TOPIC: CCHE-CAPITAL ASSETS POLICY SECTIONS REPEALS, REVISIONS**

**PREPARED BY: JEANNE ADKINS**

**I. SUMMARY**

The Commission Capital Assets Policies have been in the process of being updated to reflect statutory changes. Many policies until the past three months have not been updated since 1973. Policy changes proposed – Policies M, N and Q – this month reflect changes in statutory requirements.

Staff has read and reviewed all existing policies for conformance with existing statutes, elimination of unnecessary processes and attempted to simplify the policies for ease of implementation and understanding. Policy revisions were referred to the Attorney General's office for review for statutory compliance.

**II. BACKGROUND AND STAFF ANALYSIS**

Generally, 23-1-106, C.R.S., establishes the framework for capital asset decision-making for the Commission. In the statute the Commission is charged with establishing the statewide higher education master plan, providing guidelines for space utilization, establishing procedures for program planning, establishing institutional facility and academic master plan guidelines, establishing a five-year rolling capital investment plan for higher education and outlining procedures for developing these plans and projects.

The Commission is also charged with review and approval of individual project requests, prioritization of capital projects, approval of acceptance of gifts and bequests of buildings and lands, authorization of leases and lease-purchases and oversight of bond issues proposed under the Higher Education Facilities Act.

In the 2001 legislative session, several statutory provisions were changed affecting Policy Q, last updated to reflect statutory changes in July 1999. The statute changes the conditions under which projects must be submitted for review. Under the legislation, projects – regardless of the non-state source of funding – that are \$250,000 or under no longer require prior review and approval from CCHE.

CCHE supported the statutory change. It eliminates minor project review for capital construction funding. The legislation also altered the appropriation requirements, requiring Long Bill listing and/or Capital Development Committee and Joint Budget Committee approval beyond a \$500,000 threshold for both cash-funded and SB92-202 (auxiliary funded) projects.

Statute also requires submission of an annual report to the General Assembly from CCHE reflecting the expenditure. Staff intends to begin the reporting electronically following the same format as the two electronic conversion projects already completed or to be completed by July 1 by the Capital Assets team – the creation of the electronic lease database and the electronic filing of the financial release documents for capital construction projects.

Staff undertook an assessment of all 17 sections of Capital Assets policies outlined in Section III of the CCHE Policies.

Staff has made statutory conforming changes to part M and simplified it to match current practice.

Although statute has not changed with reference to Part N, which deals with approval of gifts, grants and bequests to institutions, the original CCHE policy did not incorporate a process for satisfying the financial certification required of CCHE on these project requests. The additional language in the policy satisfies that statutory requirement and provides a blueprint for institutions to understand what is required.

Parts J, O and P remain to be updated. They will be submitted to the Commission for review in the fall.

Upon submission of changes to those sections, the Commission will have reviewed and revised or repealed all 17 sections of the Capital Assets Policy and brought them up to date.

### **III. STAFF RECOMMENDATION**

That the Commission approve the changes in Part Q (Policies for Self-Funded Capital Construction) to reflect statutory changes and the updates to Part M (Capital Improvements Plan Policies) and Part N (Criteria and Procedures for Implementation of 23-5-112 C.R.S. Concerning Gifts and Bequests to Institutions of Higher Education).

Attachments: Part M – Capital Improvements Plan Policies  
Part N – Criteria and Procedures for Implementation of 23-5-112 C.R.S.  
Part Q – Purpose/Introduction

## SECTION III

### PART M CAPITAL IMPROVEMENTS PROGRAM POLICIES

#### 1.00 Statutory Authority

In addition to setting a recommended priority of funding, ~~H.B. 1187 directs 23-1-106 (7) (a), C.R.S. DIRECTS the Commission to "annually establish a unified five-year capital improvements program coordinated with education plans and shall transmit it) to the Office of State Planning and Budgeting, the Governor, and the General Assembly,..." (23-1-106 (7)(a), C.R.S.).~~

The five-year capital improvement program outlines the scheduling of the projected capital construction needs identified in the long-range facilities master plan for each institution. The long-range forecast outlines long-range building needs scheduled beyond the five-year capital improvement program.

The legislative Capital Development Committee has requested the Commission to submit a long-range forecast of higher education capital construction needs. That joint legislative committee is statutorily directed to "forecast the state's requirements for capital construction ... for the five and ten fiscal years next following the fiscal year for which recommendations are made." (2-3-1304 (1)(d), C.R.S.).

#### 2.00 Review Process

EACH HIGHER EDUCATION INSTITUTION GOVERNING BOARD IS REQUIRED TO SUBMIT BY STATUTE A FIVE-YEAR CAPITAL DEVELOPMENT PLAN, OUTLINING ALL APPROVED AND PROPOSED CAPITAL CONSTRUCTION PROJECTS. ALL PROJECTS REGARDLESS OF WHETHER THEY ARE STATE-FUNDED, CASH-FUNDED, FEDERALLY-FUNDED OR PROPOSED FROM CASH-FUNDED EXEMPT SOURCES PROPOSED BY EACH INSTITUTION UNDER THE GOVERNING BOARD'S JURISDICTION MUST BE INCLUDED IN THE PLAN TO BE FILED NO LATER THAN JUNE 30 OF EACH YEAR. THE CAPITAL IMPROVEMENT PLAN SHALL BE ANNUALLY UPDATED ON THE APPROPRIATE ELECTRONIC AND/OR WRITTEN FORM AS STATED IN THE ANNUAL BUDGET INSTRUCTIONS. ~~governing board H.B. 1187 directs the Commission to "request, annually, from each governing board a five-year projection of capital development projects." The Commission is to "determine whether a proposed project is consistent with role and mission and master planning of the institution and conforms to standards recommended by the Commission" (23-1-106 (6), C.R.S.).~~

~~These governing board projections are summarized for projects proposed to be state-funded and those anticipated to be non-state funded. This summary represents a five-year "rolling plan," which is to be annually amended and constantly projected five years into the future, and kept current with more immediate programmatic and budgetary~~

~~decision making. It is not constrained by revenue projections, nor assumptions about future levels of appropriations. Such budgeting responsibilities are statutorily assigned to the Office of State Planning and Budgeting. The Governor's Five-Year Capital Investment Plan comprehensively addresses the match of costs, revenue sources, and options for the state capital investment financing.~~

### **3.00 General Policies and Criteria**

Commission acceptance of the governing board projections of five-year building requirements does not constitute support for such future project requests. It must be determined that these long-range needs are generally consistent with:

E State Postsecondary Education Master Plan policies and designated campus role and mission

E Campus Long-Range Facilities Master Plan

Where these long-range projections of future building requirements have been determined to be not consistent with this policy, these projects are noted by CCHE staff and omitted from the recommended Capital Improvement Program.

Conformity with approved space and utilization standards, codes, regulations, and program standards is determined through the facilities program planning process, usually in the year prior to the project budget request.

Capital construction projects often require spending patterns that extend to three fiscal years. Code compliance programs are often phased into manageable projects that extend over several years for completion. Accordingly, these projected spending patterns represent the year in which the money would be spent. The actual appropriation would necessarily include the money to be spent in the following year or a commitment to completion of a project. Projected costs are to be shown in current year dollars.

~~Capital Construction Projects that directly conflict with Commission policies and criteria for:~~

~~E discontinuance of academic or vocational programs;~~

~~E educational degree programs reduction;~~

~~E enrollment, academic admission and program standards; or~~

~~E distinctive role and mission determinations among graduate offerings of UC-Boulder, CSU, UNC, and graduate program phase-outs at ASC, and WSC will not be recommended.~~

~~Those programmatic, property protection, and safety needs essential to the system of public higher education and academic master plans for 1987-1992, and realistic relative to the state's economic outlook, will be scheduled in the Commission's Capital Improvements Program.~~

~~Pending Commission action on the State Postsecondary Education Master Plan (1987-1992), to defer capital improvements for new facilities that increase the educational capacity of institutions.~~

~~Considering the state's uncertain economic outlook, non-essential enhancements of physical plant facilities should be deferred from the Commission's Five-Year Capital Improvements Program.~~

~~Pending Commission action on the financing strategies section of the State Postsecondary Education Master Plan (1987-1992);~~

~~The CCHE scheduling of state-funded capital investments should generally be constrained at about ten percent of the state higher education general fund operating budget for the year concerned.~~

#### **4.00 Scheduling of Capital Investments**

In order to assist the Governor and General Assembly in forward financial planning, the annual capital costs set forth in the CCHE "Capital Improvement Program" should be realistic relative to the state's fiscal policies and economic outlook.

The Commission's judgments about the essential needs of the system of higher education are sought by the governor and legislature because state resources are so limited, and because construction budgets compete with tax dollars for operating budgets.

THE COMMISSION'S ASSESSMENT IN FORWARDING THE CCHE FIVE-YEAR CAPITAL IMPROVEMENT PLAN SHOULD REFLECT ITS ASSESSMENT OF PRIORITIES FOR THE HIGHER EDUCATION SYSTEM AND THE VARIOUS INSTITUTIONAL AND SYSTEM-WIDE MASTER PLANS.

~~The CCHE scheduling of state-funded capital investments should be generally constrained at about ten percent of the state higher education general fund operating budget for the year concerned.~~

~~The 1987 policy is to be annually reviewed, and amended if appropriate, to keep current with CCHE postsecondary education master planning decisions and changing state fiscal policies.~~

#### **5.00 Policies and Criteria for Essential Capital Investment Needs**

Completion of Current Projects Authorized by the Legislature

Current projects that have received a partial capital construction appropriation or an architectural/engineering appropriation for subsequent construction funding.

New projects for:

- E Renovation of existing space for revised academic programs, or to consolidate programs from functionally obsolete existing facilities when renovation is not practical or feasible; and
- E Replacement of specialized instructional, or hospital equipment with item costs exceeding \$50,000.

Physical Plant Support Facilities

New projects for replacement of obsolete or hazardous Physical Plant department facilities.

Capital Construction Consultant Services

Recommendations include campus physical facilities Master Plan updates and detailed life-cycle cost analyses and program planning for complex projects, as provided for by statute and Long Bill headnotes.

Preservation of Public Property and Safety of Occupants

New projects for:

- E Correction of serious health hazards;
- E Renovation to bring many campus buildings into compliance with more stringent fire safety codes;
- E Utility and site improvements responsive to demands for more efficient physical plant operation or prevention of disruptions to vital campus operations; and
- E Compliance with changing codes, regulations and standards not otherwise rectified through space renovation projects.

## SECTION III

### PART Q POLICIES FOR SELF-FUNDED CAPITAL CONSTRUCTION

#### 1.00 Introduction

- 1.01 The Cash Funds Fiscal Accountability Reporting Policy and Implementation Plan was established pursuant to FY 1989-90 Long Bill (S.B. 245), Footnote 34 requesting the Commission to develop recommendations on the use of cash funds for capital construction and controlled maintenance projects. THIS POLICY DOES NOT APPLY TO ANY PROJECT FUNDED WHOLLY OR IN PART BY STATE MONEYS AS DEFINED IN 24-75-302(1). The CCHE policy was ratified by the legislative Capital Development Committee and Joint Budget Committee during November 1989. This policy was amended July 1, 1999, to bring it into compliance with the requirements of section 23-1-106, C.R.S. The General Assembly in 2001 adopted SB01-209, which amended section 23-1-106. THE AMENDMENTS TO THIS POLICY ARE EFFECTIVE AUGUST 9, 2001, FOLLOWING THE 90-DAY PERIOD DURING WHICH IT MAY BE SUBJECT TO REFERENDUM PETITION PURSUANT TO THE COLORADO CONSTITUTION.
- 1.02 The effect of the ~~new~~-policy will be that certain cash-funded capital projects not exceeding \$250,000 will be exempted from legislative spending authority in the Long Bill AND FROM COMMISSION REVIEW FOR PRE-EXPENDITURE APPROVAL OR WAIVER OF PROGRAM PLANNING. Section 23-1-106(5) (b), C.R.S., allows the Commission to exempt from program planning and physical planning certain projects below \$500,000 of state monies. The combined effect of both the planning and appropriation policies will permit more timely and efficient implementation of cash-funded minor space remodeling, major capital equipment purchases, and demolition projects while continuing CCHE approval and legislative fiscal oversight of more expensive capital projects.
- 1.03 THE STATUTORY REVISIONS 23-1-106 (9) (a) REQUIRE THAT THE COMMISSION REVIEW AND APPROVE ANY PLAN FOR A CAPITAL CONSTRUCTION PROJECT ESTIMATED TO REQUIRE EXPENDITURES EXCEEDING \$250,000 THAT IS CONSTRUCTED, OPERATED AND MAINTAINED FROM AUXILIARY ENTERPRISES, STUDENT FEES, RESEARCH BUILDING REVOLVING FUNDS, OR WHOLLY ENDOWED GIFTS AND BEQUESTS, OR A COMBINATION OF SUCH SOURCES.
- 1.04 THE STATUTORY PROVISIONS IN 23-1-106 (10), C.R.S., REQUIRE THAT THE COMMISSION REVIEW AND APPROVE ANY PLAN FOR A CAPITAL CONSTRUCTION PROJECT THAT IS ESTIMATED TO REQUIRE TOTAL EXPENDITURES EXCEEDING \$250,000 THAT IS CONSTRUCTED SOLELY FROM CASH FUNDS HELD BY THE INSTITUTION OTHER THAN THOSE FUNDS SPECIFIED IN 1.03. NO COMMISSION REVIEW OR APPROVAL IS REQUIRED FOR SUCH PROJECTS COSTING \$250,000 OR LESS.

1.05 CCHE Tuition and Fees Policy prohibits institutions from using student fees, tuition or general fund increases to pay for academic facility construction projects.

## **2.00 Legislative Fiscal Oversight and Fiscal Accountability Reporting Policy**

2.01 Any capital construction project with a total value of over \$500,000 ~~\$250,000~~, except those constructed, operated and maintained from auxiliary enterprises, student fees, research building revolving funds, or wholly endowed gifts and bequests, or a combination of such sources, must be specifically appropriated by the legislature. This policy does not exempt from legislative spending authorization:

- a) any capital construction project which is conditional upon or requires expenditures of state-controlled funds for capital construction, facilities operations, and facilities maintenance; or
- b) any gift or bequest funded capital construction project which directly or indirectly involves significant ongoing expenditures for facilities operations and maintenance by the state of Colorado.

~~2.02 The governing boards of higher education through the CCHE will report annually to the Office of State Planning and Budgeting, and legislative Capital Development Committee and Joint Budget Committee on all cash funds expended for capital construction projects that exceed \$100,000 in project cost.~~

2.02- EFFECTIVE SEPTEMBER 1, 2001, AND EVERY SEPTEMBER 1 THEREAFTER, EACH INSTITUTION SHALL SUBMIT TO THE COMMISSION IN AN ELECTRONIC FORMAT TO BE SPECIFIED A LIST AND DESCRIPTION OF EACH PROJECT FOR WHICH EXPENDITURE WAS MADE DURING THE IMMEDIATELY PRECEDING FISCAL YEAR THAT WAS NOT SUBJECT TO COMMISSION REVIEW IN 1.03 AND 1.04 FOR THE PURPOSES OF COMPILING THE ANNUAL REPORT REQUIRED IN 23-106-11.

2.03 The annual fiscal reporting on the cumulative impact of all prior and current cash-funded capital projects is intended to assure the General Assembly that the proposed use of cash funds:

- is prudent;
- will not endanger cash reserves; and
- will not - by themselves - lead to higher General Fund support or Student Tuition levels.

## **3.00 Approval Procedures for Cash-Funded Capital Projects**

3.01 Governing boards currently have statutory duties for control and direction of all funds and appropriations. CCHE has statutory duties for review and approval of program and financial plans for capital construction.

- (a) The governing boards and the state-supported institutions of higher education may not authorize, or acquire, sites, or initiate any program or activity requiring capital construction for the use of state-supported institutions of higher education, regardless of the source of funding, unless it has obtained the prior approval of CCHE. This includes acquisition or utilization of real property for the use of a state-supported institution of higher education by lease, lease-purchase, purchase, gift or otherwise.
- (b) CCHE will review and approve master and program planning for all capital construction projects for institutions of higher education on state-owned or controlled land, regardless of the source of funds. No capital construction can commence except in accordance with the CCHE approved master plan, program plan, and physical plan.
- (c) Plans for any capital construction project for the use and benefit of any state-supported institution of higher education to be funded through private, foundation, or federal funds require review and approval of CCHE prior to acquisition or commencement of any such project.

3.02 CCHE Facility Program and Financial Plan approval policy will require governing board actions to specifically make documented findings of fact that sufficient cash funds will be available to pay the capital project costs, and that projected operating funds will not be adversely affected by the project.

3.03 CCHE Capital Construction Budget Instructions will require the governing board documented findings of fact in (3.02) above to be appended to each cash-funded major capital project's budget request document; and an annual fiscal report on the cumulative impact of all cash-funded major and minor capital projects for the fiscal years affected.

For fiscal reporting AND REVIEW purposes:

- a) Major capital projects exceed \$250,000;
- b) Minor capital projects cost ~~less than~~ \$250,000 OR LESS, but exceed Capital Outlay expenditure thresholds established in the Long Bill

3.04 CCHE will require a Cash-Funded Projects Capital Construction Budget Addendum to disclose the Source and Use of Funds for each major capital construction project.

3.05 Amended Policy implementation for FY ~~1999-00~~ 2001-02.

## SECTION III

### PART N CRITERIA AND PROCEDURES FOR IMPLEMENTATION OF 23-5-112 (CRS 1973) CONCERNING GIFTS AND BEQUESTS TO INSTITUTIONS OF HIGHER EDUCATION

Approved August 24, 1976

~~Revised June 20, 1986~~

REVISED JUNE 7, 2001

#### **1.00 Authorized Acceptance of Gifts and Bequests**

Subsection (1) of 23-5-112 (CRS 1973) authorizes state institutions of higher education to receive gifts and bequests of money or property under stated conditions.

(2) When a governing board of an institution of higher education is offered a gift of property, whether real or personal, which directly or indirectly involves significant ongoing expenditures, the institution shall require in connection therewith, an endowment sufficient to fund such expenses. This subsection (2) shall not apply when the gift has been approved by the Colorado Commission on Higher Education with the understanding that acceptance will require an allocation of state funding and the Commission is satisfied that provision therefore can be made within available resources. The Commission shall prepare a statement of procedures of review and of criteria to be applied in its review of any such gifts, which shall have the approval of the Governor and the Joint Budget Committee.

(3) PRIOR TO ACCEPTANCE OF A GIFT OR BEQUEST COVERED UNDER THE TERMS OF SECTION 23-5-112, C.R.S., THE INSTITUTION SHALL CERTIFY TO THE CCHE THE FOLLOWING INFORMATION: (A) THE PROPOSED OR ANTICIPATED USE OF THE PROPERTY BY THE INSTITUTION; (B) THE PROPOSED OR ANTICIPATED COST TO THE INSTITUTION OF THE MAINTENANCE, OPERATION OR IMPROVEMENT OF THE PROPERTY BY THE INSTITUTION; (C) THE PROPOSED OR ANTICIPATED SOURCE OF FUNDS TO BE USED BY THE INSTITUTION FOR THE OPERATION, MAINTENANCE, OR IMPROVEMENT OF THE PROPERTY; AND (D) EVIDENCE THAT THE INSTITUTION HAS REVENUES SUFFICIENT TO MAINTAIN, OPERATE, OR IMPROVE THE PROPERTY WITHIN AVAILABLE RESOURCE.

(4) IN THE EVENT THE INSTITUTION CANNOT SATISFY THE REQUIREMENTS IN (3) (D), IT MUST INDICATE ITS INTENTION TO SUBMIT EITHER A CAPITAL FUNDING OR OPERATIONAL BUDGET REQUEST TO ACCOMMODATE ITS PLANS AND ESTIMATE THOSE NEEDS.

## 2.00 Definitions and Procedures

The following definitions and procedures shall apply to gifts and bequests covered by 23-5-112 (2) CRS 1973 which directly or indirectly involve significant ongoing expenditures.

- 2.01 An ongoing expenditure shall be deemed to be "significant" when such expenditure will lead to a specific institutional request for funding from tax fund or cash appropriations, or when it exceeds one-quarter of one percent of the institution's operating budget appropriation in the year concerned, or \$50,000, whichever is less.
- 2.02 An institution, or any person or organization acting in behalf of such institutions or its governing board, will consult with the Commission, through its Executive Director, at the earliest feasible date concerning any gift or bequest covered by 23-5-112 (2) (CRS 1973), or campaign for funds similarly covered, in order to determine appropriate procedures for Commission review and approval relating to the particular situation.
- 2.03 THE COMMISSION, IN ITS DISCRETION, MAY APPROVE AN EXCEPTION FROM THE REQUIREMENT OF AN ENDOWMENT SUFFICIENT TO COVER THE ONGOING OPERATING COSTS, UPON ADEQUATE DEMONSTRATION BY THE INSTITUTION TO THE COMMISSION OF ANY OF THE FOLLOWING: ~~In general, in accordance with the statutes, the Commission would approve an exception from the requirement of an endowment sufficient to cover ongoing operating costs, subject to provision 2.03.01 and to 2.03.02 or 2.03.03:~~
- 2.03.01 The resulting facility or resource is in accord with the institutional master plan including approved statements of institutional role and mission and is shown, through the facility program plan or other appropriate documentation, to contribute to approve programs and functions of the institution such that it would be appropriate to provide the facility or resource through state funds, if such funds were available.
- 2.03.02 The institution governing board states that the facility or resource will be utilized without requirement of or request for funding beyond the current operating appropriation by reason of the provision of such facility or resource.
- 2.03.03 The facility or resource is shown to require operating funding beyond the current operating appropriation but in the opinion of the Commission is a facility or resource of such importance to the institutions and its programs that it is justified to expect an ongoing state appropriation for operating expenses.
- 2.04 The criteria set forth in item 2.03 above will not exclude consideration of any gift or bequest or campaign related thereto on an exceptional basis.
- 2.05 Each proposal approved by the Commission which requires or may require funding for operations beyond current appropriation levels, with documentation describing all elements affecting the state interest including operating costs, will be submitted by the

Commission to the Governor and to the Joint Budget Committee. Where additional construction or operating costs for facilities will be involved, Commission approval is effective upon approval of the Governor and Joint Budget Committee.

**TOPIC:                   TEACHER EDUCATION AUTHORIZATION**

**PREPARED BY:       DIANE LINDNER/SHARON M. SAMSON**

**I.       SUMMARY**

CCHE, in conjunction with Colorado Department of Education, has been reviewing teacher education programs offered by Colorado colleges and universities during the past 11 months. This agenda item presents

- the final group of degree programs that are recommended for initial teacher licensure authorization,
- recommendations for secondary endorsement areas,
- Special Service licensures, and
- Administration licensures.

As provided in statute, all licensure programs not approved by the Commission prior to June 30, 2001 will sunset.

**TOPIC: ENVIRONMENTAL SCIENCE AUTHORIZATION  
MESA STATE COLLEGE**

**PREPARED BY: DIANE LINDNER**

**I. SUMMARY**

CCHE, in conjunction with Colorado Department of Education, has been reviewing teacher education programs offered by Colorado colleges and universities. Mesa State College received CCHE approval for initial teacher licensure for 10 degree undergraduate programs in March, 2001. In addition to the degree programs for which authorization has been approved, the staff recommends teacher education authorization for Mesa State College in:

| <b>LICENSURE LEVEL</b>     | <b>DEGREE PROGRAM</b>                |
|----------------------------|--------------------------------------|
| <u>Secondary Education</u> | Environmental Science and Technology |

**II. BACKGROUND**

The Commission approved the curriculum of Bachelor of Science degree in Environmental Science and Technology in June 2000. Given the changes in licensure standards, the Board of Trustees of the State Colleges in Colorado chose to delay acting on the concentration that was targeted for teacher licensure. The Trustees approved the new concentration area in March 2001 and subsequently submitted a request to the Commission for teacher authorization.

**III. STAFF ANALYSIS**

Mesa's general education program for the Bachelor of Science degree requires a minimum of 33 credit hours of lower division work. Nine credits are selected in the skill areas and 24 credits in content areas with the mathematics course at or above the level of Calculus. The general education provides writing, mathematics, and information skills, understanding of the natural environment and human relationships, and opportunities to explore literature, art, and music.

As submitted, the Environmental Science Education curriculum establishes a foundation of scientific knowledge through core courses in the disciplines of biology, chemistry, physics, geology, mathematics and statistics. Students learn environmental science as an interdisciplinary application of the traditional sciences. The concentration ensures that students seeking secondary science teaching licensure will have the appropriate knowledge in environmental science

and the interaction of technology and the environment. The content of the Mesa State College Environmental Science and Technology degree program is aligned with the content standards necessary for secondary science teacher preparation. Complete content analysis of the degree program is appended.

**IV. STAFF RECOMMENDATION**

**That the Commission approve teacher education authorization in the secondary education for Mesa State College's Environmental Science and Technology degree program.**

## MESA ENVIRONMENTAL SCIENCE AND TECHNOLOGY, B.S.

### Secondary Science Education

| CURRICULUM                     | Credits    |
|--------------------------------|------------|
| General Education              | 37         |
| Environmental Science Major    | 44         |
| Electives                      | 10         |
| Professional Knowledge         | 29         |
| <b>GRADUATION REQUIREMENTS</b> | <b>120</b> |

Students who complete an Environmental Science and Technology degree at Mesa State College (MSC) are required to enroll in seven core classes (21 credits) and seven courses in related sciences (23 credits).

|          |   |   |
|----------|---|---|
| ENGS 110 | Environmental Science and Technology I      | 3 |
| ENGS 210 | Environmental Science and Technology II     | 3 |
| ENGS 312 | Soil Properties and Characterization, Lab   | 4 |
| ENGS 331 | Water Quality, Lab                          | 4 |
| ENGS 340 | Air Quality and Pollution Control           | 3 |
| ENGS 492 | Capstone                                    | 2 |
|          | One additional Environmental Science course | 2 |

Two Biology courses from the following

|          |                                   |   |
|----------|-----------------------------------|---|
| BIOL 105 | Attributes of Living Systems, Lab | 5 |
| BIOL 141 | Human Anatomy and Physiology, Lab | 5 |
| BIOL 211 | Ecosystem Biology, Lab            | 5 |

Two Chemistry courses

|          |                                      |   |
|----------|--------------------------------------|---|
| CHEM 121 | Principles of Chemistry, Lab         | 5 |
| CHEM 122 | Principles of Organic Chemistry, Lab | 5 |
| Or       |                                      |   |
| CHEM 131 | General Chemistry, Lab               | 5 |
| CHEM 132 | General Chemistry, Lab               | 5 |

One Physics course

|          |                      |   |
|----------|----------------------|---|
| PHYS 100 | Concepts of Physics  | 3 |
| PHYS 111 | General Physics, Lab | 5 |

### Content Analysis:

The curriculum specified in MSC's Environmental Science and Technology degree program ensures that students seeking secondary Science Teaching licensure will have the appropriate knowledge, including

- Understanding the processes of scientific investigation and design, conduct, and ability to communicate such investigations (Environmental Science and Technology I-II, Principles of Chemistry, General Chemistry)

- Knowledge of the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment (Environmental Science and Technology I-II, Attributes of Living Systems, Ecosystem Biology)

- Understanding the processes and interactions of Earth's systems and the structure and dynamics of Earth and other objects in space (Environmental Science and Technology I-II, Soil Properties and Characterization, general education science course)

- Knowledge of the interrelationships among science, technology, and human activity and how they can affect the world (Environmental Science and Technology I-II)

- Understanding the common properties, forms, and changes in matter and energy (Concepts of Physics, General Physics)

- Understanding that science involves a particular way of knowing and understanding common connections among scientific disciplines (Environmental Science and Technology I-II)

MSC students will have a solid grounding in environmental science and the interaction of technology and the environment.

**Conclusions:**

The content of MSC's Environmental Science and Technology degree program is aligned with the standards that a secondary science teacher needs to know.

**TOPIC: TEACHER EDUCATION AUTHORIZATION:  
UNIVERSITY OF COLORADO AT BOULDER**

**PREPARED BY: SHARON M. SAMSON**

**I. SUMMARY**

The agenda item presents 13 undergraduate programs for initial teacher licensure authorization at the University of Colorado at Boulder (UCB). The action appends the list of 31 teacher education authorizations approved by the Commission on May 3, 2001, including 28 degree programs and three post-baccalaureate programs. As noted in the May teacher education presentation, action on ten UCB degree programs was pending due to curriculum revisions in progress or missing documentation. As provided in the teacher education approval process, CCHE staff has continued to review and process submitted material until the June statutory deadline. With the new material, the staff recommends approval for seven degree programs for elementary licensure and seven degree programs for secondary.

So that there is a common understanding, the complete list of UCB degree programs recommended for teacher education authorization is listed below with those recommended for authorization in this agenda printed in bold.

**LICENSURE LEVEL**

Elementary

**DEGREE PROGRAM**

**American Studies**

Anthropology

**Astronomy**

Communication

Economics

English

Geography

**Distributive Studies:** EPO Biology,

Chemistry and **Geology**)

History

Humanities

Linguistics

Mathematics

**Physics**

**Political Science**

**Psychology**

**Spanish**

Post-baccalaureate

Secondary Education

**American Studies**

Anthropology

Astronomy

Biology EPO

Chemistry

Communications

Economics

English

Geography

History

Humanities

International Affairs

Linguistics

Mathematics

Physics

Political Science

Classics (Latin)

French

German

Italian

Japanese

Russian

Spanish

Post-baccalaureate

K-12

Music

Post-baccaluareate

**II. BACKGROUND**

The Commission approved teacher education authorization for 11 degree programs in elementary education, 14 degree programs in secondary education, and K-12 licensure in Music at the May 2001 Commission meeting. In recommending these degree programs the staff noted that several additional requests were pending. In some cases, the requested degree programs exceeded the four-year graduation requirement (i.e., credit hours ranged from 133 – 155 credits). In other cases, primarily elementary education, the content of the major did not align with the K-6 content standards.

Recognizing that UCB administration wished to provide missing information and that faculty were redesigning the curriculum in some degree programs to meet standards, CCHE staff noted that additional requests for teacher education authorization would be handled at the June Commission meeting. It also noted other components that were still in transition including:

- Revisions to the teacher education advising forms, teacher education checklists, and the college catalog. The conflicting information is somewhat attributed to the fact that UCB had not redesigned its teacher education programs to meet the standards at the time of the site review in November. Interviewed students confirmed that the advising was very confusing and that even faculty advisors were unsure of the course requirements under the old system. To alleviate this problem, UCB has agreed to
  - (1) Republish its advising forms and teacher education checklists after June 2001 when the authorization is concluded, and
  - (2) Identify the general education required courses in bold in its 2002-2003 college catalog.
- UCB assessment plan for its teacher education candidates is in progress. UCB will select a general education assessment tool (e.g., ETS Academic Profile, CAAP) for teacher education candidates and has agreed to assess the content knowledge of its post-baccalaureate or masters' candidates prior to admission.

### **III. STAFF ANALYSIS**

The statute lists six performance criteria that each degree program seeking teacher education authorization needs to meet to gain authorization. The Commission reviewed and approved the admission, counseling, field experience and assessment components of UCB' teacher education program at its May meeting. The State Board of Education recommended approval of the skills and mastery of knowledge in the professional courses at its May meeting. Since the other five criteria were addressed in the May agenda, this agenda focuses on two statutory requirements – (1) ability to complete the degree program in four years and (2) that the degree program has an appropriate mix of general education, content knowledge, and professional knowledge. CCHE's Teacher Education Policy further specifies this criterion in the performance matrix. "CURRICULUM REVIEW will ascertain that the breadth and depth of curriculum prepares the teacher ed. candidate to successfully teach the subject matter taught in a Colorado standards-based classroom at the licensure level (elementary, middle school, secondary) being sought."

To assess the degree that content knowledge, field experience, and professional knowledge are integrated into a performance-based model, the analysis tested if the curriculum of the degree program provided elementary candidates with the breadth of knowledge in reading, writing, mathematics, science, social studies, and science, and depth of knowledge in one of these areas as defined in the K-12 content standards (grades K-6). The analysis of degree programs seeking secondary licensure tested for depth of knowledge as defined in the K-12 content standards (grades 6 – 12). The depth of knowledge test was more rigorous at the secondary licensure level.

In April, UCB defined the general education course requirements that ensure prospective elementary education candidates will have the breadth of knowledge in writing,

mathematics, science, and social studies. Because the content analysis of elementary education programs is strongly dependent on general education courses to meet the content test, the attachment also includes the negotiated general education courses for elementary education. This is the same general education analysis that was published in the May 2001 agenda.

**IV. STAFF RECOMMENDATION:**

**That the Commission approve the authorization for:**

- **American Studies, Astronomy, Distributive Studies – Geology concentration, Physics, Political Science, Psychology, and Spanish for elementary education licensure, and**
- **American Studies, Anthropology, Astronomy, Economics, International Affairs, and Physics for secondary licensure**

**at the University of Colorado at Boulder with the understanding that all undergraduate teacher candidates will be assessed in general education and that candidates to the post-baccalaureate program will pass a content test prior to admission.**

## UCB AMERICAN STUDIES, B.A.

### Elementary Education

| <b>CURRICULUM</b>              | <b>Credits</b> |
|--------------------------------|----------------|
| General Education              | 49             |
| American Studies Major         | 36             |
| Supporting courses             | 0              |
| Professional Knowledge         | 40             |
| <b>GRADUATION REQUIREMENTS</b> | <b>125</b>     |

Students who complete an American Studies degree at UCB are required to enroll in twelve classes (36 credit hours).

|  |                                       |    |
|--|---------------------------------------|----|
| AMST 2000  | Themes in American Culture 1          | 3  |
| AMST 2010  | Themes in American Culture 2          | 3  |
| Completion of one of the tracks in American Studies  |                                       | 15 |
| Track I:   | American Political and Institutions   |    |
| Track II   | American Identities                   |    |
| Track III:   | American Cultures and Societies       |    |
| One upper division course focusing on diversity  |                                       | 3  |
| One upper division course focusing on American democracy<br>or<br>American representation              |                                       | 3  |
| Two of the following classes   |                                       |    |
| AMST 3950  | Critical Thinking in American Studies | 3  |
| AMST 4500  | American Autobiography                | 3  |
| AMST 4950  | Seminar in American Studies           | 3  |
| AMST 4960  | Seminar in American Studies           | 3  |
| One upper division course in the language, culture, or history of a<br>non-North American civilization |                                       | 3  |

### Content Analysis:

The curriculum requirements specified in UCB's American Studies degree program, in conjunction with general education requirements, provides students with the following content knowledge, including:

- Ability to write and speak using conventional grammar, usage, sentence structure, punctuation, capitalization, and spelling (general education writing requirement – composition course)

- Apply thinking skills to reading, writing, speaking, listening, and viewing (general education critical thinking requirement –Critical Thinking in American Studies)
- Understanding that literature is a record of human experience (general education literature requirement – English Literature, Humanities I or Humanities II)
- Knowledge of number systems, algebra, and geometric concepts (general education math courses – Spirit and Uses of Mathematics I & II)
- Ability to use a variety of tools and techniques to measure, apply the results to problem solving situations, and communicate the reasoning used in the situations (general education quantitative reasoning requirement – Spirit & Uses of Mathematics I & II).
- Knowledge of significant events and people in US history and Colorado history (general education history course, Themes in American Culture, American Identities track, American Cultures and Societies track).
- Understand political institutions and how they change over time (general education contemporary societies – American Political Systems, American Political Cultures and Institutions track, American Cultures and Societies track).
- Ability to analyze present day issues (general education ideals and values requirement – Survey of Western Political Thought, American Political Cultures and Institutions track)
- Knowledge of the physical characteristics of places and use this knowledge to define and study regions (liberal arts requirement – World Geography).
- Experience in scientific investigation and design (general education laboratory based science requirement)
- Chemistry and Physics knowledge – understand common properties, forms, and changes in matter and energy (general education science requirement – Physical Science of the Earth System)
- Biology -- Knowledge of the characteristics and structure of living things (general education science requirement – Life Science of the Earth System)
- Earth and Space Science – understand the composition of the earth, processes that shaped it, fundamental processes of weather, and the solar system (general education science requirement – Physical Science of the Earth System)

UCB's American Studies program will provide students with an adequate background in American history, culture, politics, and society. However, from the teacher preparation perspective, the degree program could be strengthened by adding a course (s) on Colorado history and politics. Presently, such a class is absent from the degree requirements for this program.

**Conclusion:**

UCB's American Studies degree program provides the breadth and depth of content knowledge appropriate for students seeking elementary education licensure.

## UCB ASTRONOMY, B.A.

### Elementary Education

| CURRICULUM                     | Credits    |
|--------------------------------|------------|
| General Education              | 47         |
| Astronomy Major                | 39         |
| Supporting Courses             | 4          |
| Professional Knowledge         | 37         |
| <b>GRADUATION REQUIREMENTS</b> | <b>127</b> |

Students who complete an Astronomy degree at UCB are required to enroll in 13 required Astronomy courses (45 credits). Astronomy courses satisfy six general education science credits.

|   |  |    |
|---|--|----|
| Introductory courses                                    |  | 16 |
| ASTR 1010   | Introductory Astronomy I                   | 4  |
| ASTR 1020   | Introductory Astronomy II                  | 3  |
| or  |  |    |
| ASTR 1030   | Accelerated Introductory Astronomy I       |    |
| ASTR 1040   | Accelerated Introductory Astronomy II      |    |
| PHYS 1110   | General Physics                            | 4  |
| PHYS 1120   | General Physics II                         | 4  |
| PHYS 1140   | Experimental Physics                       | 1  |
| Select two from the following courses or paired courses |  | 6  |
| ASTR 3010   | Telescopes and Instrumentation             | 4  |
| ASTR 3020   | Astronomical Observing                     | 4  |
| ASTR 3060   | Introduction to Space Experimentation      | 3  |
| PHYS 2140   | Methods of Theoretical Physics             | 3  |
| PHYS 2150   | Experimental Physics                       | 1  |
| And   |  |    |
| PHYS 2170   | Foundations of Modern Physics              | 3  |
| Select one class from the following                     |  | 3  |
| ASTR 2000   | Ancient Astronomers                        |    |
| ASTR 2010   | Modern Cosmology                           |    |
| ASTR 2020   | Space Astronomy                            |    |
| ASTR 2030   | Black Holes                                |    |
| ASTR 3020   | Astronomical Observing                     |    |
| ASTR 3210   | Intermediate Astronomy: Solar System       |    |
| ASTR 3220   | Intermediate Astronomy: Stars and Galaxies |    |
| Upper division course sequence:                         |  | 6  |
| ASTR 3720   | Planets and Their Atmospheres              |    |

|   |  |    |
|---|--|----|
| ASTR 3750   | Planets, Moons, and Rings                |    |
| or  |  |    |
| ASTR 3730   | Astrophysics 1: Stellar and Interstellar |    |
| ASTR 3830   | Astrophysics 2: Galactic                 |    |
| Select four upper division elective Astronomy courses |  | 12 |
| ASTR 3740   | Cosmology & Relativity                   |    |
| ATOC 4710   | Atmospheric Physics                      |    |
| ATOC 4720   | Atmospheric Dynamics                     |    |
| ASTR 5750   | Observational Astronomy                  |    |
| ASTR 5760   | Astronomical Instrumentation             |    |
| ASTR 4000   | Independent Study and Research           |    |
| Select one critical thinking course:                  |  | 3  |
| ASTR 4800   | Space and Science: Practice & Policy     |    |
| ASTR 4810   | Science and Pseudo-science in Astronomy  |    |

Astronomy students must enroll in 15 credit hours of supporting science courses. Of these, 11 credits are satisfied under general education.

|           |                            |      |
|-----------|----------------------------|------|
| APPM 1350 | Calculus for Engineers     | 4 ge |
| APPM 1360 | Calculus for Engineers II  | 4    |
| EPOB 1011 | Environmental Chemistry I  | 3 ge |
| EPOB 1031 | Environmental Chemistry II | 4 ge |

### **Content Analysis:**

The curriculum requirements specified in UCB's Astronomy degree program, in conjunction with general education requirements, provides students with the following content knowledge, including:

- Ability to write and speak using conventional grammar, usage, sentence structure, punctuation, capitalization, and spelling (general education writing requirement – composition course)
- Apply thinking skills to reading, writing, speaking, listening, and viewing (general education critical thinking requirement – Space and Science: Practice & Policy or Science and Pseudo-science of Astronomy)
- Understanding that literature is a record of human experience (general education literature requirement – English Literature, Humanities I or Humanities II)
- Knowledge of number systems, algebra, and geometric concepts (general education math courses – Spirit and Uses of Mathematics I & II)
- Ability to use a variety of tools and techniques to measure, apply the results to problem-solving situations, and communicate the reasoning used in the situations (general education quantitative reasoning)

- requirement – Spirit & Uses of Mathematics I & II, Calculus for Engineers I & II).
- Knowledge of significant events and people in US history and Colorado history (general education history course).
  - Understand political institutions and how they change over time (general education contemporary societies – American Political Systems).
  - Ability to analyze present day issues (general education ideals and values requirement – Survey of Western Political Thought)
  - Knowledge of the physical characteristics of places and use this knowledge to define and study regions (liberal arts requirement – World Geography).
  - Experience in scientific investigation and design (general education laboratory based science requirement, Astronomy lab courses)
  - Chemistry and Physics knowledge – understand common properties, forms, and changes in matter and energy (general education science requirement – Physical Science of the Earth System, Introductory Astronomy I, General Physics I & II, Experimental Physics)
  - Biology -- Knowledge of the characteristics and structure of living things (general education science requirement – Life Science of the Earth System; Biology: A Human Approach I & II, Biology: A Human Approach Lab)
  - Earth and Space Science – understand the composition of the earth, processes that shaped it, fundamental processes of weather, and the solar system (general education science requirement – Physical Science of the Earth System, Introduction to Geology I & II)

**Conclusion:**

UCB's Astronomy degree program provides the breadth of content knowledge and depth of science knowledge appropriate for students seeking elementary education licensure.

## UCB DISTRIBUTIVE STUDIES (Geology), B.A.

### Elementary Education

| <b>CURRICULUM</b>              | <b>Credits</b> |
|--------------------------------|----------------|
| General Education              | 49             |
| Distributed Studies Major      | 42             |
| Minor/Electives/Supporting     |                |
| Professional Knowledge         | 37             |
| <b>GRADUATION REQUIREMENTS</b> | <b>128</b>     |

Students who enroll in UCB's Distributive Studies degree program select a science concentration area that parallels the curriculum of the corresponding degree program (e.g., Geology). According to the catalog, the Distributed Studies degree is designed for students who are not pursuing a career in science (i.e., science teachers). For example, Geological Science is designed for the future geologist with specific concentrations in Geophysics, Petrology, and Geoscience. This is a general geology degree.

### Geology Concentration

61 credits

Students who complete the Geology Concentration in Distributive Studies at UCB are required to enroll in 61 credits. Of these, six credits satisfy the general education math requirement and 13 credits satisfy the general education science requirement.

|                      |                                |           |
|----------------------|--------------------------------|-----------|
| GEOL 1010            | Intro to Geology I             | 3         |
| GEOL 1020            | Intro to Geology II            | 3         |
| Or                   |                                |           |
| GEOL 1060            | Global Change I                |           |
| GEOL 1070            | Global Change II               |           |
| GEOL 2700            | Intro to Field Geology         | 2         |
| GEOL 3010            | Intro to Mineralogy            | 3         |
| GEOL 3020            | Petrology                      | 3         |
| GEOL 3120            | Structural Geology             | 4         |
| GEOL 3430            | Sedimentology and Stratigraphy | 4         |
| Two of the following |                                | 6 credits |
| GEOL 3320            | Intro to Geochemistry          |           |
| GEOL 3410            | Paleobiology                   |           |
| GEOL 4130            | Principles of Geophysics       |           |
| CHEM 1115            | General Chemistry I            | 5         |
| CHEM 1131            | General Chemistry II           | 5         |
| PHYS 1110            | General Physics I              | 4         |
| PHYS 1120            | General Physics II             | 4         |
| PHYS 1140            | Experimental Physics           | 1         |

|                                     |                           |   |
|-------------------------------------|---------------------------|---|
| EPOB 1210                           | General Biology           | 3 |
| APPM 1350                           | Calculus I for Engineers  | 4 |
| APPM 2300                           | Calculus II for Engineers | 4 |
| Critical thinking course in Science |                           | 3 |

### **Content Analysis:**

The curriculum requirements specified in UCB's Astronomy degree program, in conjunction with general education requirements, provides students with the following content knowledge, including:

- Ability to write and speak using conventional grammar, usage, sentence structure, punctuation, capitalization, and spelling (general education writing requirement – composition course)
- Apply thinking skills to reading, writing, speaking, listening, and viewing (general education critical thinking requirement)
- Understanding that literature is a record of human experience (general education literature requirement – English Literature, Humanities I or Humanities II)
- Knowledge of number systems, algebra, and geometric concepts (general education math courses – Spirit and Uses of Mathematics I & II)
- Ability to use a variety of tools and techniques to measure, apply the results to problem-solving situations, and communicate the reasoning used in the situations (general education quantitative reasoning requirement – Spirit & Uses of Mathematics I & II, Calculus for Engineers I & II).
- Knowledge of significant events and people in US history and Colorado history (general education history course).
- Understand political institutions and how they change over time (general education contemporary societies – American Political Systems, Introduction to Comparative Politics, Survey of Western Political Thought).
- Ability to analyze present day issues (general education ideals and values requirement – Survey of Western Political Thought)
- Knowledge of the physical characteristics of places and use this knowledge to define and study regions (liberal arts requirement – World Geography).
- Experience in scientific investigation and design (laboratory based Chemistry and Geology required courses)
- Chemistry and Physics knowledge – understand common properties, forms, and changes in matter and energy (general education science requirement –General Chemistry I & II, General Physics I, General Physics II, Experimental Physics)
- Biology -- Knowledge of the characteristics and structure of living things (general education science requirement – General Biology)
- Earth and Space Science – understand the composition of the earth, processes that shaped it, fundamental processes of weather, and the

solar system ( Intro to Geology I, Intro to Geology II, Global Change I, Global Change II, Intro to Field Geology, Intro to Mineralogy, Petrology, Structural Geology, Sedimentology and Stratigraphy)

**Conclusion:**

UCB's Distributive Studies degree program – Geology concentration - provides the breadth and depth of content knowledge appropriate for students seeking elementary education licensure.

## UCB PHYSICS, B.A.

### Elementary Education

| <b>CURRICULUM</b>              | <b>Credits</b> |
|--------------------------------|----------------|
| General Education              | 47             |
| Physics Major                  | 31             |
| Supporting                     | 10             |
| Professional Knowledge         | 37             |
| <b>GRADUATION REQUIREMENTS</b> | <b>125</b>     |

Students who complete a Physics degree at UCB are required to enroll in 13 classes (36 credits). Of these, 5 credits satisfy in general education requirements.

|           |  |   |
|-----------|--|---|
| PHYS 1110 | General Physics I                          | 4 |
| PHYS 1120 | General Physics II                         | 4 |
| PHYS 1140 | Experimental Physics I                     | 1 |
| PHYS 2140 | Methods of Theoretical Physics             | 3 |
| PHYS 2150 | Experimental Physics II                    | 1 |
| PHYS 2170 | Foundations of Modern Physics              | 3 |
| PHYS 3210 | Analytical Mechanics                       | 3 |
| PHYS 3220 | Quantum Mechanics and Atomic Physics I     | 3 |
| PHYS 3310 | Principles of Electricity and Magnetism I  | 3 |
| PHYS 3320 | Principles of Electricity and Magnetism II | 3 |
| PHYS 3330 | Junior Laboratory                          | 2 |
| PHYS 4230 | Thermodynamics and Statistical Mechanics   | 3 |
| PHYS 4410 | Quantum Mechanics and Atomic Physics II    | 3 |
| PHYS 4430 | Introduction to Research in Modern Physics | 3 |

In addition, students must enroll in 3 supporting math classes (12 credits).

|           |   |   |
|-----------|---|---|
| MATH 2300 | Analytic Geometry and Calculus II                         | 4 |
| MATH 2400 | Analytic Geometry and Calculus III                        | 4 |
| APPM 2360 | Introduction to Linear Algebra and Differential Equations | 4 |

Required chemistry lab courses satisfied under general education.

### Content Analysis:

The curriculum requirements specified in UCB's Physics degree program, in conjunction with general education requirements, provides students with the following content knowledge, including:

- Ability to write and speak using conventional grammar, usage, sentence structure, punctuation, capitalization, and spelling (general education writing requirement – composition course)
- Apply thinking skills to reading, writing, speaking, listening, and viewing (general education critical thinking requirement – Introduction to Research in Modern Physics )
- Understanding that literature is a record of human experience (general education literature requirement – English Literature, Humanities I or Humanities II)
- Knowledge of number systems, algebra, and geometric concepts (general education math courses – Spirit and Uses of Mathematics I & II)
- Ability to use a variety of tools and techniques to measure, apply the results to problem-solving situations, and communicate the reasoning used in the situations (general education quantitative reasoning requirement – Calculus).
- Knowledge of significant events and people in US history and Colorado history (general education history course – US History Since 1865, Western Civilization II: 16<sup>th</sup> Century to the Present).
- Understand political institutions and how they change over time (general education contemporary societies – American Political Systems).
- Ability to analyze present day issues (general education ideals and values requirement – Survey of Western Political Thought)
- Knowledge of the physical characteristics of places using this knowledge to define and study regions (liberal arts requirement – World Geography).
- Experience in scientific investigation and design (Chemistry I & II, Experimental Physics I & II, Junior Laboratory)
- Chemistry and Physics knowledge – understand common properties, forms, and changes in matter and energy (general education science requirement – Chemistry I & II; physics courses: General Physics I & II, Foundations of Modern Physics, Analytical Mechanics, Quantum Mechanics and Atomic Physics I, Principles of Electricity and Magnetism I, Principles of Electricity and Magnetism II, Thermodynamics and Statistical Mechanics)
- Biology -- Knowledge of the characteristics and structure of living things (general education science requirement – Life Science of the Earth System)
- Earth and Space Science – understand the composition of the earth, processes that shaped it, fundamental processes of weather, and the solar system (general education science requirement – Physical Science of the Earth System)

UCB's undergraduate degree in Physics emphasizes knowledge and awareness of

- the major principles of physics, their historical development, and the roles they play in the various sub-fields of physics

- the importance of physics in other fields such as chemistry, biology, engineering, medicine, and in society at large
- the interrelations between theory and observation, the role of systematic and random experimental errors, and methods used to analyze experimental uncertainty and compare experiment with theory

**Conclusion:**

UCB's Physics degree program provides the breadth and depth of content knowledge appropriate for students seeking elementary education licensure.

## UCB POLITICAL SCIENCE, B.A.

### Elementary Education

| CURRICULUM                     | Credits    |
|--------------------------------|------------|
| General Education              | 49         |
| Political Science Major        | 30         |
| Required supporting courses    | 8          |
| Professional Knowledge         | 37         |
| <b>GRADUATION REQUIREMENTS</b> | <b>124</b> |

Students who complete a Political Science degree at UCB are required to enroll in twelve foundation courses (12 credit hours), five courses in the distribution area (15 credits), two elective courses (6 credits), and one critical thinking course, totaling 36 credits. The credits for *The American Political System* and *Survey of Western Political Thought* courses are counted under the general education requirements.

|           |   |   |
|-----------|---|---|
| PSCI 1101 | The American Political System           | 3 |
| PSCI 2223 | Introduction to International Relations | 3 |
| PSCI 2012 | Introduction to Comparative Politics    | 3 |
| PSCI 2004 | Survey of Western Political Thought     | 3 |

Students must complete 15 hours distributed in four primary political science fields:

|                    |  |   |
|--------------------|--|---|
| <u>American</u>    |  | 6 |
| PSCI 3011          | The American Presidency                          |   |
| PSCI 3031          | Political Parties and Pressure Groups            |   |
| PSCI 3041          | The American Congress                            |   |
| PSCI 3051          | Public Opinion and Political Behavior            |   |
| PSCI 3061          | State Government and Politics                    |   |
| PSCI 3171          | Government and Capitalism in the United States   |   |
| PSCI 3191          | National Security Organization and Policy Making |   |
| PSCI 4111          | Urban Problems and Public Policies               |   |
| PSCI 4131          | Latinos and the US Political System              |   |
| PSCI 4241          | Constitutional Law I                             |   |
| PSCI 4251          | Constitutional Law II                            |   |
| PSCI 4721          | Rethinking American Politics                     |   |
| <u>Comparative</u> |  | 3 |
| PSCI 3062          | Revolution and Political Violence                |   |
| PSCI 3072          | Government and Politics in Southeast Asia        |   |
| PSCI 4002          | Western European Politics                        |   |
| PSCI 4012          | Global Development                               |   |
| PSCI 4272          | The Political Economy of Industrial Societies    |   |
| PSCI 4732          | Critical Thinking in Development                 |   |

|                      |                                     |   |
|----------------------|-------------------------------------|---|
| <u>International</u> |                                     | 3 |
| PSCI 3123            | War, Peace, and Strategic Defense   |   |
| PSCI 3143            | Problems in International Relations |   |
| PSCI 3163            | American Foreign Policy             |   |
| PSCI 4173            | International Organization          |   |
| PSCI 4183            | International Law                   |   |
| PSCI 4783            | Global Issues                       |   |

|               |                                    |   |
|---------------|------------------------------------|---|
| <u>Theory</u> |                                    | 3 |
| PSCI 3054     | American Political Thought         |   |
| PSCI 4094     | Classical Greek Political Thought  |   |
| PSCI 4224     | Rationality, Democracy, and Policy |   |
| PSCI 4704     | Politics and Language              |   |
| PSCI 4714     | Liberalism and Its Critics         |   |

|                                    |                       |   |
|------------------------------------|-----------------------|---|
| Required critical thinking course: |                       |   |
| PSCI 4751                          | The Politics of Ideas | 3 |

|  |                              |   |
|--|------------------------------|---|
| Students must enroll in two supporting courses (8 credit hours). |                              |   |
| ECON 2010  | Principles of Microeconomics | 4 |
| ECON 2020  | Principles of Macroeconomics | 4 |

### **Content Analysis:**

The curriculum requirements specified in UCB's Political Science degree program, in conjunction with general education requirements, provides students with the following content knowledge, including:

- Ability to write and speak using conventional grammar, usage, sentence structure, punctuation, capitalization, and spelling (general education writing requirement – composition course)
- Apply thinking skills to reading, writing, speaking, listening, and viewing (general education critical thinking requirement –The Politics of Ideas)
- Understanding that literature is a record of human experience (general education literature requirement – English Literature, Humanities I or Humanities II)
- Knowledge of number systems, algebra, and geometric concepts (general education math courses – Spirit and Uses of Mathematics I & II)
- Ability to use a variety of tools and techniques to measure, apply the results to problem-solving situations, and communicate the reasoning used in the situations (general education quantitative reasoning requirement – Spirit & Uses of Mathematics I & II).
- Knowledge of significant events and people in US history and Colorado history (general education history course).
- Understand political institutions and how they change over time (general education contemporary societies – American Political Systems, Introduction to Comparative Politics, Survey of Western Political Thought).

- Ability to analyze present day issues (general education ideals and values requirement – Survey of Western Political Thought, Introduction to International Relations, Introduction to Comparative Politics)
- Knowledge of the physical characteristics of places and use this knowledge to define and study regions (liberal arts requirement – World Geography).
- Experience in scientific investigation and design (general education laboratory based science requirement)
- Chemistry and Physics knowledge – understand common properties, forms, and changes in matter and energy (general education science requirement – Physical Science of the Earth System)
- Biology -- Knowledge of the characteristics and structure of living things (general education science requirement – Life Science of the Earth System)
- Earth and Space Science – understand the composition of the earth, processes that shaped it, fundamental processes of weather, and the solar system (general education science requirement – Physical Science of the Earth System)

UCB's Political Science program will provide students with breadth of knowledge in reading, writing, mathematics, science and social studies and deeper knowledge in social studies, emphasizing American, comparative, and international politics.

**Conclusion:**

UCB's Political Science degree program provides the breadth and depth of content knowledge appropriate for students seeking elementary education licensure.

## UCB PSYCHOLOGY, B.A.

### Elementary Education

| <b>CURRICULUM</b>              | <b>Credits</b> |
|--------------------------------|----------------|
| General Education              | 49             |
| Psychology Major               | 35             |
| Electives                      | 0              |
| Professional Knowledge         | 37             |
| <b>GRADUATION REQUIREMENTS</b> | <b>121</b>     |

Students who complete a Psychology degree at UCB are required to enroll in seven foundation Psychology classes (24 credits), and an interdisciplinary track in Biological Psychology or Cognitive Psychology (11 credits), totaling 35 credit hours.

|           |   |   |
|-----------|---|---|
| PSYC 1001 | General Psychology                            | 4 |
| PSYC 2012 | Biological Psychology                         | 3 |
| PSYC 2145 | Cognition and Perception                      | 3 |
| PSYC 2606 | Social Psychology                             | 3 |
| PSYC 3101 | Statistics and Research Methods in Psychology | 4 |
| PSYC 3102 | Behavioral Genetics                           | 3 |

Select one of the following courses to satisfy general education critical thinking requirement: 3

|           |                                    |
|-----------|------------------------------------|
| PSYC 3105 | Experimental Methods in Psychology |
| PSYC 4521 | Critical Thinking in Psychology    |

Select three courses in one of the following tracks 11

A. Biological Psychology (Biology and Psychology)

|           |                          |   |
|-----------|--------------------------|---|
| PSYC 4052 | Behavioral Neuroscience  | 4 |
| PSYC 4122 | Quantitative Genetics    | 3 |
| PSYC 4165 | Psychology of Perception | 4 |

B. Cognitive Psychology (Linguistics, Cognitive Science, and Psychology)

|           |                          |   |
|-----------|--------------------------|---|
| PSYC 3005 | Cognitive Science        | 3 |
| PSYC 4145 | Cognitive Psychology     | 4 |
| PSYC 4165 | Psychology of Perception | 4 |
| PSYC 4205 | Psychology of Learning   | 4 |
| PSYC 4684 | Developmental Psychology | 3 |

## **Content Analysis:**

The curriculum requirements specified in UCB's Psychology degree program, in conjunction with general education requirements, provides students with the following content knowledge, including:

- Ability to write and speak using conventional grammar, usage, sentence structure, punctuation, capitalization, and spelling (general education writing requirement – composition course)
- Apply thinking skills to reading, writing, speaking, listening, and viewing (general education critical thinking requirement—Critical Thinking in Psychology)
- Understanding that literature is a record of human experience (general education literature requirement – two of the following courses: Humanities I or Humanities II, Masterpieces of British Literature, Masterpieces of English Literature, Shakespeare, Modern and Contemporary Literature)
- Knowledge of number systems, algebra, and geometric concepts (general education math courses – Spirit and Uses of Mathematics I & II)
- Ability to use a variety of tools and techniques to measure, apply the results to problem solving situations, and communicate the reasoning used in the situations (general education quantitative reasoning requirement – Spirit & Uses of Mathematics I & II).
- Knowledge of significant events and people in US history and Colorado history (general education history course – US History Since 1865).
- Understand political institutions and how they change over time (general education contemporary societies – American Political Systems).
- Ability to analyze present day issues (general education ideals and values requirement – Survey of Western Political Thought)
- Knowledge of the physical characteristics of places and use this knowledge to define and study regions (liberal arts requirement – World Geography).
- Experience in scientific investigation and design (general education General Biology I & II labs)
- Chemistry and Physics knowledge – understand common properties, forms, and changes in matter and energy (general education science requirement – Physical Science of the Earth System)
- Biology -- Knowledge of the characteristics and structure of living things (general education science requirement – General Biology I & II)
- Earth and Space Science – understand the composition of the earth, processes that shaped it, fundamental processes of weather, and the solar system (general education science requirement – Physical Science of the Earth System)

According to UCB's 2001-02 catalog, UCB's undergraduate degree program in Psychology emphasizes (1) social and biological background of human nature, (2) research bases necessary for understanding and predicting behavioral

outcomes, (3) the development and amelioration of abnormal thoughts, feelings, and behavior, (4) mechanics of heredity, neural transmission, plasticity, development, and aging, (5) an integrated historical overview of modern psychology, (6) knowledge of major ideas and scholars in Psychology, and (7) ethical issues germane to research investigation and practice of psychology as a profession.

UCB has developed two tracks that are natural science based: Biological Psychology and Cognitive Psychology.

The analysis concluded that:

- The breadth of knowledge as defined in the K-6 content standards is addressed by the general education courses. Therefore, all Psychology majors will complete the prescribed general education requirements for elementary education, approved on the May 2001 Commission agenda (attached) Specifically, students may not use literature in translation courses to substitute for general education literature courses for elementary education students (i.e., Introduction to Humanities, Masterpieces of British Literature, Masterpieces of English Literature, Shakespeare, Modern and Contemporary Literature).
- The five required Psychology foundation courses provide knowledge about the influences operating in social situations, the psychological attributes of a person in generating human behavior, and research methods appropriate to psychological research. The content of these courses enhance the content of the professional knowledge courses while the content of the emphasis areas supplement the content knowledge in science or reading.
- The Biological Psychology emphasis supplements the student's knowledge of science by emphasizing the biological and psychological connections between behavior and genetics, the functioning of the human nervous system, and the physiological and neurological aspects of perception. It addresses the K-6 science standard – knowledge of how the human body functions and factors that influence its structures and functions. With the general education General Biology I & II, the student should have a good understanding of the skeletal, respiratory, circulatory, nervous, reproductive systems.
- The Cognitive emphasis area provides students with knowledge of linguistic rules, conceptual structure and metaphor, logic, problem solving and judgment and addresses two content standards
  - Develop the phonological and linguistic skills related to reading (K-6 reading standard).

- Ability to use a variety of tools and techniques to measure, apply the results to problem solving situations, and communicate the reasoning used in the situations (K-6 science standard).

**Conclusion:**

UCB's Psychology degree program, with the required Biological or Cognitive emphasis area, provides students seeking an elementary education licensure with the appropriate content knowledge and experiences.

## UCB SPANISH, B.A.

### Elementary Education

| <b>CURRICULUM</b>              | <b>Credits</b> |
|--------------------------------|----------------|
| General Education              | 49             |
| Spanish Major                  | 30             |
| Required Emphasis Area         | 12             |
| Professional Knowledge         | 37             |
| <b>GRADUATION REQUIREMENTS</b> | <b>128</b>     |

Students who complete a Spanish degree at UCB are required to enroll in nine Spanish courses (29 credits) and complete an emphasis in Linguistics or History (12 credits).

#### Written Communication Skills:

|           |                                   |   |
|-----------|-----------------------------------|---|
| SPAN 3000 | Advanced Spanish Language Skills  | 5 |
| SPAN 3120 | Advanced Spanish Grammar          | 3 |
| SPAN 4010 | Advanced Rhetoric and Composition | 3 |

#### Oral Communication Skills

|           |  |   |
|-----------|--|---|
| SPAN 3050 | Spanish Phonology and Phonetics        | 3 |
| or        |  |   |
| SPAN 4430 | Special Topics in Hispanic Linguistics |   |
| or        |  |   |
| SPAN 4440 | Introduction to Hispanic Linguistics   |   |

#### Spanish Literature:

|             |  |    |
|-------------|--|----|
| SPAN 4150-3 | Masterpieces of Spanish Literature to 1700         | 10 |
| or          |  |    |
| SPAN 4160-3 | Masterpieces of Spanish Literature 1700 to Present |    |

SPAN 4170-3 Masterpieces of Spanish American Literature 1700 to Present

or  
SPAN 4180-3 Masterpieces of Spanish American Literature 1898 to Present

SPAN 4220-1 Special Topics in Spanish or Spanish American Literature

#### Critical Thinking

SPAN 3100 Literary Analysis in Spanish 3

#### Spanish Culture

SPAN 3200 Spanish Culture 3  
or  
SPAN 3210 The Cultural Heritage of Latin America

In addition, each student seeking elementary licensure will complete one of the two emphasis areas:

Linguistics emphasis 12 credits

LING 1500 Basic Traditional Grammar

LING 2000 Introduction to Linguistics

LING 4030 Linguistic Phonetics

LING 4420 Morphology & Syntax

History emphasis 12 credits

HIST 1010 Western Civilization I: From Antiquity to the 16<sup>th</sup> century

HIST 1015 History of the United States to 1865

HIST 4215 The Revolutionary War and the Making of the American Republic

Or

HIST 4225 The New Nation America: 1800-1828

Or

HIST 4315 Civil War and Reconstruction

HIST 2117 History of Colorado

Or

HIST 2227 History of the American Southwest

Or

HIST 2537 Chicano History

### **Content Analysis:**

The curriculum specified in UCB's Spanish degree program, in conjunction with general education requirements and one of the selected emphasis areas, provides students with the following content knowledge, including:

- Ability to write and speak using conventional grammar, usage, sentence structure, punctuation, capitalization, and spelling (general education writing requirement – composition courses)
- Apply thinking skills to reading, writing, speaking, listening, and viewing (general education critical thinking requirement—Literary Analysis in Spanish)
- Understanding that literature is a record of human experience (general education literature requirement – English Literature, Humanities I or Humanities II)
- Knowledge of number systems, algebra, and geometric concepts (general education math courses – Spirit and Uses of Mathematics I & II)
- Ability to use a variety of tools and techniques to measure, apply the results to problem solving situations, and communicate the reasoning used in the situations (general education quantitative reasoning requirement – Spirit & Uses of Mathematics I & II).

- Knowledge of significant events and people in US history and Colorado history (general education history courses – US History Since 1865, Western Civilization II: 16<sup>th</sup> Century to the Present).
- Understand political institutions and how they change over time (general education contemporary societies – American Political Systems).
- Ability to analyze present day issues (general education ideals and values requirement – Survey of Western Political Thought)
- Knowledge of the physical characteristics of places and use this knowledge to define and study regions (liberal arts requirement – World Geography).
- Experience in scientific investigation and design (general education laboratory based science requirement)
- Chemistry and Physics knowledge – understand common properties, forms, and changes in matter and energy (general education science requirement – Physical Science of the Earth System)
- Biology -- Knowledge of the characteristics and structure of living things (general education science requirement – Life Science of the Earth System)
- Earth and Space Science – understand the composition of the earth, processes that shaped it, fundamental processes of weather, and the solar system (general education science requirement – Physical Science of the Earth System).

To meet the content knowledge test used in elementary education to determine if a student has sufficient depth of knowledge in language arts, social studies, science, or mathematics for elementary education – the primary subjects taught in a K-6 classroom, the analysis examined the general education courses, courses required in the major, and those in the required emphasis area. The analysis concluded that:

- The breadth of knowledge needed as defined in the K-6 content standards is addressed by the general education courses. Therefore, all Spanish majors will complete the negotiated general education requirements for elementary education, approved on the May 2001 Commission agenda (attached) No Spanish courses will be used to satisfy the general education literature requirements. Specifically, Spanish majors may not use Spanish translation courses to substitute for general education literature courses for elementary education students (i.e., Introduction to Humanities, Masterpieces of British Literature, Masterpieces of English Literature, Shakespeare, Modern and Contemporary Literature).
- Because the courses of the Spanish major do not provide depth of knowledge in the content standards defined for K-6, the program was redesigned to include a mandatory 12 credits in one of two emphasis areas: Linguistics or History.
- The proposed Linguistics emphasis supplements the language acquisition skills of the Spanish major by providing knowledge in the fundamental

architecture of language, emphasizing phonetics, phonology, morphology, syntax and semantics. The four courses will enhance the Spanish major's ability to write and speak using conventional grammar, usage, sentence structure, and punctuation and aligns with the reading and writing K-6 standards.

- The history emphasis, whose courses are listed above, also is a viable emphasis for Spanish. It complements the Spanish culture course required in the major and supplements the two required general education history courses. The History emphasis aligns with the History standards for the elementary classroom, requires knowledge of Colorado History that is lacking in all other UCB degree programs approved for elementary authorization, and reinforces the students' knowledge of geography.
  - Chronologically organizing significant events, groups, and people in the history of Colorado -K-4 standard (History of Colorado, History of the American Southwest)
  - Describing significant events and people which form the foundation of United States History - 4-8 standard (US History To 1865, Revolutionary War, New Nation: America, Civil War and Reconstruction)
  - Explaining how the cultures of the earliest civilizations spread and interacted - 4-8 standard. (Western Civilization I: Antiquity to 16<sup>th</sup> Century,).

### **Conclusion:**

UCB's Spanish degree program, with the required Linguistics or History emphasis areas, provides students seeking an elementary education licensure with the appropriate content knowledge and experiences. Because of the poor performance record on the PLACE exam by Spanish majors, the Spanish degree program's performance data will be reviewed and student interviews will be conducted in 2002-2003.

## UCB AMERICAN STUDIES, B.A.

### Secondary Social Studies Education

| <b>CURRICULUM</b>              | <b>Credits</b> |
|--------------------------------|----------------|
| General Education              | 43             |
| American Studies Major         | 36             |
| Electives                      | 7              |
| Professional Knowledge         | 34             |
| <b>GRADUATION REQUIREMENTS</b> | <b>120</b>     |

Students who complete an American Studies degree at UCB are required to enroll in twelve classes (36 credit hours).

|           |                              |   |
|-----------|------------------------------|---|
| AMST 2000 | Themes in American Culture 1 | 3 |
| AMST 2010 | Themes in American Culture 2 | 3 |
| AMST 3950 | Methods in American Studies  | 3 |

Completion of one of the tracks in American Studies, consisting of five upper-division courses and representing at least two different departments, plus one course from one of the two tracks not chosen (18 credits). These tracks include:

Track I: American Political Cultures and Institutions

Track II: American Identities

Track III: American Cultures and Societies

Two of the following classes:

|           |                             |   |
|-----------|-----------------------------|---|
| AMST 4500 | American Autobiography      | 6 |
| AMST 4950 | Seminar in American Studies |   |
| AMST 4960 | Seminar in American Studies |   |

One upper division course in the language, culture, or history of a Non-North American civilization 3

### **Content Analysis:**

The curriculum requirements specified in UCB's American Studies degree program, in conjunction with general education requirements, provides students with the following content knowledge, including:

- Understanding the chronological organization of history and how to organization events and people into major eras to identify and explain historical relationships (general education history course—US History Since 1865, American Identities Track, Themes In American Culture I-II)
- Understanding that societies are diverse and have changed over time (Themes in American Culture I-II, American Cultures and Societies Track)

- Knowledge of how political institutions and theories have developed and changed over time (general education contemporary societies—American Political Systems, American Political Cultures and Institutions Track)
- Knowledge of how religious and philosophical ideas have been powerful forces throughout history (general education ideals and values requirement—Survey of Western Political Thought, American Political Cultures and Institutions Track)
- Understanding how science, technology, and economic activity have developed and changed over time (American Political Cultures and Institutions Track)
- Understanding the purposes of government, the basic constitutional principles of the United States republican form of government (American Political Cultures and Institutions Track)
- Knowledge of the structure and function of local, state, and national government and how citizen involvement shapes public policy (American Political Cultures and Institutions Track)
- Knowledge of the political relationship of the United States and its citizens to other nations and to world affairs (American Identities and American Political Cultures and Institutions Tracks)
- Understanding how citizens exercise the roles, rights, and responsibilities of participation in civic life at all levels—local, state, and national (general education contemporary societies—American Political Systems, American Political Cultures and Institutions Track)

UCB's American Studies program will provide students with an adequate background in American history, culture, politics, and society. However, from the teacher preparation perspective, the degree program could be strengthened by adding a course on Colorado history and politics.

UCB's American Studies degree program emphasizes knowledge and awareness of

- the main topics in the cultural history of the United States, from its origins to the present
- at least three disciplinary approaches to the cultural study of the United States

### **Conclusion:**

UCB's American Studies degree program provides the breadth and depth of content knowledge appropriate for students seeking secondary social studies education licensure.

## UCB ANTHROPOLOGY, B.A.

### Secondary Social Studies Education

| <b>CURRICULUM</b>              | <b>Credits</b> |
|--------------------------------|----------------|
| General Education              | 46             |
| Anthropology Major             | 30             |
| Electives                      | 10             |
| Professional Knowledge         | 34             |
| <b>GRADUATION REQUIREMENTS</b> | <b>120</b>     |

Students who complete an Anthropology degree at UCB are required to enroll in three Anthropology courses (9 credits) and seven elective Anthropology courses (21 credits).

|           |                                       |   |
|-----------|---------------------------------------|---|
| ANTH 2010 | Introduction to Physical Anthropology | 3 |
| ANTH 2100 | Frontiers of Cultural Anthropology    | 3 |
| ANTH 2200 | Introduction to Anthropology          | 3 |

|  |   |   |
|--|---|---|
| One upper division topical course in cultural anthropology |   | 3 |
| ANTH 3170  | America: An Anthropological Perspective             |   |
| ANTH 4500  | Cross-Cultural Aspects of Socioeconomic Development |   |
| ANTH 4510  | Applied Cultural Anthropology                       |   |
| ANTH 4520  | Symbolic Anthropology                               |   |
| ANTH 4590  | Urban Anthropology                                  |   |
| ANTH 4600  | Human Ecology: Cultural Aspects                     |   |

|  |  |   |
|--|--|---|
| One upper division ethnographic area course in cultural anthropology |  | 3 |
| ANTH 3100  | Africa: Peoples and Societies in Change      |   |
| ANTH 3110  | Ethnography of Mexico and Central America    |   |
| ANTH 3130  | North American Indians: Traditional Cultures |   |
| ANTH 3160  | Peoples of the South Pacific                 |   |
| ANTH 4560  | North American Indian Acculturation          |   |
| ANTH 4740  | Peoples and Cultures of Brazil               |   |
| ANTH 4750  | Culture and Society in South Asia            |   |
| ANTH 4760  | Ethnography of Southeast Asia and Indonesia  |   |

|  |   |   |
|--|---|---|
| One upper division course in archaeology |   | 3 |
| ANTH 4200                                | North American Archaeology                |   |
| ANTH 4210                                | Southwestern Archaeology                  |   |
| ANTH 4220                                | Archaeology of Mexico and Central America |   |
| ANTH 4230                                | Settlement Archaeology                    |   |
| ANTH 4270                                | Plains Archaeology                        |   |
| ANTH 4330                                | Environmental Archaeology                 |   |
| ANTH 4410                                | Archaeology of Ancient Near East          |   |
| ANTH 4420                                | Archeology of Ancient Egypt               |   |

|  |   |   |
|--|---|---|
| ANTH 4430  | Biblical Archaeology                              |   |
| One upper division course in physical anthropology |   | 3 |
| ANTH 3000  | Primate Behavior                                  |   |
| ANTH 3010  | The Human Animal                                  |   |
| ANTH 4060  | Nutrition and Anthropology                        |   |
| ANTH 4080  | Anthropological Genetics                          |   |
| ANTH 4110  | Human Evolutionary Biology                        |   |
| ANTH 4120  | Advanced Physical Anthropology                    |   |
| ANTH 4150  | Human Ecology: Biological Aspects                 |   |
| ANTH 4170  | Primate Evolutionary Biology                      |   |
| Three upper division electives                     |   | 9 |
| Critical thinking class in anthropology:           |   |   |
| ANTH 4180  | Anthropological Perspectives: Contemporary Issues | 3 |

### **Content Analysis:**

The curriculum requirements specified in UCB's Anthropology degree program provides students with the following content knowledge, including:

- Understanding the chronological organization of history and how to organize events and people into major eras to identify and explain historical relationships (Frontiers of Cultural Anthropology)
- Understanding that societies are diverse and have changed over time (Frontiers of Cultural Anthropology, upper division required course in cultural anthropology, upper division required course in ethnographic area in cultural anthropology, Anthropological Perspectives: Contemporary Issues)
- Knowledge of how political institutions and theories have developed and changed over time (Not fulfilled by the degree requirements)
- Knowledge of how religious and philosophical ideas have been powerful forces throughout history (Frontiers of Cultural Anthropology, upper division required course in cultural anthropology)
- Understanding how science, technology, and economic activity have developed and changed over time (combination of anthropology courses and general education required courses)

UCB's undergraduate degree in Anthropology emphasizes knowledge and awareness of:

- Variation, patterning, and creativity in human social behavior and symbolic systems

- Primate evolution, including theories of human evolution and the basic data of the hominid fossil record, as well as biological variation in contemporary human populations
- Identify trends or patterns in anthropological data from different cultures or periods and identify an appropriate context of explanation or interpretation

**Conclusion:**

UCB's Anthropology degree program provides the breadth and depth of content knowledge appropriate for students seeking secondary social studies licensure.

## UCB ASTRONOMY, B.A.

### Secondary Science Education

| CURRICULUM                        | Credits    |
|-----------------------------------|------------|
| General Education                 | 43         |
| Astronomy Major                   | 45         |
| Math & science supporting courses | 8          |
| Professional Knowledge            | 31         |
| <b>GRADUATION REQUIREMENTS</b>    | <b>127</b> |

Students who complete an Astronomy degree at UCB are required to enroll in 13 required Astronomy courses (45 credits). Astronomy courses satisfy six general education science credits.

|   |  |    |
|---|--|----|
| Introductory courses                                    |  | 16 |
| ASTR 1010   | Introductory Astronomy I                   | 4  |
| ASTR 1020   | Introductory Astronomy II                  | 3  |
| or  |  |    |
| ASTR 1030   | Accelerated Introductory Astronomy I       |    |
| ASTR 1040   | Accelerated Introductory Astronomy II      |    |
| PHYS 1110   | General Physics                            | 4  |
| PHYS 1120   | General Physics II                         | 4  |
| PHYS 1140   | Experimental Physics                       | 1  |
| Select two from the following courses or paired courses |  | 6  |
| ASTR 3010   | Telescopes and Instrumentation             | 4  |
| ASTR 3020   | Astronomical Observing                     | 4  |
| ASTR 3060   | Introduction to Space Experimentation      | 3  |
| PHYS 2140   | Methods of Theoretical Physics             | 3  |
| PHYS 2150   | Experimental Physics                       | 1  |
| And   |  |    |
| PHYS 2170   | Foundations of Modern Physics              | 3  |
| Select one class from the following                     |  | 3  |
| ASTR 2000   | Ancient Astronomers                        |    |
| ASTR 2010   | Modern Cosmology                           |    |
| ASTR 2020   | Space Astronomy                            |    |
| ASTR 2030   | Black Holes                                |    |
| ASTR 3020   | Astronomical Observing                     |    |
| ASTR 3210   | Intermediate Astronomy: Solar System       |    |
| ASTR 3220   | Intermediate Astronomy: Stars and Galaxies |    |
| Upper division course sequence:                         |  | 6  |

|   |  |    |
|---|--|----|
| ASTR 3720   | Planets and Their Atmospheres            |    |
| ASTR 3750   | Planets, Moons, and Rings                |    |
| or  |  |    |
| ASTR 3730   | Astrophysics 1: Stellar and Interstellar |    |
| ASTR 3830   | Astrophysics 2: Galactic                 |    |
| Select four upper division elective Astronomy courses |  | 12 |
| ASTR 3740   | Cosmology & Relativity                   |    |
| ATOC 4710   | Atmospheric Physics                      |    |
| ATOC 4720   | Atmospheric Dynamics                     |    |
| ASTR 5750   | Observational Astronomy                  |    |
| ASTR 5760   | Astronomical Instrumentation             |    |
| ASTR 4000   | Independent Study and Research           |    |
| Select one critical thinking course:                  |  | 3  |
| ASTR 4800   | Space and Science: Practice & Policy     |    |
| ASTR 4810   | Science and Pseudo-science in Astronomy  |    |

Astronomy students must enroll in 25 credit hours of supporting science courses. Of these, 17 credits are satisfied under general education.

|           |                            |      |
|-----------|----------------------------|------|
| APPM 1350 | Calculus for Engineers     | 4 ge |
| APPM 1360 | Calculus for Engineers II  | 4    |
| CHEM 1011 | Environmental Chemistry I  | 3 ge |
| CHEM 1031 | Environmental Chemistry II | 4 ge |
| EPOB 1210 | General Biology I          | 3 ge |
| EPOB 1220 | General Biology II         | 3    |
| EPOB 1230 | General Biology Laboratory | 1    |
| GEOL 1010 | Introduction to Geology    | 3 ge |

### **Content Analysis:**

The curriculum requirements specified in UCB's Astronomy degree program, in conjunction with general education requirements, provides students with the following content knowledge, including:

- Understanding the processes of scientific investigation and ability to design, conduct, and communicate such investigations (Introductory Astronomy I-II, General Physics I-II, Intermediate Astronomy I-II, Space Experimentation, Accelerated Introductory Astronomy I-II, Introduction to Space Experimentation, Experimental Physics, Astronomical Observing, Observational Astronomy)

- Knowledge of the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment (General Biology I-II, Biology Laboratory)
- Understanding the processes and interactions of Earth's systems and the structure and dynamics of Earth and other objects in space (Introductory Astronomy I-II, Planets and Their Atmospheres, Introduction to Geology I-II, Accelerated Introductory Astronomy I-II, Introduction to Space Experimentation, Astronomical Observing, Space Astronomy, Modern Cosmology, Astronomical Observing, Intermediate Astronomy I-II, Planets, Moons, and Rings, Atmospheric Dynamics)
- Knowledge of the interrelationships among science, technology, and human activity and how they can affect the world (general education science courses, Space and Science: Practice & Policy -- Critical Thinking in the Sciences)
- Understanding the common properties, forms, and changes in matter and energy (General Physics I-II, Experimental Physics, Foundations of Modern Physics, Methods of Theoretical Physics, Astrophysics 1-2, Atmospheric Physics, Introduction to Geology)
- Understanding that science involves a particular way of knowing and understanding common connections among scientific disciplines (astronomy, physics, math, and biology courses in major)

**Conclusion:**

UCB's Astronomy degree program provides the breadth of content knowledge and depth of science knowledge appropriate for students seeking secondary science education.

## UCB ECONOMICS, B.A.

### Secondary Social Studies Education

| <b>CURRICULUM</b>              | <b>Credits</b> |
|--------------------------------|----------------|
| General Education              | 43             |
| Economics Major                | 33             |
| Electives                      | 11             |
| Professional Knowledge         | 34             |
| <b>GRADUATION REQUIREMENTS</b> | <b>120</b>     |

Students who complete an Economics degree at UCB are required to enroll in nine core economic classes (32 credits)

|                                   |   |   |
|-----------------------------------|---|---|
| ECON 1000                         | Introduction to Economics                             | 4 |
| Or                                |   |   |
| ECON 2010                         | Principles of Microeconomics                          |   |
| ECON 2020                         | Principles of Macroeconomics                          | 4 |
| ECON 1078                         | Mathematical Tools of Economists I                    | 3 |
| ECON 1088                         | Mathematical Tools of Economists II                   | 3 |
| Or                                |   |   |
| Six hours of Math Modules         |   | 6 |
| Or                                |   |   |
| MATH 1050                         | Linear Equations and Matrices                         | 1 |
| MATH 1060                         | Linear Programming                                    | 1 |
| MATH 1070                         | Combinatorics and Probability                         | 1 |
| MATH 1300                         | Analytic Geometry and Calculus I                      | 5 |
| ECON 3070                         | Intermediate Microeconomics Theory                    | 3 |
| ECON 3080                         | Intermediate Macroeconomics Theory                    | 3 |
| ECON 3818                         | Introduction to Statistics with Computer Applications | 4 |
| ECON 4808                         | Introduction to Mathematical Economics                | 3 |
| Or                                |   |   |
| ECON 4818                         | Introduction to Econometrics                          |   |
| ECON 4838                         | Microcomputer Applications in Economics               | 3 |
| Required critical thinking class: |   |   |
| ECON 4999                         | Economics in Action: A Capstone Course                | 3 |

## **Content Analysis:**

The curriculum requirements specified in the Economic degree program provide students with the following content knowledge, including:

- Knowledge that because of the condition of scarcity, decisions must be made about the use of resources (Introduction to Economics, Principles of Microeconomics, Principles of Macroeconomics)
- Understanding how different economic systems impact decisions concerning the use of resources and the production and distribution of goods and services (Economics in Action: A Capstone Course, Intermediate Macroeconomic Theory)
- Understanding the results of trade, exchange, and interdependence among individuals, households, businesses, governments, and societies (Economics in Action: A Capstone Course, Principles of Macroeconomics)

UCB's Economics degree program provides depth of knowledge in mathematics content with an interesting foundation in technology applications.

UCB's Economic degree program emphasizes knowledge and awareness of

- the descriptive statistics commonly used by economists
- the institutional characteristics of the U.S. economy and how they differ from those used in other countries
- the tools of microeconomic theory to reach sound conclusions for simple economic problems
- the arguments concerning macroeconomic theory, to distinguish between sound and fallacious reasoning, and understand how differences in policy prescription may arise
- how to perform statistical analyses, such as multiple regression, and understand similar analyses performed by others

## **Conclusion:**

UCB's Economics degree program provides the breadth and depth of content knowledge appropriate for students seeking secondary social studies education licensure.

## UCB INTERNATIONAL AFFAIRS, B.A.

### Secondary Social Studies Education

| <b>CURRICULUM</b>              | <b>Credits</b> |
|--------------------------------|----------------|
| General Education              | 46             |
| International Affairs Major    | 45             |
| Professional Knowledge         | 31             |
| <b>GRADUATION REQUIREMENTS</b> | <b>122</b>     |

Students who complete an International Affairs degree (Option II) at UCB are required to enroll in 5 core classes (18 credits), six courses in the selected emphasis areas (18 credits), and three courses in an area of concentration (12 credits) and a critical thinking course (3 credits). Of these, six credits satisfy general education requirements.

|           |   |   |
|-----------|---|---|
| ECON 1000 | Introduction to Economics               | 4 |
| Or        |   |   |
| ECON 2010 | Principles of Microeconomics            | 4 |
| ECON 2020 | Principles of Macroeconomics            | 4 |
| IAFS 1000 | Global Issues and International Affairs | 4 |
| PSCI 2012 | Introduction to Comparative Politics    | 3 |
| PSCI 2223 | Introduction to International Relations | 3 |

Option I: Complete one course from each of the following seven categories and complete 12 hours of upper division courses concentrating on a region outside of the United States

Option II: Complete one course from six of the following seven categories and complete 12 hours of upper division courses concentrating on a region outside the United States.

No more than four courses out of the seven categories may be from one department. IAFS 3000 Special Topics in International Affairs could count for one upper division category depending on the specific topic.

#### **Areas of Concentration:**

##### Development and Culture

|           |   |   |
|-----------|---|---|
| ANTH 4500 | Cross-Cultural Aspects of Socioeconomic Development | 3 |
| ANTH 4510 | Applied Cultural Anthropology                       | 3 |
| ECON 3545 | Environmental Economics                             | 3 |
| ECON 4606 | Introduction to Economic Demography                 | 3 |
| ECON 4774 | Economic Reform in Developing Countries             | 3 |

|           |  |   |
|-----------|--|---|
| GEOG 3672 | Gender and Global Economy                    | 3 |
| GEOG 3682 | Geography of International Development       | 3 |
| IAFS 4700 | Global Perspectives and Political Philosophy | 3 |
| LING 3545 | World Language Policies                      | 3 |
| PSCI 4012 | Global Development                           | 3 |
| PSCI 4732 | Critical Thinking in Development             | 3 |

#### International Economics/Business

|           |                                    |   |
|-----------|------------------------------------|---|
| ECON 3403 | International Economics and Policy | 3 |
| ECON 4413 | International Trade                | 3 |
| ECON 4423 | International Finance              | 3 |
| INBU 4200 | International Financial Management | 3 |

#### Political Economy

|           |   |   |
|-----------|---|---|
| ECON 4433 | Economics of the Pacific Area               | 3 |
| ECON 4784 | Economic Development                        | 3 |
| ECON 4999 | Economics in Action                         | 3 |
| INBU 4100 | International Business and Marketing        | 3 |
| PSCI 4272 | Political Economy of Industrialized Society | 3 |

#### Political Geography

|           |                     |   |
|-----------|---------------------|---|
| GEOG 4721 | Political Geography | 3 |
|-----------|---------------------|---|

#### International Relations/Behavior

|           |                                     |   |
|-----------|-------------------------------------|---|
| ANTH 4580 | Power: The Anthropology of Politics | 3 |
| PSCI 3121 | War, Peace, and Strategic Defense   | 3 |
| PSCI 3143 | International Relations             | 3 |
| PSCI 3193 | International Behavior              | 3 |

#### Foreign Policy

|           |  |   |
|-----------|--|---|
| HIST 4050 | The World War Era                                | 3 |
| HIST 4126 | Diplomatic History of the US Since 1940          | 3 |
| HIST 4166 | The War in Vietnam and its Legacy                | 3 |
| PSCI 3191 | National Security Organization and Policy Making | 3 |
| PSCI 3163 | American Foreign Policy                          | 3 |
| RLST 4550 | Religion, War, Peace                             | 3 |

#### Regimes, Norms, and Institutions

|           |                                    |   |
|-----------|------------------------------------|---|
| PHIL 3260 | International Human Rights         | 3 |
| PSCI 3062 | Revolution and Political Violence  | 3 |
| PSCI 4173 | International Organization         | 3 |
| PSCI 4183 | International Law                  | 3 |
| PSCI 4213 | Europe in the International System | 3 |
| PSCI 4703 | Alternative World Futures          | 3 |
| PSCI 4783 | Global Issues                      | 3 |

**Content Analysis:**

The curriculum requirements specified in UCB's International Affairs degree program in conjunction with general education requirements, provides students with the following content knowledge, including:

- Understanding the chronological organization of history and how to organization events and people into major eras to identify and explain historical relationships (Diplomatic History of the US Since 1940, Introduction to International Relations, Introduction to Comparative Politics).
- Understanding that societies are diverse and have changed over time (Cross-Cultural Aspects of Socioeconomic Development, Global Issues and International Affairs, Applied Cultural Anthropology)
- Knowledge of how political institutions and theories have developed and changed over time (Introduction to International Relations, Introduction to Comparative Politics, Global Perspectives and Political Philosophy, Global Issues and International Affairs)
- Knowledge of how religious and philosophical ideas have been powerful forces throughout history (Global Perspectives and Political Philosophy, Religion, War, and Peace)
- Understanding how science, technology, and economic activity have developed and changed over time (Economic Development, Political Economy of Industrialized Society, Economics in Action)
- Understanding the purposes of government, the basic constitutional principles of the United States republican form of government (general education contemporary societies – American Political Systems, National Security Organization and Policy Making, American Foreign Policy)
- Knowledge of the structure and function of local, state, and national government and how citizen involvement shapes public policy (general education contemporary societies – American Political Systems)
- Knowledge of the political relationship of the United States and its citizens to other nations and to world affairs (Introduction to International Relations, Introduction to Comparative Politics, Global Issues)
- Understanding how citizens exercise the roles, rights, and responsibilities of participation in civic life at all levels—local, state, and national (International Law, Introduction to International Relations, Global Perspectives and Political Philosophy)

UCB's International Affairs degree program emphasizes the knowledge and awareness of

- the major political, economic, social, and cultural problems facing international community
- the international political system in the broadest global context
- the ethical issues involved in international relations

It is strongly aligned with the secondary social studies content standards and parallels the topical history standards

**Conclusion:**

UCB's International Affairs degree program provides students seeking secondary education licensure with appropriate content knowledge.

## UCB PHYSICS, B.A.

### Secondary Education

| <b>CURRICULUM</b>                 | <b>Credits</b> |
|-----------------------------------|----------------|
| General Education                 | 44             |
| Physics major                     | 42             |
| Supporting math & science courses | 11             |
| Professional Knowledge            | 31             |
| <b>GRADUATION REQUIREMENTS</b>    | <b>127</b>     |

Students who complete a Physics degree at UCB are required to enroll in 12 classes (33 credits), three electives (9 credits), and one critical thinking course (3 credits). Of these, three credits satisfy the general education science requirement.

|           |  |   |
|-----------|--|---|
| PHYS 1110 | General Physics I  | 4 |
| PHYS 1120 | General Physics II   | 4 |
| PHYS 1140 | Experimental Physics I   | 1 |
| PHYS 2140 | Methods of Theoretical Physics                                 | 3 |
| PHYS 2150 | Experimental Physics II  | 1 |
| PHYS 2170 | Foundations of Modern Physics                                  | 3 |
| PHYS 3210 | Analytical Mechanics   | 3 |
| PHYS 3220 | Quantum Mechanics and Atomic Physics I                         | 3 |
| PHYS 3310 | Principles of Electricity and Magnetism I                      | 3 |
| PHYS 3320 | Principles of Electricity and Magnetism II                     | 3 |
| PHYS 3330 | Junior Laboratory  | 2 |
| PHYS 4230 | Thermodynamics and Statistical Mechanics                       | 3 |
| PHYS 4430 | Introduction to Research in Modern Physics - Critical Thinking | 3 |

Physics majors are required to enroll in 6 supporting math and science courses (24). Of these, 14 credits are satisfied in general education courses.

|                              |  |   |
|------------------------------|--|---|
| MATH 1300<br>or<br>APPM 1350 | Analytic Geometry and Calculus I<br>Calculus I for Engineers     | 4 |
| MATH 2300<br>or<br>APPM 1360 | Analytic Geometry and Calculus II<br>Calculus II for Engineers   | 4 |
| MATH 2400<br>or<br>APPM 2350 | Analytic Geometry and Calculus III<br>Calculus III for Engineers | 3 |

|           |   |   |
|-----------|---|---|
| APPM 2360 | Introduction to Linear Algebra and Differential Equations | 4 |
| or        |   |   |
| MATH 3130 | Introduction to Linear Algebra                            | 3 |
| and       |   |   |
| MATH 4430 | Ordinary Differential Equations                           | 3 |
| CHEM 1111 | General Chemistry I                                       | 5 |
| CHEM 1131 | General Chemistry II                                      | 5 |

### **Content Analysis:**

The curriculum requirements specified in UCB's Physics degree program, in conjunction with general education requirements, provides students with the following content knowledge, including:

- Understanding the processes of scientific investigation and design, conduct, and ability to communicate such investigations (General Physics I-II, General Chemistry I & II, Junior Laboratory)
- Knowledge of the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment (not addressed)
- Understanding the processes and interactions of Earth's systems and the structure and dynamics of Earth and other objects in space (not addressed)
- Knowledge of the interrelationships among science, technology, and human activity and how they can affect the world (general education science courses, Introduction to Research in Modern Physics)
- Understanding the common properties, forms, and changes in matter and energy (General Physics I, General Physics II, Experimental Physics I, Methods of Theoretical Physics, Analytical Mechanics, Quantum Mechanics and Atomic Physics I, Principles of Electricity and Magnetism I, Principles of Electricity and Magnetism II, Junior Laboratory, Thermodynamics and Statistical Mechanics, Quantum Mechanics and Atomic Physics II)
- Understanding that science involves a particular way of knowing and understanding common connections among scientific disciplines (physics, chemistry, and math courses)

UCB's undergraduate degree in Physics emphasizes knowledge and awareness of

- the major principles of physics, their historical development, and the roles they play in the various sub-fields of physics

- the importance of physics in other fields such as chemistry, biology, engineering, medicine, and in society at large
- the interrelations between theory and observation, the role of systematic and random experimental errors, and methods used to analyze experimental uncertainty and compare experiment with theory.

With four high-level math courses, this student is better prepared to teach mathematics than biology or geology.

**Conclusion:**

UCB's Physics degree program provides adequate breadth in math and science and depth of physical science knowledge appropriate for students seeking secondary science licensure.

**TOPIC:                    AUTHORIZATION OF SECONDARY ENDORSEMENTS AND  
DEGREE PROGRAMS FOR SPECIAL SERVICES, PRINCIPALS  
AND ADMINISTRATORS**

**PREPARED BY:        DIANE LINDNER**

**I.        SUMMARY**

In the past four months, the Commission has approved initial teacher licensure programs at fifteen colleges and universities. Frequently, practicing teachers expand their teaching options by obtaining a second teaching endorsement. These secondary endorsements require that the candidate have qualified for initial licensure either prior to or in conjunction with the secondary endorsement. Consequently, the required courses for secondary endorsement are focused on the particular teaching skills or content area. Student teaching is not normally required for a second endorsement, except for Special Education.

The Special Services and Administrative licenses are associated with professional degree programs. The Colorado Commission on Higher Education (CCHE) and the Colorado Department of Education (CDE) have agreed that the standard degree approval process would function as the licensure review and approval for this group of programs.

CCHE and CDE are recommending approval of secondary endorsements offered by the public and private four-year colleges in Colorado including

- 9 Linguistically Diverse Programs in Bilingual and/or English as a Second Language
- 5 Reading Teacher and/or Reading Specialist programs
- 26 Special Education endorsements ranging from Early Childhood to Special Education for Profound Needs Children
- 25 Special service degree programs
- 14 Administrative licensure programs

**II.        BACKGROUND**

Prior to Senate Bill 99-154, the Colorado Department of Education approved programs that led to Secondary endorsements. Senate Bill 99-154 transferred the approval for programs leading to Secondary endorsements such as Bilingual Education and Reading Teacher for teacher licensure to the Colorado Commission on Higher Education. Second endorsements are endorsements added to a teacher's license as a second or even third endorsement. These include Reading and Linguistically Diverse (Bilingual, English as a Second Language) endorsements. Second endorsements, Special Services, principals and administrators programs may be offered within graduate or undergraduate degree programs currently approved by the Commission. The Commission has already reviewed the curriculum and in many cases, the candidates must already hold initial teacher licensure to qualify for the

endorsement program. Some students also enter as non-degree-seeking students to complete some of these endorsements such as School Principal or School Psychologist.

The State Board of Education has determined when a particular endorsement requires a graduate degree, baccalaureate degree, or may be obtained outside a degree program. In an effort to maintain consistency with the State Board of Education rules, the Commission staff recommend that the endorsements be approved within programs as they now exist. A comprehensive review of the subsequent endorsements will be completed in conjunction with CDE during the next phase of reviews for teacher education programs.

### III. STAFF ANALYSIS

The following institutions have approval for the endorsements as listed. These programs have been offered successfully by the institution, with the original authorization under State Board of Education rules.

| Institution                      | Licensure       |   | Degree                  |
|----------------------------------|-----------------|---|-------------------------|
| <b>Adams State College</b>       |                 |   |                         |
| Linguistically Diverse:          |                 |   |                         |
| Bilingual Education              | Elem, Sec, K-12 | U | Bilingual Ed.           |
| English as a Second Language     | Elem, Sec, K-12 | U | ESL                     |
| Principal                        | K-12            | G | Ed. Leadership          |
| Counselor                        | Elem, Sec       | G | Counseling              |
| Special Education-Moderate Needs | Ages 5-21       | G | Spec. Ed.               |
| <b>Colorado State University</b> |                 |   |                         |
| Counselor                        | Ages 0-21       | G | Master of Ed.           |
| Linguistically Diverse:          |                 |   |                         |
| English as a Second Language     | Sec             | G | M.A. English            |
| School Administrator             | K-12            | G | Master of Ed.           |
| Occupational Therapist           | Ages 0-21       | U | Occupational<br>Therapy |
| School Principal                 | K-12            | G | Master of Ed.           |
| School Social Worker             | Ages 0-21       | G | MSW                     |
| <b>Fort Lewis College</b>        |                 |   |                         |
| Linguistically Diverse:          |                 |   |                         |
| Bilingual                        | Elem            | U | Degrees<br>Approved for |

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|   |                 |   |  |
|---|-----------------|---|--|
|   |                 |   | Initial licensure                            |
| English as a Second Lang.                                   | Elem, Sec       | U | Degrees<br>Approved for<br>Initial licensure |
| <b>Metropolitan State College of Denver</b>                 |                 |   |  |
| School Nurse  | K-12            | U | Nursing                                      |
| Linguistically Diverse Bilingual                            | Elem            | U |  |
| Special Education: Moderate Needs                           | Ages 5-21       | U | Individually<br>Constructed Pending<br>CCHE  |
| <b>Regis University</b>                                     |                 |   |  |
| Linguistically Diverse:                                     |                 |   |  |
| Bilingual   | Elem, Sec, K-12 | G |  |
| English as a Second Language                                | Elem, Sec, K-12 | G |  |
| School Nurse  | Ages 0-21       | U |  |
| Special Ed Teacher 1: Moderate Needs                        | Ages 5-21       | G |  |
| Special Ed Teacher 4: Early Childhood                       | Ages 0-5        | G |  |
| <b>University of Colorado at Boulder</b>                    |                 |   |  |
| Audiologist   | Ages 0-21       | G | Comm. Disorders<br>& Speech Sci.             |
| Linguistically Diverse:                                     |                 |   |  |
| Bilingual   | Elem            | G | Social,<br>Multicultural &<br>Bilingual      |
| English as a Second Lang.                                   | Elem, Sec       | G | Social,<br>Multicultural &<br>Bilingual      |
| Reading Teacher   | K-12            | G | Instruction and<br>Curriculum                |
| Speech/Language<br>Pathologist                              | Ages 0-21       | G | Comm. Disorders<br>& Speech Sci.             |
| Special Education Teacher 1: Moderate Needs                 | Ages 5-21       |   | Instruction and<br>Curriculum                |
| <b>UNIVERSITY OF COLORADO HEALTH SCIENCES CENTER-DENVER</b> |                 |   |  |

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|   |                 |     |  |
|---|-----------------|-----|--|
| Physical Therapy  | Ages 0-21       | U   | Physical Th.                                       |
| School Nurse  | Ages 0-21       | U/G | Nursing  |
| <br><b>University of Colorado at Colorado Springs</b>       |                 |     |  |
| Counselor   | Ages 0-21       | G   | Guidance and<br>Human Services                     |
| Reading Teacher   | Elem, Sec, K-12 | G.  | Curr.& Instr                                       |
| School Administrator  | K-12            | G   | Curr.& Instr                                       |
| School Principal  | K-12            | G   | Curr.&Instr.                                       |
| Special Education Teacher 1:<br>Moderate Needs              | Ages 5-21       | U/G | Special Ed.  |
| Special Education Teacher 2:<br>Severe Needs: Cognitive     | Ages 5-21       | U/G | Special Ed.  |
| Special Education Teacher 2:<br>Severe Needs: Affective     | Ages 5-21       | U/G | Special Ed   |
| <br><b>University of Colorado at Denver</b>                 |                 |     |  |
| Counselor   | Ages 0-21       | G   | M.A.<br>Counseling Psychology<br>and Counselor Ed. |
| Linguistically Diverse:<br>Bilingual                        | Elem, Sec, K-12 | G   | M.A.<br>Curriculum                                 |
| Instruction<br>English as a Second Language                 | Elem, Sec, K-12 | G   | M.A.<br>Curriculum Instruction                     |
| Reading Teacher   | Elem, Sec, K-12 | G   | M.A.<br>Curriculum Instruction                     |
| School Administrator  | K-12            | G   | Ed. Specialist                                     |
| School Library Media  | Elem, Sec, K-12 | G   | Information and<br>Learning Technologies           |
| School Principal  | K-12            | G   | Ed. Specialist                                     |
| School Psychologist   | Ages 0-21       | G   | Ed Specialist                                      |
| Special Education Teacher 1:<br>Moderate Needs              | Ages 5-21       | G   | Special Ed.  |
| Special Education Teacher 2:<br>Severe Needs: Cognitive     | Ages 5-21       | G   | Special Ed   |
| Special Education Teacher 2:<br>Severe Needs: Affective     | Ages 5-21       | G   | Special Ed   |
| Special Education Teacher 2:<br>Severe Needs: Communication | Ages 5-21       | G   | Special Ed   |
| Special Education Teacher 3:                                |                 |     |  |

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|--|-----------------|-----|--------------------------------|
| Profound Needs   | Ages 0-21       | G   | Special Ed                     |
| Special Education Teacher 4:<br>Early Childhood Special Ed | Ages 0-5        | G   | Special Ed.                    |
| <b>University of Denver</b>                                |                 |     |                                |
| Counselor  | Ages 0-21       | G   |                                |
| Director, Special Education                                | K-12            | G   |                                |
| School Administrator                                       | K-12            | G   |                                |
| School Principal   | K-12            | G   |                                |
| School Psychologist  | Ages 0-21       | G   |                                |
| School Social Worker                                       | Ages 0-21       | G   |                                |
| Special Education Teacher 1:<br>Moderate Needs             | Ages 0-21       | G   |                                |
| Special Education Teacher 4:<br>Early Childhood            | Ages 0-5        | G   |                                |
| <b>University of Northern Colorado</b>                     |                 |     |                                |
| Audiologist  | Ages 0-21       | G   | M.A. Severe Needs<br>Hearing   |
| Counselor  | Ages 0-21       | G   | M.A. Counseling                |
| Director, Special Education                                | K-12            | G   | Post M.A. Special<br>Education |
| Linguistically Diverse:                                    |                 |     |                                |
| Bilingual  | Elem, Mdl, Sec  | U   |                                |
| English as a Second Language                               | Elem, Mdl, Sec  | U   |                                |
| Orientation & Mobility                                     | Ages 0-21       | G   | M.A. Vision                    |
| Reading Teacher  | Elem, Sec, K-12 | G   | M.A. Reading                   |
| Reading Specialist   | K-12            | G   | Post M.A. Reading              |
| School Administrator                                       | K-12            | G   | M.A. Ed.<br>Leadership         |
| School Principal   | K-12            | G   | “ “                            |
| School Library Media                                       | Elem, Sec, K-12 | G   | M.A. Ed. Media                 |
| School Nurse   | Ages 0-21       | U   | Nursing                        |
| School Psychologist  | Ages 0-21       | G   | M.A.School<br>Psychology       |
| Special Education Teacher1:<br>Moderate Needs              | Ages 5-21       | U/G | Special Ed.                    |
| Special Education Teacher 2:<br>Severe Needs: Cognitive    | Ages 5-21       | G   | Special Ed.                    |
| Special Education Teacher 2:<br>Severe Needs: Affective    | Ages 5-21       | G   | Special Ed.                    |
| Special Education Teacher 2:<br>Severe Needs: Vision       | Ages 0-21       | G   | Special Ed.                    |
| Special Education Teacher 2:                               |                 |     |                                |

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|   |                       |        |   |
|---|-----------------------|--------|---|
| Severe Needs: Hearing<br>Special Education Teacher 2:       | Ages 0-21             | G      | Special Ed.   |
| Severe Needs: Communication<br>Special Education Teacher 3: | Ages 5-21             | G      | Special Ed.   |
| Profound Needs<br>Special Education Teacher 4:              | Ages 0-21             | U/G    | Special Ed.   |
| Early Childhood<br>Speech/Language Pathologist              | Ages 0-5<br>Ages 0-21 | G<br>G | Special Ed.<br>M.A. Com.<br>Disorders:<br>Speech-Lang.<br>Pathology |
| <br><b>University of Phoenix</b>                            |                       |        |   |
| Counselor   | Elem, Sec, K-12       | G      |   |
| Linguistically Diverse:<br>English as a Second Language     | Elem, Sec, K-12       | G      |   |
| School Principal  | K-12                  | G      |   |
| <br><b>Western State College</b>                            |                       |        |   |
| Elem/Sec Ed. + Moderate Needs                               | K-12                  | U      | Commisson-<br>approved  |
| <br><b>University of Southern Colorado</b>                  |                       |        |   |
| School Nurse  | K-12                  |        | Nursing   |

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**IV. STAFF RECOMMENDATION**

**That the Commission approve the listed special services, secondary endorsements, principal and administrator programs. Full review of these programs will occur within ongoing education program reviews.**

**Appendix A**

**STATUTORY AUTHORITY**

(C.R.S. 23-2-121 (2) On or before July 1, 2000, the commission shall adopt policies establishing the requirements for teacher preparation programs offered by institutions of higher education. The commission shall work in cooperation with the state board of education in developing the requirements for teacher preparation programs. At a minimum, the requirements shall ensure that each teacher preparation program may be completed within four academic years, is designed on a performance-based model, and ...

**TOPIC:                   PROGRAMS OF EXCELLENCE**

**PREPARED BY:       JOANN EVANS**

**I.       SUMMARY**

*Program of Excellence* is Colorado's most prestigious academic honor. Each year the Commission seeks nominations of those programs that exemplify quality and high levels of academic performance. The designation of this honor recognizes programs that excel and demonstrate a continuing commitment to outstanding performance. The award entitles each program to five years of enhancement funding.

The governing boards nominated 29 degree programs for consideration in this year's selection process ([Attachment A](#)). An external review panel, composed of noted professionals in the arts, business, engineering, health, humanities, science and technology, completed its evaluation and forwarded a list of semi-finalists to the Commission sub-committee. The Commission sub-committee members included Commissioners Robert Hessler, Peggy Lamm and James Stewart. The subcommittee reviewed each of the nine semi-finalist proposals and forwarded its recommendations to the Commission for action.

The General Assembly has appropriated \$4,441,483 for the 2001-2002 Programs of Excellence Awards. These funds will support twenty programs that are in years two, three, four and five of their funding cycles at \$3,070,968 and \$1,370,515 for new awards. Every Program of Excellence Award is limited to five years of funding and the award is non-renewable. This provides the program with enhancement funding for a short period of time while they are building the program and seeking other outside funding. A hand-out available at the June Commission meeting will provide a detailed funding recommendation for the new and continuing programs.

**II.       STAFF RECOMMENDATIONS**

- 1.       That the Commission approve the recommendation of the sub-committee and designate the selected programs as the 2001 Programs of Excellence.**
- 2.       That the Commission approve the funding recommendation for the 2001-2002 fiscal year.**

**Appendix A**

**STATUTORY AUTHORITY**

21-1-118 (1) ...Program nominations by the governing boards shall be submitted to the commission at a time to be prescribed by the commission. .... “programs of excellence” means any academic program or consortium of programs of a state-supported institution of higher education that directly enrolls students and is distinguished by the quality of the educational experience that it offers and by the quality of the faculty and students it can attract.

(2) The commission, after consultation with the governing boards, shall develop and employ criteria for identifying programs of excellence in state institutions of higher education. Employing the criteria adopted, the commission shall designate programs and centers of excellence, which shall number not more than five percent of the academic programs offered in state-supported institutions of higher education. Programs of excellence designations shall be reviewed annually by the commission.

**Attachment A**

**2001 NOMINATIONS  
PROGRAMS OF EXCELLENCE**

Nominees are listed in alphabetical order by program name.

**ART**

**Adams State College**

The Adams State College Art Department is an active, vital, successful, and innovative program, committed to achieving artistic and academic excellence in a small college environment. The primary mission of the Art Department is to provide undergraduate and graduate education in the visual arts. Undergraduate programs prepare students for careers in studio art, design, and art education. The masters program provides art educators with a resource for professional growth and studio artists with a resource for developing proficiency in their chosen media. In addition, the department is committed to providing cultural enrichment and service to the campus and surrounding community. Each year the department presents a rich variety of art exhibitions, guest lectures, workshops, festivals, and art-making events to the college, public schools and local community.

The Art Department has anticipated the essential role that technology will play in the 21<sup>st</sup> century, not only in art education, but in the very creation of art itself. By judiciously incorporating modern instructional technology into a program firmly grounded in the fundamentals of artistic expression, the art faculty will be able to enhance student learning, incorporate art across the curriculum, and ensure the professional success of graduates.

**BIOLOGY**

**Fort Lewis College**

The Fort Lewis College Biology Department has maintained a consistently excellent program of study since the inception of the baccalaureate degree in 1964 at FLC. Individual student development is the focus of the four-year curriculum that is marked by a high level of faculty/student interaction, course design that fosters critical thinking, an emphasis on communication skills, and a requirement of all majors to complete independent research projects. With about 50 graduates per year, the biology department is one of the largest on the FLC campus.

The program has been recognized by the Council on Undergraduate Research, which listed Fort Lewis as fifth in the nation in both the number of Biology graduates per 1000 students enrolled and in the number of graduates who go on to enroll in graduate programs.

Alumni of the biology department have been well prepared for post-graduate activities. Of the more than one thousand graduates since 1964 (whose post-graduate pursuits are known), 45% completed or are enrolled in formal post-graduate education including 15% who have received or are successfully working on doctoral degree programs. More than three quarters of graduates entered biologically, scientifically, or technically related fields.

The Biology program has a curriculum acknowledged by both students and faculty as one of the most rigorous on campus. The five benchmarks of effective educational practices that capture many of the dimensions students view as important to their undergraduate experience include: 1) level of academic challenge; 2) active and collaborative learning; 3) student interactions with faculty members; 4) an enriching educational experience, and 5) a supportive campus environment. The Biology department embodies these traits by providing students with the highest quality of educational experience.

## **BIOLOGY**

### **Mesa State College**

The Department of Biology at Mesa State College is committed to offering the finest science instruction in the state. It provides students educational opportunities that are unique. The combination of excellent faculty, dedicated students, state of the art facilities, and modest institutional support enables Mesa State College to provide outstanding service to its students and community. The department maintains strong ties with local state and federal agencies, health care facilities, and local industry. The biology program fosters academic excellence and research experience for undergraduates. The department of biology has the only fully equipped electron microscope facility on the western slope and has developed the Western Colorado Center for Tropical Research. Many graduates from the program go on to pursue advanced degrees in medicine and research as well as in teaching and industry.

The biology faculty believes that undergraduate biology majors should be trained as scholars and scientists first and as biologists second. In addition, students should be trained in practical scientific and laboratory skills that will allow them to successfully compete in the existing job market for biology graduates. The department offers field experiences beyond the scope of the normal classroom setting by providing opportunities for students to conduct ecological studies in Costa Rica and Puerto Rico in conjunction with the MSC Western Colorado Center for Tropical Research. The department's primary mission is to offer the highest quality educational experience possible in order to prepare students for professional employment, postgraduate education or to provide significant enrichment to their intellectual foundations as they choose any number of career paths.

**BUSINESS – MBA PROGRAM**  
**Colorado State University**

With a curriculum that focuses on issues that are timely and timeless, the Distance MBA program at Colorado State University has pursued and preserved excellence as its cornerstone. Through the efforts of the MBA Programs Committee, a body comprised of faculty and staff, the MBA program curriculum is designed to address timeless issues such as ethics, communications, leadership, and cross-cultural differences. In addition, the curriculum has a strong focus on more timely issues such as the role of the internet in business relationships, managing in a networked environment, compensation, marketing and financial models in the new economy, among others. The College of Business faculty structure their courses in a rigorous manner designed to enhance the learning of the student. The on-campus courses are videotaped and sent to distance students weekly. In addition, each video discussion is augmented by an extensive on-line component that provides distance students the opportunity to share and debate ideas relative to the class materials or case discussions. This provides the distance student with an opportunity to view the professor's lecture, including his or her interaction with the students. Several classes require students to participate in virtual team projects. This not only offers corporate and timely experiences for students as they learn how to coordinate and participate in virtual meetings, but the students also benefit from the interactions with other students. This curriculum was identified by the AACSB – the International Association for Management education as one of the outstanding features of the Program. In addition, the program at Colorado State University was rated in the top 20 Distance Learning MBA program (Forbes 1998).

**CHEMICAL ENGINEERING**  
**The University of Colorado at Boulder**

The Department of Chemical Engineering at the University of Colorado has 62 graduate students, 247 undergraduates, and 14 full-time faculty. Its innovative Ph.D. program includes inter-disciplinary courses and research training in the exciting new field of nanoscale engineering. The program is characterized by a high level of faculty-student collaboration, including both graduate and undergraduate students, and participation of industry through the Department's centers and programs. The faculty are widely recognized for excellence in both teaching and research, with eight faculty receiving university or national teaching awards and 13 faculty receiving major national research awards. The Ph.D. students are also outstanding, with the highest average undergraduate grade-point-average (3.74/4.00) of all science and engineering programs, outstanding average GRE scores of 2010/2400, and the largest number of National Science Foundation Fellows (eight) of any department in the state. Graduates from the program have gone on to excel as leaders in academia, commerce, and government.

**CHEMISTRY AND BIOCHEMISTRY**  
**University of Colorado at Boulder**

Chemistry and Biochemistry are vital components of education in science, engineering, and medicine and have become essential tools in Colorado high tech industries. The University of Colorado has an internationally renowned Chemistry and Biochemistry program and faculty. The graduate program attracts the very best students in the field and provides an essential research, technology, and personnel base for surrounding industry. There are increasingly extensive applied research collaborations with newly developing fields of applied chemistry, the state's corporate sector, and national laboratories. The program attracts world-renowned scientists to present lectures, collaborate on new research directions, and enhance the training of students. The undergraduate program currently builds on these interdisciplinary research links through informal undergraduate research, development of new interdisciplinary courses, limited use of state of the art research instrumentation, and the Honors program.

**COMPUTER INFORMATION SYSTEMS**  
**University of Southern Colorado**

The Computer Information Systems Department at the University of Southern Colorado has established a quality program characterized by excellence in preparation for the Bachelor of Science degree in Computer Information Systems. The key factor driving the success of the program is the strength of relationships with the program's external constituents. The program emphases include effective use of technology in the curriculum and an abundance of opportunities for hands-on, applied student learning through internships, cooperative education experiences, and team-based community projects. The unique curriculum was developed and is maintained through an interactive feedback process between faculty and a computer industry advisory board. The advisory board has provided curricular recommendations and feedback throughout the history of the program. As a result, the curriculum emphasizes the importance of strong conceptual foundations, reinforced by the use of state-of-the-art technologies in the classroom and laboratories, and an abundance of "real world" experiences. In addition to the large number of internship and work opportunities for students and graduates, the faculty has developed collaborative opportunities and partnerships with regional industry and educational institutions through programs such as a department sponsored Information Technology Guest Lecture Series, participation in the annual Education Extravaganza, a summer high school Computer Camp, and a regional K-12 Web Page Design Contest. The faculty has strong academic records with a minimum of two years of full-time professional work experience. The department has been a proven leader in teaching and service to the University as demonstrated by the receipt of numerous teaching and scholarly activity awards, and extensive participation in all facets of faculty governance.

**CREATIVE WRITING**  
**Colorado State University**

The Creative Writing Program at Colorado State University will be bringing Colorado public school language arts teachers to campus for a series of innovative and high profile Book Weeks that will draw together professors and students from many disciplines on campus. These twice-yearly literary festivals will feature nationally prominent writers reading and discussing their work as it relates to a literary topic of broad popular appeal.

At the undergraduate and graduate level, the Creative Writing Program offers a sequence of courses in fiction, poetry and creative nonfiction writing and is staffed by nine distinguished writers who teach workshops in their specialty and work one-on-one with undergraduates, advising them on courses and careers, writing letters of recommendation, helping them make decisions about jobs, fellowships, and graduate study. Faculty act as mentors for graduate students, preparing them for opportunities, and attendance at literary and academic conferences.

**ECOLOGY**  
**Colorado State University**

Colorado State University's Graduate Degree Program provides state-of-the-art education and research experience, using the expertise and research support of more than 90 professors and agency scientists in the Ft. Collins area.

Ecology provides the scientific foundation for developing sustainable strategies in agriculture and natural resources human societies, under changing conditions in Colorado and around the world. CSU has great strengths in ecological sciences, ranging from ecology of agricultural systems to atmosphere/biosphere interactions at global scales.

**EMERGENCY MEDICAL SERVICES**  
**Pueblo Community College**

The program provides a high quality of educational experience for its students as demonstrated by the performance of students on state and national certification examinations. According to state certification examination statistics, 92% of all students successfully obtain Colorado certification as Emergency Medical Technician-Basic, Emergency Medical Technician-Intermediate, or Emergency Medical Technician-Paramedic upon program completion. In addition, 96% of all graduating Paramedics were employed within 90 days following Colorado certification. The continual growth of this unique partnership between Pueblo Community College and Parkview Medical Center (PMC) demonstrates the high quality experience of combining both academic and real-life health care experience into a joint effort.

The quality of students is high. In order to ensure student success, the EMS program reviews the academic skills and preparation of each student as they enter advanced life support classes.

Students routinely participate in various community service projects, including providing support to charitable events throughout the community.

This combination of technical medical expertise and academic structure has developed an outstanding program that provides the student with every possible opportunity to learn those skills and knowledge necessary to provide life saving emergency care in their communities.

## **ENGINEERING PHYSICS**

### **Colorado School of Mines**

Current and future education in science and technology must prepare students for the diverse technological changes which will occur in their lifetime. To cope with these changes, the Engineering Physics students at the Colorado School of Mines receive an education based upon a sound foundation in fundamental science combined with a depth of practical technical understanding. The need for understanding of fundamental science increases as diverse technologies drive the economy and become prevalent in our society. To cope with future changes in technology, the students educated at CSM must have a sound understanding of basic science in addition to a depth of technical understanding in their uses. The CSM Engineering-Physics curriculum carefully balances general knowledge in fundamental science with specific practical engineering skills. This unique set of skills is in demand from high technology industries. As one of the largest physics programs in the country, Physics at CSM reflects the demand for such an education as well as for the quality Colorado School of Mine's approach allows. The curriculum is presented in a nurturing environment, as is evident by the Society of Physics Students winning the national Outstanding Chapter Award 11 times in the last 21 years.

## **FISHERY AND WILDLIFE BIOLOGY**

### **Colorado State University**

For more than 50 years Colorado State University's unique program in Fishery and Wildlife Biology has prepared students to be stewards of natural resources. With 425 undergraduate majors, 58 graduate students, and 2,788 alumni, the program is repeatedly recognized in national surveys as one of the top two programs (out of 90). The faculty and students place first in nation-wide rankings of scholarly productivity. Faculty serve on editorial and governing boards of numerous professional societies and have earned international, national, and state awards for excellence in research, teaching, and outreach. Fishery and wildlife biology was the first academic program to emphasize the importance of incorporating public input and two-way communication in decision-making for wildlife policy. The program has an international reputation for developing new quantitative methods in applied ecology and conservation biology. Results of these initiatives have often had important policy implications. The faculty has worked to remediate the toxic effects of mining wastes, pesticides, and other contaminants in aquatic and terrestrial habitats and food webs. Each year external research grants exceeding \$3 million help students gain essential field experience as they apply what they learn. They have diversified the gender and cultural background of the students by attracting highly qualified individuals from

throughout the state and nation so that women comprise half of the graduates. The students participate in on-campus seminars and forums, professional activities through self-organized student chapters, in research projects with faculty members, and have coauthored scientific publications in nationally peer-reviewed journals.

## **GEOCHEMISTRY**

### **Colorado School of Mines**

The Interdisciplinary Geochemistry Program at CSM is a cooperative graduate program granting degrees in geochemistry at the M.S. and Ph.D. levels and is run by fifteen faculty in the Departments of Chemistry & Geochemistry and Geology & Geological Engineering. Following restructuring in 1991, the program was granted membership in the Western Regional Graduate Program and tripled student enrollment. The Program is the second largest in the USA, with the exceptional breadth of faculty research and teaching expertise, and places about 5 students in the workforce annually.

The geochemistry program has focused on developing a program with two attributes; 1) applied areas of geochemistry are emphasized, and 2) these applications have a direct impact on the environmental and natural resources of Colorado. This focus has helped to ensure a quality educational experience for students and has benefited the citizens of Colorado in general. The excellence of the graduate geochemistry program at CSM most directly benefits government agencies and industries within the State of Colorado.

## **GEOLOGY**

### **Western State College of Colorado**

The Geology Program at Western has provided an excellent undergraduate education for forty years. This program is based on a broad background in the geologic sciences with a solid field-based experience in order to prepare graduates for a variety of careers in education, industry, or research. Feedback from graduates consistently emphasizes the excellent instruction in a fantastic natural laboratory as a major factor in their successful careers. It is the dedication and success of Western State College's graduates in various careers in the Earth sciences that best reflects the excellence of the education they obtained while at Western.

The geology curriculum at Western is typical of undergraduate degrees at most colleges or universities – with a core of geology classes supported by courses in chemistry, mathematics, and physics. The difference at Western is the delivery and philosophy behind the education. A geology education at Western has always offered a high quality integrated undergraduate experience that includes the following components; 1) a strong grounding in basic geologic sciences; 2) a strong grounding in the supporting sciences and mathematics; 3) a strong commitment to “learning by doing”; and, 4) a team atmosphere that fosters student-faculty collaboration; 5) an emphasis on communication skill.

## **HUMAN SERVICES PROFESSIONS**

### **Metropolitan State College of Denver**

The Department of Human Services at Metropolitan State College of Denver offers an extended major or minor in Human Services with a human services generalist (mental health), addiction studies, domestic violence counseling, high risk youth studies or nonprofit organization administration concentration. Certificates of completion in high-risk youth studies and nonprofit organization administration are also offered.

The purpose of the Human Services Profession is to train individuals to fill the gap between untrained aides and the graduate level professionals in the mental health area. The vocationally oriented curriculum emphasizes the training of workers who provide effective treatment, rehabilitation and prevention services in agencies and organizations involving youth corrections, psychiatric services, developmental disabilities, drug-alcohol abuse, social welfare and other human services fields. Utilizing experiential learning and focusing on skill development in counseling, coaching, networking, administration and case management, the coursework emphasizes an understanding of supportive help relationships and group skills under the supervision of highly trained department and agency personnel.

## **JOURNALISM AND TECHNICAL COMMUNICATION**

### **Colorado State University**

The Journalism and Technical Communication Department at Colorado State University is nationally accredited and has been since 1972. An undergraduate program serves 450 majors and 300 pre-majors in four concentrations: News/Editorial Journalism, Television News and Video Communication, Public Relations, and Specialized Communication. Ninety graduate students are enrolled in a Communication Management program on campus or in Denver. An Information Technology-based Ph.D. program is in development.

Students are converging on the Department's programs because of a stellar reputation for preparing graduates for professional careers. The department has led the way in utilizing an integrated, well-balanced approach to teaching both communication theory and hands-on communication skills utilizing the latest information technologies.

During the most recent decade, students from the Department have earned more than 200 regional and national journalism awards along with dozens of prestigious scholarships.

## **KINESIOLOGY**

### **University of Northern Colorado**

The School of Kinesiology and Physical Education (KPE) at the University of Northern Colorado has established a national reputation in each of its several areas of study: Exercise and Sports Science; Sport Administration; Outdoor education; and Sport Pedagogy. Many of the

School's accomplishments over the last decade have come from faculty and students collaborating to respond to community needs. A hallmark of KPE's undergraduate and graduate programs is the commitment to linking citizenship with scholarship; that is, the emphasis on scholarship-based service, and service-based scholarship. As a consequence, the faculty and graduates are making distinguished contributions, are helping to shape public discourse, and are maintaining strong ties to the state and to the community.

In addition to its focus on physical activity, KPE is becoming a pacesetter among similar departments across the nation in its integration of service learning within the curriculum. As a core educational strategy, service learning links the curriculum with a concern for others. By guiding students in service to others in multiple and diverse settings (e.g., corporate wellness centers, professional and youth sports, backcountry expeditions, and public school physical education programs), KPE continues its long-standing dedication to strengthening healthy individuals and communities through physical activity.

## **LANDSCAPE HORTICULTURE / LANDSCAPE ARCHITECTURE**

### **Colorado State University**

In Colorado, only CSU offers bachelor's degrees in Landscape Architecture (LA) and Landscape Horticulture (LH), which together comprise landscape design and management. The focus of LA is on problem solving design of outdoor spaces; the focus of LH is on the use of plants to enhance landscape space.

Faculty are recognized as devoted advisors/mentors and expert teachers. They teach highly capable students in a context enriched by strong working relationships with associated industries and professionals. Students value the emphasis on experimental learning, and take advantage of diverse internships and related work opportunities. Alumni reflect favorably on the overall quality of their educational experience, and have become leaders and effective problem-solvers in landscape industries and professions.

The program is strongly endorsed by industry, and is highly visible because of the importance of the outdoors to most Coloradoans and their quality of life. The importance/economic contribution of landscape design and management is related to the impacts of growth and urbanization on Colorado. Population growth has driven expansion of the state's "green Industry" (the segment of agriculture involved in the production and use of landscape plants) beyond an economic impact of \$1.5 billion.

## **MECHANICAL ENGINEERING**

### **University of Colorado at Boulder**

The Department of Mechanical Engineering (ME) in the College of Engineering and Applied Science at the University of Colorado at Boulder has established a nationally ranked, multidisciplinary graduate program in microsystems. A substantial fraction of the Department's

72 graduate students and 21 faculty are affiliated with the program. In addition, the 355 undergraduate students have access to curricula developed for the upper division students. The program is collaborating with more than 39 individual organizations in the State of Colorado. More than \$6.5M in microsystem research grants has been awarded during the past three years. The Department's microsystem web site has been accessed by approximately 13,000 off-campus individuals during the past year, and these visitors download about 600 student papers per week. This attention to microsystem technology and science reflects the importance of this field to State and national economic development. It is likely that microsystems will enhance the daily life through bio-medical, optical, wireless communication, data sensing and storage, as well as novel energy and environmental applications. The Department is well positioned to take a leadership role in defining the microsystems revolution.

**MODERN LANGUAGES – SPANISH PROGRAM**  
**Metropolitan State College of Denver**

The Modern Language Spanish program exemplifies: consistent updating of curricula for a successful foreign language pedagogy using educational technology; a new state-of-the-art facility and smart classrooms; distinguished professors, committed to excellence, making outstanding contributions; involvement in economic development; strong international ties with educators and other leaders in Spanish-speaking countries such as Mexico, Spain, and Argentina; excellent job opportunities for graduates; a high caliber of students and graduates; and a strong commitment from the institution.

**MUSIC**  
**Fort Lewis College**

The Fort Lewis College Department of Music is an active and vital program committed to musical excellence within a small college environment. Each year, more than 1,600 students of the 4,400 member resident student body participate in music through classes, lessons, and performing ensembles.

The primary mission of the Department of Music is to provide undergraduate education in Music Education, Performance, General, and Liberal Arts. Service to and cultural enrichment for the College and the community are also vital parts of the Department's mission. Annually, the Department presents more than fifty performances, with the FLC Choirs, Bands, San Juan Symphony, Jazz Ensembles, Faculty Recital Series, and the Artist in Residence Program. The Department hosts public school music festivals including the Select Honor Band, Honor Choir, and Jazz Festival. Chamber music opportunities involve music students in more intimate music arrangements with select choirs, woodwind, brass, percussion, piano, and string ensembles.

The Department of Music seeks to retain and to build upon a long and much-honored tradition of musical excellence at FLC by establishing an innovative Summer Music Arts Academy focused toward High School students from Southern Colorado and throughout the State. Through this

innovative Summer Musical Arts Academy, the FLC Department of Music can become a model of excellence for small-college music programs in the Twenty-First Century.

## **OCCUPATIONAL THERAPY**

### **Colorado State University**

The Occupational Therapy (OT) program is designated as a Program of Research and Scholarly Excellence at CSU. It is also ranked among the top ten programs in the nation (US News and World Report, 1998). The OT faculty has taken a major leadership role in establishing the young profession as a science-based practice. The CSU OT program is known for its curricular innovations that speak to the skills necessary to address the ongoing changes in the healthcare environment. The program has been restructured from a traditional lecture format to one that requires students to actively participate in their own learning process.

The curricula are built on the underlying goal of the program to prepare outstanding science-based practitioners. To achieve this goal, the program focuses on a framework that includes experimental learning within a teamwork context that requires strong communication skills, respect, inclusive leadership, and the ability to characterize and solve open-ended problems from a scientific standpoint. By decreasing class sizes and increasing the emphasis on client interaction, the program results in students who graduate proficient in OT assessment, intervention, and evaluation strategies which are outcome-driven and provided in a culturally sensitive approach that work in the challenging health care environment of today.

## **OPHTHALMIC TECHNICIAN PROGRAM**

### **Pueblo Community College**

Pueblo Community College (PCC) nominated its Ophthalmic Technician (OPT) Program for consideration as a Program of Excellence by the Colorado Commission on Higher Education (CCHE) because:

- The students demonstrate the quality of education as demonstrated by the 100% employment rate of those students desiring employment with many being hired before graduation.
- The faculty is highly experienced and represents over 89 years of actual ophthalmic technician experience. Each faculty member has repeatedly taught the same course and as a result have become experts in their particular disciplines. The seven adjunct instructors work full time in the field and are able to keep current as advances are made in the ophthalmology practice. Students are a priority and each faculty member is committed to being available for advice, tutoring, and general support.
- In order to assure student success, the Department Chair reviews and advises every OPT student. Re-mediation is advised when needed in order to assure that the student will be successful in completing the Ophthalmic Technician Program. The OPT students are regularly involved in community service projects involving visual

- screenings. The response from the Ophthalmology and Optometric employers is very positive with an appreciation for the development of professional skills, as well as, cognitive knowledge.
- Program support is evidenced by the involvement of both the ophthalmology and optometry offices being part of the Advisory Board and providing Internship facilities for the OPT students. Local doctors have been guest lecturers, donated equipment and housed the OPT program during the remodeling of the PCC facility. PCC provides financial support, student support services, facilities and state-of-the-art equipment.

## **PHYSICS**

### **University of Colorado at Boulder**

Physics is an essential ingredient of education in science and engineering and is established as a vital resource in the country's struggle to maintain technological preeminence. The University of Colorado at Boulder has top ranked, internationally recognized Physics programs and faculty on its campus. The Ph.D. program attracts exceptional students in the field and provides the infrastructure needed to conduct research and collaborations that incorporates other departments, centers, institutes, campuses, and universities. There are increasingly broad multidisciplinary and active links with the state's corporate sector and with national laboratories. The research and instructional program attracts world-renowned physicists to present lectures, collaborate on research projects and to help enhance the educational mission.

Physics is the underpinning for many other scientific endeavors and serves as the training ground for at least one-half of all doctoral scientists employed in US industry. Advances in Physics are often translated into broad advances in science and technology and then into societal benefits. The Department of Physics in the College of Arts and Sciences on the Boulder campus is a world-class research and education department. The Program of Excellence proposed here will bring the expertise of the department faculty to bear on the education of scientists and engineers from the K-12 level to advanced graduate training.

## **PROFESSIONAL LEARNING & ADVANCEMENT NETWORKS**

### **University of Colorado at Denver School of Education**

The Professional and Advancement Networks (PLAN) Division in UCD's School of Education is an interdisciplinary unit committed to supporting teachers' ongoing professional learning, and, through that learning, the success of Colorado's P-12 schools. PLAN offers Master's degrees in Curriculum and Instruction and Information and Learning Technologies and the Educational Specialist degree in School Psychology.

PLAN is organized as a unique partnership with twenty school districts in the Denver metropolitan area in conjunction with the Front Range BOCES for Teacher Leadership. Working with the BOCES, PLAN sets priorities for program development in partnership with

school district executives, and then develops and offers programs through “Joint Faculties” that include university professors and content specialists from schools and community organization. This formally shared decision-making creates the foundation for innovative and responsive programs that directly address the needs of teachers and their students. Teachers participating in these programs become members of “Teacher Leadership Networks” that offer ongoing support crossing traditional boundaries between districts, universities, and community organizations. The mission is an applied one – to improve the quality of teaching in P-12 schools, and the evidence of excellence in faculty and students aligns with this mission. The students and recent graduates – practically all teachers from the twenty districts – demonstrate exceptional leadership in their schools, districts, and professional organizations.

## **PUBLIC ADMINISTRATION**

### **University of Colorado at Denver and Colorado Springs**

The Graduate School of Public Affairs is the only school authorized to offer graduate programs in public administration in Colorado, and it educates many of the state’s eminent public and non-profit leaders. Located on two campuses of the University of Colorado, Denver and Colorado Springs, GSPA offers the Master of Public Administration on both campuses, on the Western Slope, and via the Internet, and it offers the Ph.D. in Public Affairs in Denver. In 1998, US News and World Report ranked the Master’s Program in the top 15% nationally, and the faculty’s scholarship also receives national acclaim. The first school in the U.S. to make it possible for students to complete an MPA degree online, GSPA is known for its use of technology in instructional delivery. The School has an historic commitment to solving pressing public problems, and it demonstrates that commitment through its teaching, its scholarship, and its partnerships and strong linkages with the communities it serves. Its Public Issues Forums, Legislative Leadership forums, and other public events bring nationally known experts to Colorado to work with students, faculty, and policy-makers to address public issues.

## **PUBLIC HEALTH**

### **University of Colorado Health Sciences Center**

The Master of Science in Public Health (MSPH) program at the UCHSC School of Medicine is a fully accredited program that provides generalist training in five public health concentrations: epidemiology, biostatistics, environmental health, behavioral health, and health systems. The MSPH is the major degree for the public health work force. UCHSC’s MSPH program is the sole accredited generalist public health program in the Rocky Mountain region. The MSPH program has graduated 196 alumni since it was established in 1982, 80% of whom live and work in Colorado as epidemiologists, public health program managers, analysts, and clinicians whose practices concentrate on the health of populations. The quality of MSPH students is measured best by their accomplishments in community projects, presentations of their work at professional meetings, publication of their work in respected journals, and the leadership positions to which they are recruited upon graduation. External evidence of MSPH excellence was noted by US News and World Report’s Best Graduate Schools 2001: UCHSC’s MSPH program was ranked

Number One of all accredited programs in community health/preventative medicine. The MSPH program produces a work force that helps Coloradoans maintain their quality of health and quality of life, in accordance with UCHSC's Institutional Master plan

### **TOURISM AND RESORT MANAGEMENT** **Fort Lewis College School of Business Administration**

The Tourism and Resort Management program emphasizes comprehensive education in the general business disciplines, intensive study of services management and markets, and hands-on experience through a management internship. The unique design of the program provides an in-depth understanding of the management challenges and organizational practices in this complex and diverse business sector. It improves students' practical skills to enter the workforce. The use of analytical tools and techniques for decision-making, the development of the capacity for critical thought and leadership, and the ability to work in teams significantly improves as students interact with regional companies through field projects and with faculty in collaborative research projects.

The ideal location provides Fort Lewis students with a natural laboratory of year-round tourism that challenges traditional approaches to tourism and resort management education. The program's size and reputation for leadership offers students direct benefits from networking and interning with local industry leaders. The Tourism and Resort Management program has established a relationship with many local companies that immediately place students upon graduation. An average 65% of graduates have benefited from direct placement.

### **SPECIAL EDUCATION – SEVERE NEEDS** **University of Northern Colorado**

The Special Education Low Incidence Emphasis Areas prepare teachers to provide specialized educational services to students who have visual disabilities, severe disabilities, or who are deaf or hard-of-hearing, a population comprising less than one-half of one percent of the school-age population. Graduates of these programs have knowledge and skills in orientation and mobility, Braille, American Sign Language, augmentative communication, content standards and curriculum accommodation processes, effective support of students with problem behaviors, technology accessibility, and second language acquisition. They serve in the public schools of Colorado.

If special education is to meet the demand for teachers where that demand is being expressed, then we must become more reliant on the burgeoning field of distance education and the use of internet channels for course delivery. And perhaps in no other area within special education is this need more critical than in the area of low incidence disabilities. Across the nation, approximately one million children and youth have low incidence disabilities that affect their vision, hearing, movement, emotional, and intellectual capabilities. And the teacher resources that are available to meet the educational needs of these students hardly come close to the level of demand they present.

**PROGRAMS OF EXCELLENCE BUDGET RECOMMENDATION**

| Yr   | Institution  | Program                         | 1995-96     | 1996-97     | 1997-98     | 1998-99     | 1999-00     | 2000-01     | 2001-02     | 2002-2003<br>Estimate | 2003-2004<br>Estimate | 2004-2005<br>Estimate | TOTAL        |
|--|--|---------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-----------------------|-----------------------|-----------------------|--------------|
| <b>1997-98</b>                                 |  |                                 |             |             |             |             |             |             |             |                       |                       |                       |              |
|  | Aims Community College                                       | Aviation Technology             |             |             | \$130,662   | \$130,500   | \$130,500   | \$128,500   | \$128,500   |                       |                       |                       | \$648,662    |
|  | Adams State College  | Music                           |             |             | \$165,095   | \$161,500   | \$151,000   | \$48,000    | \$40,000    |                       |                       |                       | \$565,595    |
|  | Colorado School of Mines                                     | Chemical Engineering            |             |             | \$202,806   | \$299,971   | \$299,997   | \$299,982   | \$300,002   |                       |                       |                       | \$1,402,758  |
|  | Colorado State University                                    | Veterinary Medicine             |             |             | \$141,510   | \$189,000   | \$178,099   | \$166,716   | \$175,674   |                       |                       |                       | \$850,999    |
|  | Univ. of Colorado at Boulder                                 | Aerospace Engineering           |             |             | \$188,680   | \$250,000   | \$250,000   | \$250,000   | \$250,000   |                       |                       |                       | \$1,188,680  |
| <b>1998-99</b>                                 |  |                                 |             |             |             |             |             |             |             |                       |                       |                       |              |
|  | Colorado State University                                    | Psychology                      |             |             |             | \$140,000   | \$140,000   | \$140,000   | \$140,000   | \$140,000             |                       |                       | \$700,000    |
|  | Fort Lewis College   | Anthropology                    |             |             |             | \$153,500   | \$171,000   | \$166,026   | \$171,000   | \$171,000             |                       |                       | \$832,526    |
|  | Univ. of Colorado at Boulder                                 | Telecommunication               |             |             |             | \$250,000   | \$250,000   | \$250,000   | \$250,000   | \$250,000             |                       |                       | \$1,250,000  |
|  | Univ. of Colorado at Boulder                                 | Engineering Undergraduate       |             |             |             | \$283,000   | \$281,000   | \$294,000   | \$292,000   | \$287,000             |                       |                       | \$1,437,000  |
|  | Health Sciences Center                                       | Medicine                        |             |             |             | \$74,500    | \$223,250   | \$155,649   | \$117,190   | \$120,775             |                       |                       | \$691,364    |
|  | Univ. of Northern Colorado                                   | Theatre                         |             |             |             | \$126,000   | \$60,097    | \$112,500   | \$48,943    | \$12,000              |                       |                       | \$359,540    |
|  | Univ. of Southern Colorado                                   | Chemistry                       |             |             |             | \$93,800    | \$108,000   | \$118,000   | \$145,000   | \$71,700              |                       |                       | \$536,500    |
| <b>1999-2000</b>                               |  |                                 |             |             |             |             |             |             |             |                       |                       |                       |              |
|  | Colorado School of Mines                                     | Engineering                     |             |             |             |             | 186,998     | \$233,659   | \$227,989   | \$235,159             | \$244,174             |                       | \$1,127,979  |
|  | Univ. of Colorado at Boulder/<br>Univ. of Colorado at Denver | Applied Mathematics             |             |             |             |             | 248,000     | \$306,920   | \$316,197   | \$325,845             | \$335,878             |                       | \$1,532,840  |
| <b>2000-2001</b>                               |  |                                 |             |             |             |             |             |             |             |                       |                       |                       |              |
|  | Western State College  | Biology                         |             |             |             |             |             | \$269,420   | \$114,521   | \$135,200             | \$99,100              | \$35,000              | 653,241      |
|  | Univ. of Northern Colorado                                   | College of Business             |             |             |             |             |             | \$72,850    | \$72,976    | \$78,255              | \$80,602              | \$83,020              | 387,703      |
|  | Adams State College  | Counselor Education Program     |             |             |             |             |             | \$169,000   | \$153,000   | \$68,500              | \$64,500              | \$69,500              | 524,000      |
|  | Community College of Denver                                  | Graphic Design                  |             |             |             |             |             | \$206,688   | \$34,360    | \$41,232              | \$237,304             | \$29,976              | 549,560      |
|  | Univ. of Co. at Colo. Springs                                | Geography/Environmental Studies |             |             |             |             |             | \$88,600    | \$61,116    | \$63,202              | \$65,362              | \$75,097              | 353,377      |
|  | Morgan Community College                                     | Physical Therapy Assistant      |             |             |             |             |             | \$88,600    | \$32,500    | \$54,900              | \$31,600              | \$17,200              | 224,800      |
|  |  | Continuing Programs             | \$814,086   | \$0         | #REF!       | \$1,030,971 | \$2,242,943 | \$2,669,952 | \$3,070,968 | \$2,054,768           | \$1,158,520           | \$309,793             | \$29,869,577 |
|  |  | New Programs                    | #REF!       | #REF!       | \$828,753   | \$1,120,800 | \$1,803,501 | \$895,158   | \$1,370,515 |                       |                       |                       |              |
| <b>Long Bill Appropriation:</b>                |  |                                 | \$2,899,831 | \$2,899,831 | \$2,899,831 | \$3,646,444 | \$4,046,444 | \$4,441,483 | \$4,441,483 | \$4,836,122           | \$5,230,761           | \$5,230,761           | \$54,866,932 |
| <b>Sum of Current Awarded Projects:</b>        |  |                                 | \$814,086   | \$0         | \$828,753   | \$2,151,771 | \$2,677,941 | \$3,565,110 | \$3,070,968 | \$2,054,768           | \$1,158,520           | \$309,793             | \$29,869,577 |
| <b>New Dollars Appropriated by Legislature</b> |  |                                 | \$0         | \$0         | \$0         | \$746,613   | \$400,000   | \$395,039   | \$0         | \$394,639             | \$394,639             |                       |              |
| <b>Number of New Programs of Excellence</b>    |  |                                 | 4           | 6           | 5           | 7           | 2           | 6           |             |                       |                       |                       |              |

**TOPIC: 2001-2002 FINANCIAL AID ALLOCATION**

**PREPARED BY: SHARON M. SAMSON**

**I. SUMMARY**

Statutorily, the Commission is responsible for approving the annual allocation for the financial aid appropriated in the Long Bill. This agenda item presents the allocation methodology and the allocation of state financial aid need-based, merit and work-study dollars. The methodology is student-driven. It directs dollars to students with the least ability to pay and allocates merit dollars proportional to the number of degree-seeking students. The allocation model is strongly tied to the eligibility criteria of each state financial aid program and becomes an essential step in implementing CCHE's new Financial Aid Policy goals.

The General Assembly appropriated \$85 million in financial aid during the past session. Of that amount, \$41,598,002 is designated for need-based grants, \$14,874,498 for merit awards, \$15,359,754 for work-study, and \$6,000,000 for the Governor's Opportunity Scholarship. The allocation model uses the calculated need of Level 1 students to allocate need-based dollars. It uses the percent of total undergraduate need to allocate work-study and one federal match program (i.e., Colorado Leveraging Education Access Program (CLEAP)), and the number of student teachers to allocate the Supplemental Leveraging Education Access Program (SLEAP). For merit allocations, the model directs funds so that each institution may award tuition scholarships to 4% of its degree-seeking undergraduate students and 2% of its graduate students. The attached spreadsheet details the specific amount that each institution will receive under the allocation model.

The categorical programs, including Governor's Opportunity Scholarship, Nursing Scholarship, Native American, and Law/POW grants, are administered by CCHE. Governor's Opportunity Scholarships are allocated to institutions through a student nomination and qualification process. The Nursing Scholarship is a competitive program serving need-based applicants. The Native American funds and Law/POW grants are entitlements that go directly to eligible students. The GOS allocation was not available at the time of the agenda. The Commission will receive the GOS allocation prior to the Commission meeting.

The staff recommends that the Commission approve the allocation model, the allocations for the 2001-2002 Financial Aid dollars, and continue the three-year transition plan.

**II. BACKGROUND**

At its April 2000 meeting, the Commission approved a new Financial Aid Policy that was designed to achieve four policy goals:

- Maximize the amount of financial aid funds available for Colorado residents.
- Direct state need-based dollars to those with the least ability to pay.
- Direct merit dollars to students who demonstrate academic achievement.
- Recognize the importance of student responsibility in paying for higher education costs, either through scholarship, work-study, or outside employment.

The Commission adopted a new allocation model in June 2000 to implement the goals of the Financial Aid Policy. The allocation model uses the calculated need of Level 1 students to allocate need-based dollars. For merit allocations, the model directs funds so that each institution may award scholarships to 4% of its degree-seeking undergraduate students and 2% of its graduate students. It uses the percent of undergraduate need to allocate work-study and the primary federal match program (i.e., Colorado Leveraging Education Access Program (CLEAP)), and the number of student teachers to allocate the Supplemental Leveraging Education Access Program (SLEAP). The methodology used to allocate the 2001-02 state funds is a refinement of the 2000-01 model.

### **III. STAFF ANALYSIS**

With the assistance of the Financial Aid Advisory Committee, CCHE refined the model that was first introduced in the 2000-01 allocation year. The primary characteristics of the allocation model include:

- The methodology is student-based. Not only does it mean that need-based dollars will be directed toward those institutions that enroll students with the least ability to pay, it holds students harmless to policy changes. When the Commission revised its Financial Aid Policy in April, the new policy recognized that existing financial aid recipients may retain their eligibility under the “old” guidelines. Consistent with this priority, the allocation model holds harmless the existing base allocation, and directs the new dollars to those institutions that are under-funded relative to their student population.
- The need-based dollars are distributed on the calculated need of Level 1 students attending a particular institution, i.e., those whose income level is 150 percent above PELL eligibility (i.e., approximately family income of \$45,000 or below). It directs a greater percentage of need-based dollars to the community colleges, area vocational schools, and three four-year colleges.
- The merit allocation is based on the premise that the top four percent of degree seeking students deserve scholarship assistance. It multiplies the number of undergraduate degree-seeking students by 4 percent and this number by the actual tuition and fees. At the graduate level, it multiplies 2 percent of the graduate enrollment by the graduate tuition. The advisory committee recommended an aggressive strategy to achieve parity among institutions, infusing dollars in the four-year institutions that were furthest from the undergraduate 4% merit target.

- The work-study allocation was distributed based on the number of need-based undergraduate students. Because the methodology is unchanged, work study funding has remained stable.
- To simplify administration, merit dollars formerly allocated to proprietary schools were fully converted to the need-based dollars in 2001-02. This completes the transition plan for proprietary schools started last year. Area vocational schools converted 50 percent of their 2000-01 merit allocation to need dollars in 2001-02.

The following table compares the distribution of the dollars by sector. In general, a greater share of need-based dollars is going to two-year institutions. Correspondingly, a greater share of the merit dollars is shifting to the 4-year public and private institutions.

| <b>DISTRIBUTION OF 2000-01 ALLOCATIONS</b> |                   |                   |              |
|--|-------------------|-------------------|--------------|
| <b>PERCENT</b>                             | <b>Need-based</b> | <b>Work Study</b> | <b>Merit</b> |
| Public Four-Year                           | 59.5%             | 62.8%             | 64.7%        |
| Public Two-Year                            | 25.3%             | 27.5%             | 27.0%        |
| Area Vocational Schools                    | 0.9%              | 0.6%              | 1.0%         |
| Private                                    | 7.3%              | 7.4%              | 5.7%         |
| Proprietary                                | 7.5%              | 1.7%              | 1.6%         |
| <b>DISTRIBUTION OF 2001-02 ALLOCATIONS</b> |                   |                   |              |
|  | <b>Need-based</b> | <b>Work Study</b> | <b>Merit</b> |
| Public Four-Year                           | 56.9%             | 61.9%             | 66.1%        |
| Public Two-Year                            | 26.6%             | 28.2%             | 25.8%        |
| AVS  | 1.1%              | 0.6%              | 0.5%         |
| Private Colleges                           | 7.2%              | 7.3%              | 7.5%         |
| Proprietary                                | 8.2%              | 2.0%              | 0%           |
|  |                   |                   |              |

Because the community colleges continued to be significantly under-funded relative to their need-based population in the 2000-01 allocation, the Commission supported redirecting increased need-based funds to this group of institutions in 2001-02. The community colleges received the greatest increase in dollars -- \$1.3M of need-based aid -- in 2001-02.

| <b>TABLE 2: 2001-2002 ALLOCATIONS BY SECTOR</b> |                         |                   |                         |                  |
|---|-------------------------|-------------------|-------------------------|------------------|
|   | <b>Need-based</b>       | <b>Work Study</b> | <b>Merit</b>            | <b>GOS</b>       |
| Public Four-Year                                | 23,772,260              | 9,500,626         | 9,828,994               |                  |
| Public Two-Year                                 | 11,120,678              | 4,336,031         | 3,831,824               |                  |
| Area Vocational Schools                         | 474,992                 | 99,207            | 80,000                  |                  |
| Private   | 2,826,762               | 1,116,734         | 1,119,880               |                  |
| Proprietary                                     | 3,003,834               | 307,156           | 0                       |                  |
| Total Allocation                                | 41,791,749 <sup>1</sup> | 15,359,754        | 14,860,698 <sup>2</sup> | <sup>3</sup>     |
| Appropriation                                   | 41,598,002              | 15,359,754        | 14,874,498              | 6,000,000        |
| <b>INCREASE OVER 2000-01</b>                    |                         |                   |                         |                  |
| Public Four-Year                                | 682,802                 | 43,735            | 529,019                 |                  |
| Public Two-Year                                 | 1,302,127               | 192,529           | 0                       |                  |
| Area Vocational Schools                         | 136,115                 | 3,032             | -67,015 <sup>4</sup>    |                  |
| Private   | 177,072                 | 2,462             | 305,936                 |                  |
| Proprietary                                     | 416,151                 | 56,629            | -279,052 <sup>4</sup>   |                  |
|   | <b>2,714,267</b>        | <b>298,355</b>    | <b>488,888</b>          | <b>2,000,000</b> |

The GOS allocation was still in progress at the time of the agenda printing. These tables will be updated with the GOS dollars prior to the Commission meeting.

**IV. STAFF RECOMMENDATION**

**That the Commission approved the allocations for the 2001-2002 Financial Aid dollars (Attachment A).**

<sup>1</sup> Note: Need-based allocation exceeds the 2001-02 appropriation. The balance will be covered by transfer from another fund source.

<sup>2</sup> Reserves of \$13,800

<sup>3</sup> Reserves

<sup>4</sup> Converted to need-based dollars

**Appendix A**

**STATUTORY AUTHORITY**

C.R.S. 23-3.3-601 - Scholarship and grant program – funding. The commission shall use a portion of any moneys remaining after meeting the requirements of parts 2 and 3 of this article to provide other programs of financial assistance based upon financial need, merit, talent, or other criteria established by the commission for students enrolled at institutions.

**COLORADO FINANCIAL ASSISTANCE  
2001-2002 Allocation**

|                            | NEED                | WORKSTUDY           | MERIT               | GOS                | CLEAP              | SLEAP   | LOAN<br>MATCH | NURSING  | TOTAL               |
|----------------------------|---------------------|---------------------|---------------------|--------------------|--------------------|---------|---------------|----------|---------------------|
| ASC                        | \$801,832           | \$377,696           | \$220,000           | \$119,174          | \$59,253           | 156,000 | \$838         |          | \$1,734,793         |
| CSM                        | \$649,227           | \$309,591           | \$508,419           | \$137,000          | \$51,352           |         | \$14,585      |          | \$1,670,174         |
| CSU                        | \$4,091,986         | \$1,651,517         | \$2,002,582         | \$560,757          | \$241,847          | 45,000  | \$43,772      |          | \$8,637,461         |
| FLC                        | \$619,834           | \$248,274           | \$310,070           | \$113,597          | \$31,466           | 18,000  | \$0           |          | \$1,341,241         |
| MESA                       | \$1,343,409         | \$587,890           | \$368,032           | \$188,000          | \$67,908           | 21,000  | \$7,369       | \$19,108 | \$2,602,716         |
| METRO                      | \$3,913,167         | \$1,857,165         | \$1,218,930         | \$264,760          | \$155,486          | 75,000  | \$58,293      |          | \$7,542,801         |
| UCB                        | \$3,984,137         | \$1,482,782         | \$2,036,519         | \$197,954          | \$247,591          | 75,000  | \$10,413      |          | \$8,034,396         |
| UCCS                       | \$1,294,994         | \$508,219           | \$579,029           | \$188,190          | \$59,700           | 12,000  | \$19,339      | \$13,880 | \$2,675,351         |
| UCD                        | \$2,035,987         | \$618,375           | \$878,678           | \$380,700          | \$66,918           | 45,000  | \$18,157      |          | \$4,043,815         |
| UCHSC                      | \$958,953           | \$40,000            | \$196,934           | \$0                | \$15,838           | 0       | \$16,274      | \$97,986 | \$1,325,985         |
| UNC                        | \$2,162,912         | \$937,074           | \$928,965           | \$965,124          | \$184,991          | 249,574 | \$2,960       | \$14,330 | \$5,445,930         |
| USC                        | \$1,477,994         | \$656,474           | \$346,478           | \$444,653          | \$108,125          | 21,000  | \$36,324      | \$26,851 | \$3,117,899         |
| WSC                        | \$442,078           | \$225,569           | \$234,358           | \$38,344           | \$44,942           | 6,000   | \$0           |          | \$991,291           |
| ACC                        | \$605,206           | \$256,889           | \$356,023           | \$65,000           | \$35,763           |         |               | \$1,551  | \$1,320,432         |
| AIMS                       | \$716,585           | \$276,452           | \$320,182           |                    | \$39,123           |         |               |          | \$1,352,342         |
| CCA                        | \$530,377           | \$221,242           | \$249,764           | \$65,000           | \$5,628            |         |               |          | \$1,072,011         |
| CCD                        | \$1,518,427         | \$587,466           | \$405,553           | \$127,774          | \$37,892           |         |               |          | \$2,677,112         |
| CMC                        | \$313,177           | \$98,049            | \$167,696           | \$40,500           | \$21,082           |         |               |          | \$792,990           |
| CNCC                       | \$155,450           | \$60,493            | \$58,514            | \$16,114           | \$10,237           |         | \$8,628       |          | \$309,436           |
| FRCC                       | \$1,579,875         | \$641,805           | \$659,067           | \$134,000          | \$66,374           |         |               | \$33,222 | \$3,114,343         |
| LCC                        | \$230,373           | \$96,075            | \$57,154            | \$92,000           | \$6,777            |         |               | \$3,422  | \$485,801           |
| MCC                        | \$245,709           | \$95,760            | \$74,910            | \$35,600           | \$7,156            |         |               | \$3,955  | \$463,090           |
| NJC                        | \$365,883           | \$147,170           | \$145,558           | \$55,033           | \$11,400           |         |               | \$2,327  | \$727,371           |
| OJC                        | \$442,493           | \$167,716           | \$91,887            | \$69,500           | \$16,587           |         |               | \$15,104 | \$803,287           |
| PCC                        | \$1,362,985         | \$519,347           | \$266,654           | \$134,000          | \$46,719           |         |               | \$20,425 | \$2,350,130         |
| PPCC                       | \$1,639,535         | \$641,180           | \$486,098           | \$381,429          | \$71,784           |         |               | \$12,408 | \$3,232,434         |
| RRCC                       | \$671,774           | \$249,435           | \$377,257           | \$5,200            | \$24,266           |         |               |          | \$1,327,932         |
| TSJC                       | \$742,829           | \$276,952           | \$115,507           | \$288,000          | \$25,612           |         |               | \$1,670  | \$1,450,570         |
| <b>TOTAL</b>               | <b>\$34,897,188</b> | <b>\$13,836,657</b> | <b>\$13,660,818</b> | <b>\$5,107,403</b> | <b>\$1,761,817</b> |         |               |          | <b>\$70,643,134</b> |
| DELTA MONTROSE AVS         | \$147,375           | \$0                 | \$25,000            | \$0                | \$0                |         |               | \$5,338  | \$177,713           |
| EMILY GRIFFITH OPPORTUNITY | \$76,428            | \$30,660            | \$0                 | \$0                | \$0                |         |               |          | \$107,088           |
| SAN JUAN AVS               | \$125,486           | \$34,724            | \$25,000            | \$26,576           | \$4,890            |         |               |          | \$216,676           |
| TH PICKENS AVS             | \$125,703           | \$33,823            | \$30,000            | \$18,000           | \$3,450            |         |               |          | \$210,976           |
| CC                         | \$279,512           | \$148,057           | \$92,130            | \$60,000           | \$13,214           | 3,000   | \$29,366      |          | \$625,279           |
| DU                         | \$1,361,919         | \$517,933           | \$540,830           | \$186,074          | \$32,280           | 9,000   |               |          | \$2,648,036         |

**COLORADO FINANCIAL ASSISTANCE  
2001-2002 Allocation**

|                             | NEED         | WORKSTUDY    | MERIT        | GOS         | CLEAP       | SLEAP     | LOAN<br>MATCH | NURSING   | TOTAL        |
|-----------------------------|--------------|--------------|--------------|-------------|-------------|-----------|---------------|-----------|--------------|
| REGIS                       | \$1,362,403  | \$450,744    | \$486,920    | \$187,949   | \$27,268    | 15,000    | \$5,625       | \$33,475  | \$2,569,384  |
| AMERICAN BEAUTY II          | \$60,499     |              |              |             |             |           |               |           | \$60,499     |
| ART INSTITUTE               | \$515,967    | \$202,743    |              |             |             |           | \$40,498      |           | \$759,208    |
| BLAIR JR COLLEGE            | \$515,967    |              |              |             |             |           |               |           | \$515,967    |
| COLLEGE AMERICA OF COLORADO | \$6,000      |              |              |             |             |           |               |           | \$6,000      |
| COLO TECHNICAL UNIV         | \$410,276    |              |              |             |             |           | \$5,837       |           | \$416,113    |
| CONCORDE CAREER INSTITUTE   | \$191,640    |              |              |             |             |           | \$7,748       |           | \$199,388    |
| DENVER TECH COLLEGE         | \$400,000    |              |              |             |             |           |               |           | \$400,000    |
| GLENWOOD BEAUTY A           | \$17,528     |              |              |             |             |           |               |           | \$17,528     |
| INTELLITEC - COLO SPRS      | \$106,425    |              |              |             |             |           |               |           | \$106,425    |
| INTELLITEC - GRAND JUNCTION | \$65,000     |              |              |             |             |           |               |           | \$65,000     |
| INTELLITEC - MEDICAL        | \$209,042    |              |              |             |             |           |               |           | \$209,042    |
| INTERNATIONAL BEAUTY        | \$55,908     |              |              |             |             |           |               |           | \$55,908     |
| PARKS JUNIOR COLLEGE        | \$531,759    | \$50,000     |              |             |             |           |               |           | \$581,759    |
| ROCKY MT COLL ART & DESIGN  | \$107,643    | \$54,413     |              | \$31,325    |             |           |               |           | \$193,381    |
| WESTWOOD COLL- AVIATION     | \$161,331    |              |              |             |             |           |               |           | \$161,331    |
| WESTWOOD COLL- TECHN.       | \$65,000     |              |              |             |             |           |               |           | \$65,000     |
|                             | \$3,419,985  |              |              |             |             |           |               |           |              |
| GRAND TOTAL                 | \$41,795,999 | \$15,359,754 | \$14,860,698 | \$5,617,327 | \$1,842,919 | \$750,574 | \$326,026     | \$305,052 | \$81,010,835 |
| FEDERAL CONTRIBUTION        |              |              |              |             | \$409,404   | \$341,170 | \$978,082     |           |              |
| TOTAL ALLOCATED STATE FUNDS | \$41,795,999 | \$15,359,754 | \$14,860,698 | \$3,800,000 | \$1,433,515 | \$409,404 | \$790,289     |           | \$77,659,370 |
| 2001-02 Appropriation       | \$41,598,002 | \$15,359,754 | \$14,874,498 | \$6,000,000 | \$1,842,919 | \$750,574 | \$1,768,371   | \$335,856 | \$77,832,254 |
| Reserves                    |              |              | \$13,800     | \$382,673   |             |           |               | \$30,804  |              |
| OVER/UNDER Allocated        | \$2,003      | \$0          | \$0          | \$0         | \$0         | \$0       | \$1,442,345   | \$0       | \$1,444,348  |
| Transfer from 2000-01       | \$200,000    |              |              |             |             |           |               |           |              |

**TOPIC: CCHE-TECHNOLOGY ADVANCEMENT GROUP PROGRAM  
FUNDING FOR FISCAL YEAR 2001/2002**

**PREPARED BY: JEANNE ADKINS AND RICK HUM**

**I. SUMMARY**

The Colorado Advanced Technology Institute (CATI) program was transferred to CCHE on July 1, 1999, as a result of passage of HB 99-1359. This legislation provides general direction for the Advanced Technology Program now called CCHE-Technology Advancement Group (CCHE-TAG). A Performance Audit of the Advanced Technology Program was completed in August 1999, which included nine recommendations concerning the direction and administration of the program. The Commission approved the formal Program Plan in March 2000 that provides the framework for annual program review and funding.

A Science and Technology Committee, chaired by Commissioner Dean Quamme, was created to provide direction for the CCHE-TAG program and to make recommendations concerning funding and programmatic issues affecting CCHE-TAG. The Science and Technology Committee (membership is included as Attachment 1) has reviewed the individual Proposed Program Plans and Budgets for next fiscal year.

In the second year of the CCHE TAG program there have been many changes that have occurred. These include:

- Reduced the administrative support of the program by more than 50 percent,
- The funds for direct student support have increased more than 5-fold,
- Four original CATI-funded programs were reviewed and funding was discontinued; three additional programs have undergone similar funding reviews and would sunset for funding if this decision item is approved,
- An Advanced Technology Fund of \$800,000 a year was created, and
- All institutions have accepted the Intellectual Property sharing provisions.

The CCHE budget for next fiscal year includes a continuation budget from the General Fund at a level similar to the current budget of \$2.9 million. The anticipated administrative costs of the CCHE-TAG program are budgeted at \$314,777 (compared with \$718,062 for CATI in FY 1999). The Science and Technology Committee recommends funding nine programs for a total of \$1,872,496 as the initial funding in fiscal year 2001/2002. As Attachment 2 shows, uncommitted funds total \$737,280. Most of this funding will be used to fund a new Bioscience seed grant program. This replaces the Colorado Institute for Research in Biotechnology and the Colorado Ribonucleic Acid (RNA) Center. These two bioscience programs have been co-hosted for many years at CU-Boulder and CSU. A Request For Proposal has been prepared and selection of the new program site will be completed before September. These programs may resubmit an application under the new guidelines.

Additionally, HB00-1430 has created a new “Advanced Technology Fund” from the Waste Tire Fund to finance research, development and technology transfer with regard to waste diversion and recycling strategies. The anticipated annual revenues to this new Advanced Technology Fund are expected to be approximately \$800,000. Unfortunately, a technical error by JBC staff delayed the release of these funds to the Advanced Technology Fund until later this month. In the meantime, the TAG staff prepared an RFP and received 17 proposals for research in waste diversion and recycling strategies. Selection of the first projects will begin immediately after the funds are available. All funds in the Advanced Technology Fund are continuously appropriated and can be carried forward from year to year.

## **II. BACKGROUND**

Basis for Recommended Programs: The Commission approved the CCHE-TAG Program Plan and selection criteria at the March 3, 2000, Commission meeting. The Science and Technology Committee developed the program selection criteria based on:

- statutory direction provided when the advanced technology program was transferred to CCHE from CATI (the Colorado Advanced Technology Institute);
- recommendations from the Advance Technology Program Performance Audit of August 1999; and
- comments from OIT, EDO and the universities.

The selection criteria have weighted scoring that varies for the Applied Research, Product/Process Development and Commercialization programs. The technology program areas that are currently funded include Information Technology, Bioscience and Advanced Materials. The Science and Technology Committee recognizes that the seed grant programs are funding new projects involving new types of research on a continuing basis. But many of the centers that concentrate on specific areas of applied research, product or process development and commercialization have been funded for many years. The Committee asked that each center provide a plan for self-sufficiency that predicts how and when the center would be self-sustaining without the need for future General Fund support.

The CCHE-TAG staff solicited program proposals from seed grant programs and research centers in the technology program areas. The staff evaluated each plan and scored the programs based on the approved criteria. The scores, the program summaries and the detailed program proposals were provided to the Science and Technology Committee for their review and recommendations. The staff scoring and Program Summaries are included as Attachment C.

CCHE TAG Program Status: There has been substantial change to the program mix of TAG since its transfer from CATI to CCHE in July 1999. Of the 16 programs brought forward to CCHE from CATI, eight have been discontinued. Further, four new programs have been initiated, two have been targeted for possible sunseting, and five have carried forward unchanged.

Discontinued Programs. The two business incubators (Boulder Technology Incubator and the Colorado Venture Center) were discontinued as recommended by the 1999 program audit. The Colorado Manufacturing Competitiveness Center was discontinued since it focused on curriculum development, which is inconsistent with existing TAG program policies. Program support of the CU Business Advancement Center has been replaced with as-needed contract services. The Colorado Rural Technology Program was discontinued because it had completed its mission of raising rural awareness to the potential of telecommunications. The two biotechnology seed grant programs (Colorado Institute for Research in Biotechnology and Colorado RNA Center) were discontinued in order that they be combined and re-bid.

*New Programs.* The discontinued biotechnology programs are being re-bid to encourage consolidation and a focus on current technology issues. The goal is to have this technology area benefit from tighter management oversight from CCHE. A new rural program was launched with a totally new focus on the training and education needs for rural communities to fully participate in the “new economy” (e.g., the digital economy enabled by e-commerce and the Internet); this is being achieved through a consortium of rural colleges. Two new cash-funded materials-related programs were started from tire recycling fees: Tire-TAP focused on recycling tires, and the Waste Diversion and Recycling program.

*Sunsetting Programs.* The Colorado Bioprocessing Center has the potential to become self-supporting in the near future. The Colorado Advanced Materials Program will be reconfigured in FY2002-2003 with greatly reduced administrative overhead.

*Continuing Programs.* Continuing programs include two seed grant programs, two centers of excellence, and a processing facility. The Colorado Advanced Software Institute and the Colorado Photonics and Optoelectronics Program, both seed grant programs, are being continued because they provide effective well-run means of managing numerous (about 20 in total) short-term (one- or two-year) research projects between industry and academia in these two fields. The centers of excellence (Center for Commercial Applications of Combustion in Space and the Membrane Applied Science and Technology Center) receive major support from the federal government based on modest cash match from the State via TAG. Finally, support of the new photonics processing facility (Colorado Applied Photonics Technology) is continued as it completes its capital construction fund spend-out this coming year; this center has already achieved partial self-sufficiency.

Finding of Substantial Completion of Current Year’s Programs: The Audit of the Advance Technology program completed in August 1999 expressed concern that programs were approved for subsequent year funding before the staff could determine that the current year program was completed successfully. To implement the audit recommendations the CCHE-TAG Policy and Procedures Manual has been revised to include an Interim Program Report that has each program describe the success in implementing the current year program and anticipated success in the completion of the program by the end of the fiscal year. We have received Interim Program Reports from

all programs and find that each program is making acceptable progress. Staff suggest that the funding award by the CCHE be conditioned on successful completion of this year's program as evidenced in an acceptable final set of program reports.

In addition to the internal review of these reports, CCHE management asked for an independent review of the Interim Program Reports. Dr. Laura Belsten, who has administered similar programs for the Department of Local Affairs, has provided this review. Her report is included as Attachment D.

Unallocated Available Funding: Because of program changes, the re-bidding of the bioscience program and requests to spend additional resources in currently funded programs, there are unallocated resources in the budget proposed for approval. However, staff has confirmed that as long as the resources are allocated within the program year, new projects may be considered. Several possible alternatives were discussed by the Science and Technology Committee. Further discussion by staff to propose alternatives for consideration for funding will occur in June. The committee will be asked to discuss these alternatives at a follow-up meeting.

Intellectual Property Agreements: The current contracts include a provision that CCHE-TAG would share in any intellectual property revenue that results from projects funded with CCHE-TAG funds. The share is proportional to the funding contributed.

Advanced Technology Fund: The Advanced Technology Fund was established in by HB 00-1430. The fund will receive one-third of the Waste Tire Fund revenue on a continuing basis – an estimated \$800,000 annually. Unfortunately, the first-year funds have been delayed by a technical error in the state's appropriations for this year. This delay is being corrected through HB01-1018. Upon the Governor's signature of this bill approximately \$600,000 should become immediately available. Revenue transfers to the fund are allocated quarterly. The funds in the Advanced Technology Fund are limited for the following purposes:

“...to finance research, development, and technology transfer with regard to waste diversion and recycling strategies, and shall include research, development, and technology transfer regarding waste tires.”  
C.R.S. 23-1-106.5 (9)

The Commission adopted policies, priorities and criteria for the selection of projects on October 5, 2000. The staff prepared and released a request for proposals and 17 projects were submitted for the first round of funding. As soon as HB 01-1018 is signed and the funds are available the staff and the Science and Technology Committee are prepared to select projects for funding. Since the funds in the Advanced Technology Fund are continuously appropriated to the Commission and any remaining funds and interest earned are to remain in the fund, there is no need to award all funds during a specific year. Staff intends to provide additional approval cycles each year as funds are available. We anticipate that the first projects will be funded this summer.

Biosciences RFP: The biosciences RFP emphasizes a technical focus on the post-genomic biology area for the new millennium. This technical area will be the focus of modern biology in the coming decades. It combines large-scale screening of genes and proteins with computational methods. The impact of this technology will introduce enormous change in our approaches to human health, agriculture and other areas. The new seed grant program resulting from this solicitation will be announced through the CCHE website. A list-serve capability will be instituted to allow all members of the bioscience community to subscribe. This will facilitate sending e-mail messages reminding subscribers of upcoming solicitations and other activities. We will minimize administrative costs, but ensure that CCHE has greater control over quality. Projects will strive to have enhanced industrial participation, especially from startup companies. Technology transfer from universities to the private sector will be the objective, but training students will be an important component. The larger amounts in the seed grants are intended to have a greater potential to achieve real technology development, real-world experience for students, and technology transfer to Colorado biotechnology companies.

CCHE-TAG Support of Rural Technology Programs: There have been many projects in the area of rural technology that have been initiated, funded and/or staffed by CATI and now CCHE-TAG personnel. A brief summary of these programs and the staff involvement is included as Attachment E.

### **III. COMMITTEE/STAFF RECOMMENDATION**

**The Science and Technology Committee recommends approval of the funding totaling \$1,872,496 for nine programs as specified in the Recommended Funding table (Attachment 2). The funding for each individual program is conditional pending successful completion of the FY 1999/2000 programs. The Committee also recommended that the Commission delegate the authority to adjust any individual program amount within the total approved amount to the Executive Director, if any funds are unused. Further, it is recommended that the Commission delegate to the Science and Technology Committee and the Executive Director the authority to approve any additional funding with the uncommitted funds available and to approve funding of the Waste Diversion and Recycling project grants from the Advanced Technology Fund. The staff will provide a written report of the remaining awards and fund balances to the Commission.**

- Attachments:
- A. Science and Technology Committee Membership
  - B. CCHE-TAG FY 2000/2001 Recommended Funding
  - C. Program Summaries and Scores
  - D. External Review of Interim Program Reports
  - E. Summary of Rural Technology Initiatives

Attachment A

## **CCHE – TAG Science and Technology Committee Membership**

- Dean Quamme** MACTEC Environmental Restoration Services, LLC. Past member of CATI commission. Current member of Colorado Commission of Higher Education
- Merc Mecure, Ph.D.** CEO, CMD Optics. Founder of Ball Aerospace, very active in the Photonics industry in the state. Previous CATI Commissioner. Currently serves on the Colorado Advanced Photonics Technology Center Board.
- Jerry Donahue** President, Boulder Technology Incubator. Jerry Donahue is on the OIT Science and Technology Committee.
- Lynn Taussig, M.D.** President or CEO of National Jewish Medical Research Center. A previous CATI Commissioner. Currently serves on the CVC Board. Is a member of the OIT Science and Technology Committee.
- SueAnn Ambron** Dean of the University of Colorado at Denver Graduate School of Business. A previous entrepreneur in Silicon Valley, taking concepts from her work as a college professor and developing her own business.
- Representative  
Ron May** Colorado Springs legislator who has headed several IT Committees and is interested in technology issues.
- Representative  
Bill Swenson** Longmont legislator who served on CATI Commission and has long-term interest in technology/technology transfer issues.
- Dean M. Stevinson** Director, OIT Science and Technology Commission.

| CCHE - TAG FY 2001/2002 Recommended Funding  |                                    |   |                                   |
|--|------------------------------------|---|-----------------------------------|
|  | Total Current<br>Funding<br>Amount | Recommended<br>Program<br>Funding for FY<br>2001/2002 | Year to<br>Year<br>Change in<br>% |
| Administrative Personnel   | 250,000                            | 259,777   | 4%                                |
| Operations and other Administrative Expenses   | 40,000                             | 40,000  | 0%                                |
| Contract Services  | 15,000                             | 15,000  | 0%                                |
| <b>Total Administrative Budget</b>   | <b>305,000</b>                     | <b>314,777</b>  | <b>3%</b>                         |
|  |                                    |   |                                   |
| Colorado Bioprocessing Center  | 261,786                            | 261,786   | 0%                                |
| Post-Genomic Internship & Fellowship Program   | 80,000                             |   | -100%                             |
| Colorado Institute for Research in Biotechnology                                       | 351,492                            | -   | -100%                             |
| Colorado Ribonucleic Acid (RNA) Center   | 183,200                            | -   | -100%                             |
| <b>Total Bioscience Programs</b>   | <b>876,478</b>                     | <b>261,786</b>  | <b>-70%</b>                       |
|  |                                    |   |                                   |
| Boulder Technology Incubator   | 33,000                             |   | -100%                             |
| Colorado Advanced Photonics Technology Center  | 210,155                            | 146,155   | -30%                              |
| Colorado Advanced Software Institute   | 325,355                            | 272,355   | -16%                              |
| Colorado Photonics and Optoelectronics Program   | 382,000                            | 342,000   | -10%                              |
| Colorado Rural Technology Program  | 300,000                            | 300,000   | 0%                                |
| <b>Total Information Technology Programs</b>   | <b>1,250,510</b>                   | <b>1,060,510</b>                                      | <b>-15%</b>                       |
|  |                                    |   |                                   |
| Colorado Advanced Materials Institute  | 218,000                            | 218,000   | 0%                                |
| Center for Commercial Applications of Combustion in Space                              | 125,000                            | 125,000   | 0%                                |
| Center for Membrane Applied Science and Technology                                     | 45,528                             | 100,000*  | 120%                              |
| Tire Recycling Technology Assistance Program   | 155,881                            | 107,200   | -31%                              |
| <b>Total Advance Material Programs</b>   | <b>544,409</b>                     | <b>550,200</b>  | <b>1%</b>                         |
|  |                                    |   |                                   |
| <b>Total Program Support Budget</b>  | <b>2,671,397</b>                   | <b>1,872,496</b>                                      | <b>-30%</b>                       |
|  |                                    |   |                                   |
| <b>Total CCHE-TAG Base Budget</b>  |                                    | <b>2,187,273</b>                                      |                                   |
|  |                                    |   |                                   |
| <b>Total Estimated Funding</b>   |                                    | <b>2,924,553</b>                                      |                                   |
|  |                                    |   |                                   |
| <b>Estimated Uncommitted Funding Available</b>   |                                    | <b>737,280</b>  |                                   |
|  |                                    |   |                                   |
| * Note: Up to \$85,000 of this funding could be funded by the Advanced Technology Fund |                                    |   |                                   |

| Program: <u>Colorado Bioprocessing Center</u>   |                        |                   |
|---|------------------------|-------------------|
| Program Type: Product or Process Development  |                        |                   |
| Criteria  | Possible Maximum Score | Average of Scores |
| Industry involvement  | 15                     | 10.7              |
| Competitiveness - Colorado has the potential to be a leader   | 12                     | 9.0               |
| Has the potential for success and/or becoming self-supporting   | 12                     | 10.0              |
| Builds on the institutions' strengths and previous successes  | 10                     | 8.3               |
| Increases effectiveness in funding through elimination of costly duplication and gaps in infrastructure that cause the misuse of state resources                      | 9                      | 8.0               |
| Has the potential for this program to take research in Colorado in a significant new direction  | 8                      | 4.7               |
| Encourages cooperation among the institutions of higher education, local communities and other governmental entities  | 7                      | 4.7               |
| Provides a balance of applied research, product/process development and commercialization within a program area and within a program                                  | 6                      | 4.7               |
| Non-duplicative of other programs, particularly at the graduate level of instruction  | 4                      | 3.7               |
| Considers Colorado Industry needs for technical training at the: associate, baccalaureate, graduate levels, in-service and continuing education                       | 4                      | 3.0               |
| Federal involvement   | 4                      | 1.5               |
| Establishes centers of excellence in research and teaching, subject to annual appropriations  | 3                      | 2.7               |
| Provides opportunity for rural areas of the state to economically benefit from development of technology  | 3                      | 0.3               |
| Provides opportunities for developing the necessary infrastructure to support: distance learning, telemedicine, support economic development, enhanced citizen access | 3                      | 0.3               |
|   | -----                  | -----             |
| <b>Total Scores</b>   | <b>100</b>             | <b>71.5</b>       |

## Colorado Bioprocessing Center – CBC

## Bioscience Program

**Program Background:** The Colorado Bioprocessing Center is a contract research laboratory with the mission of strengthening the biotechnology industry in Colorado by providing expertise and facilities for the development of enabling technologies to improve biotechnology production processes and through education and training of students and employees of biotechnology companies. The CBC provides clients with a full range of services for the development, optimization, and scale-up of production-worthy bioprocesses from fermentation and cell culture through product recovery and purification, which help researchers turn laboratory discoveries into commercial products. Contracting with the CBC for research, development, and contract manufacturing services allows clients to supplement in-house resources and shorten their time to market without risky, long-term investment. Furthermore, student and workforce training activities produce individuals skilled in bioprocess development and operation that can meet the staffing needs of Colorado's biotechnology industry.

### Program Plan FY 2002:

#### Goal 1: Organizational Development

- Market the services of the Center to increase the number of clients and amount of revenue. It is necessary to attract a steady stream of potential clients in order to generate sufficient revenues to achieve self-sufficiency. It is clear the Center will have to rely on attracting out-of-state clients to generate the amount of revenue needed to reach self-sufficiency. The relatively small number of biotechnology companies and their generally small size means that there currently is not enough base of potential in-state clients to provide a large revenue stream.
- Fully implement the business plan developed by the Center during FY 2001 and assess the feasibility of operating the Center as a self-sufficient business.

#### Goal 2: Industrial Participation

- Perform contract services for a minimum of five Colorado companies.
- Increase contract revenues to build toward self-sufficiency.

#### Goal 3: Development of the Center's Capabilities

- Repair or replace the Center's mass spectrometer.
- Incorporate the ability to monitor cell mass concentrations in pilot scale bioreactors without having to physically take a sample.

#### Goal 4: Training in Bioprocessing

- Develop programs/experiments and provide opportunities for undergraduate and graduate students for training and bioprocess development research.
- Implement the program developed for bioprocessing training to university students and/or scientists/workers in the biotechnology industry.

### Budget:

|            | Revenues       |                   | Expenses (CCHE only) |       |
|------------|----------------|-------------------|----------------------|-------|
| CCHE       | \$261,786      | Personnel         | \$66,654             | 25.5% |
| University | 0              | Operating         | -0-                  |       |
| Federal    | 0              | Programs          | <u>195,132</u>       | 74.5% |
| Industry   | <u>253,038</u> | Total (CCHE only) | \$261,786            |       |
| Total      | \$514,824      |                   |                      |       |

| Program: <u>Colorado Advanced Photonics Technology Center</u>   |                        |                   |
|---|------------------------|-------------------|
| Program Type: Product or Process Development  |                        |                   |
| Criteria  | Possible Maximum Score | Average of Scores |
| Industry involvement  | 15                     | 12.3              |
| Competitiveness - Colorado has the potential to be a leader   | 12                     | 10.7              |
| Has the potential for success and/or becoming self-supporting   | 12                     | 7.0               |
| Builds on the institutions' strengths and previous successes  | 10                     | 8.7               |
| Increases effectiveness in funding through elimination of costly duplication and gaps in infrastructure that cause the misuse of state resources                      | 9                      | 8.0               |
| Has the potential for this program to take research in Colorado in a significant new direction  | 8                      | 7.0               |
| Encourages cooperation among the institutions of higher education, local communities and other governmental entities  | 7                      | 6.0               |
| Provides a balance of applied research, product/process development and commercialization within a program area and within a program                                  | 6                      | 5.7               |
| Non-duplicative of other programs, particularly at the graduate level of instruction  | 4                      | 3.7               |
| Considers Colorado Industry needs for technical training at the: associate, baccalaureate, graduate levels, in-service and continuing education                       | 4                      | 3.3               |
| Federal involvement   | 4                      | 0.3               |
| Establishes centers of excellence in research and teaching, subject to annual appropriations  | 3                      | 2.3               |
| Provides opportunity for rural areas of the state to economically benefit from development of technology  | 3                      | 0.7               |
| Provides opportunities for developing the necessary infrastructure to support: distance learning, telemedicine, support economic development, enhanced citizen access | 3                      | 1.0               |
|   | -----                  | -----             |
| <b>Total Scores</b>   | <b>100</b>             | <b>76.7</b>       |

## **Colorado Advanced Photonics Technology Center (CAPT) Information Technology Program**

**Program Background:** The Colorado Advanced Photonics Technology (CAPT) program was instituted to facilitate the growth and development of photonic technology-based companies in the State of Colorado. The State identified photonic technology as a key enabling technology for a number of industries that the State wishes to cultivate including telecommunications, information storage and bio & life sciences. The CAPT program is structured to accomplish this mission in four ways:

- Provide Companies with affordable access to laboratory facilities, equipment & services that expedite their ability to bring products to the market or to more effectively manufacture products that they already have.
- Provide appropriate training courses to cross train engineers and technicians from other disciplines for photonic-based manufacturing and to provide a forum for continuing education for photonic technical personnel.
- Provide basic photonics introductory training for factory and general personnel.
- Provide a forum for companies to further develop research oriented photonic technologies to the level of commercial viability.

### **Program Plan FY 2002:**

- Goal 1: Build awareness at both a local and national level of the CAPT program and the benefits that CAPT has to offer industry.
- Goal 2: Identify, plan and start to implement microphotonics fabrication and assembly capability.
- Goal 3: Coordinate and/or prepare and deliver relevant short courses to industry personnel as dictated by the evolving needs of the industry.
- Goal 4: To increase the industrial use of resources.
- Goal 5: Research.

### **Budget:**

| Revenues            |                | Expenses (CCHE only) |           |       |
|---------------------|----------------|----------------------|-----------|-------|
| CCHE                | \$146,155      | Personnel            | \$ 93,595 | 64.0% |
| CATI Capt & Reserv. | 185,000        | Operating            | 52,560    | 36.0% |
| Federal             | 15,000         | Purchases            | 0         |       |
| Industry            | <u>225,000</u> | Programs             | <u>0</u>  |       |
|                     | \$571,155      | Total (CCHE only)    | \$146,155 |       |

| Program: <u>Colorado Advanced Software Institute</u>  |                        |                   |
|---|------------------------|-------------------|
| Program Type: Applied Research  |                        |                   |
| Criteria  | Possible Maximum Score | Average of Scores |
| Industry involvement  | 13                     | 11.3              |
| Federal involvement   | 11                     | 4.0               |
| Has the potential for success and/or becoming self-supporting   | 10                     | 7.3               |
| Establishes centers of excellence in research and teaching, subject to annual appropriations  | 10                     | 4.7               |
| Has the potential for this program to take research in Colorado in a significant new direction  | 8                      | 6.0               |
| Builds on the institutions' strengths and previous successes  | 8                      | 7.0               |
| Encourages cooperation among the institutions of higher education, local communities and other governmental entities  | 7                      | 5.3               |
| Provides a balance of applied research, product/process development and commercialization within a program area and within a program                                  | 7                      | 6.0               |
| Considers Colorado Industry needs for technical training at the: associate, baccalaureate, graduate levels, in-service and continuing education                       | 6                      | 5.7               |
| Competitiveness - Colorado has the potential to be a leader   | 6                      | 5.0               |
| Increases effectiveness in funding through elimination of costly duplication and gaps in infrastructure that cause the misuse of state resources                      | 5                      | 4.3               |
| Non-duplicative of other programs, particularly at the graduate level of instruction  | 3                      | 3.0               |
| Provides opportunity for rural areas of the state to economically benefit from development of technology  | 3                      | 1.0               |
| Provides opportunities for developing the necessary infrastructure to support: distance learning, telemedicine, support economic development, enhanced citizen access | 3                      | 0.7               |
|   | -----                  | -----             |
| <b>Total Scores</b>   | <b>100</b>             | <b>71.3</b>       |

**Colorado Advanced Software Institute (CASI)**

**Information Technology Program**

**Program Background:** CASI is a partnership between industry, the public sector and Colorado's research universities. CASI's mission is to expedite shared development and transfer of emerging knowledge in advanced software technology among Colorado universities, industries, and public entities. CASI achieves its mission by conducting a research and a small-scale service program. The research program, CASI's main activity, involves business-need driven, small-scale Technology Transfer Research Seed Grants and an undergraduate research program.

**Program Plan FY 2002:**

Goal 1: Maintain a healthy seed grant program.

Goal 2: Provide timely support for its seed grant program.

Goal 3: Solicit and process seed grant proposals for projects to start July 1, 2002.

Goal 4: Maintain a healthy Undergraduate Research/Development Program.

Goal 5: Solicit and process Undergraduate Research/Development Proposals.

Goal 6: Insist on hard-cash and in-kind support from business and industry.

Goal 7: Provide a matching service that will contribute to matching the needs of its business, industry, and public sector members for the purpose of establishing direct contracts between the business/industry and public entity members and the universities.

Goal 8: During FY02, hold meetings for the purpose of the conduct of CASI business and as required by the CASI Charter.

Goal 9: Maintain its follow-on funding match.

Goal 10: Make efforts to attract additional funding.

**Budget:**

|            | Revenues       |                     | Expenses (CCHE only) |       |
|------------|----------------|---------------------|----------------------|-------|
| CCHE       | \$325,355      | Personnel           | \$79,202             | 24.3% |
| University | 0              | Operating           | 2,250                | 0.7%  |
| Federal    | --             | Equipment Purchases | 1,000                | 0.3%  |
| Industry   | <u>171,672</u> | Programs            | <u>242,904</u>       | 74.7% |
|            | \$497,139      | Total (CCHE only)   | \$325,355            |       |

| Program: <u>Colorado Photonics and Optoelectronics Program</u>  |                        |                   |
|---|------------------------|-------------------|
| Program Type: Applied Research  |                        |                   |
| Criteria  | Possible Maximum Score | Average of Scores |
| Industry involvement  | 13                     | 11.0              |
| Federal involvement   | 11                     | 0.7               |
| Has the potential for success and/or becoming self-supporting   | 10                     | 6.3               |
| Establishes centers of excellence in research and teaching, subject to annual appropriations  | 10                     | 6.3               |
| Has the potential for this program to take research in Colorado in a significant new direction  | 8                      | 7.3               |
| Builds on the institutions' strengths and previous successes  | 8                      | 7.7               |
| Encourages cooperation among the institutions of higher education, local communities and other governmental entities  | 7                      | 4.3               |
| Provides a balance of applied research, product/process development and commercialization within a program area and within a program                                  | 7                      | 6.3               |
| Considers Colorado Industry needs for technical training at the: associate, baccalaureate, graduate levels, in-service and continuing education                       | 6                      | 5.0               |
| Competitiveness - Colorado has the potential to be a leader   | 6                      | 5.3               |
| Increases effectiveness in funding through elimination of costly duplication and gaps in infrastructure that cause the misuse of state resources                      | 5                      | 4.3               |
| Non-duplicative of other programs, particularly at the graduate level of instruction  | 3                      | 3.0               |
| Provides opportunity for rural areas of the state to economically benefit from development of technology  | 3                      | 0.3               |
| Provides opportunities for developing the necessary infrastructure to support: distance learning, telemedicine, support economic development, enhanced citizen access | 3                      | 0.7               |
|   | -----                  | -----             |
| <b>Total Scores</b>   | <b>100</b>             | <b>68.7</b>       |

## **Colorado Photonics and Optoelectronics Program (CPOP) Information Technology Program**

**Program Background:** The Colorado Photonics and Optoelectronics Program is a seed-grant program aimed at providing the education and technology transfer needed to support and stimulate the emerging Colorado photonics industry. Seed grants help fund the research programs of Colorado university faculty members who wish to collaborate with Colorado companies in order to apply university-developed technology to an industrial problem. Typically the grants provide \$30,000/year for a two-year period and provide funding for a graduate student to work on the project. A company is required to share in the cost of the project, with a small company providing \$6,000/year and a large company providing \$12,000/year.

The Colorado photonics industry has more than 175 photonics companies providing the core, enabling technologies for the telecommunications, computers, medical, environmental sensing, aerospace, and materials processing industries. CPOP is a key element of the Colorado photonics cluster, producing a trained workforce and the most advanced photonics technologies.

### **Program Plan FY 2002:**

- Goal 1: Focus the seed-grant program to develop a broad range of opportunities for student researchers to learn while working on research projects with high potential to help Colorado photonics companies.
- Goal 2: Increase university participation in CPOP in the southern part of Colorado's Front Range high technology corridor.
- Goal 3: Identify and develop fertile areas for technology transfer from Colorado universities to Colorado businesses.
- Goal 4: Develop a broad recognition in Colorado of the value and opportunities associated with its photonics cluster.
- Goal 5: Improve the infrastructure for Colorado's emerging photonics industry.

### **Budget:**

|            | Revenues       | Expenses (CCHE only) |                      |
|------------|----------------|----------------------|----------------------|
| CCHE       | \$342,000      | Personnel            | \$ 81,522 23.8%      |
| University | 168,108        | Operating            | 5,478 1.6%           |
| Federal    | 0              | Purchases            | 0                    |
| Industry   | <u>114,972</u> | Programs             | <u>255,000</u> 74.6% |
|            | \$619,080      | Total (CCHE only)    | \$342,000            |

| Program: <u>Colorado Advanced Materials Institute</u>   |                        |                   |
|---|------------------------|-------------------|
| Program Type: Applied Research  |                        |                   |
| Criteria  | Possible Maximum Score | Average of Scores |
| Industry involvement  | 13                     | 10.0              |
| Federal involvement   | 11                     | 4.5               |
| Has the potential for success and/or becoming self-supporting   | 10                     | 6.0               |
| Establishes centers of excellence in research and teaching, subject to annual appropriations  | 10                     | 6.5               |
| Has the potential for this program to take research in Colorado in a significant new direction  | 8                      | 4.5               |
| Builds on the institutions' strengths and previous successes  | 8                      | 5.0               |
| Encourages cooperation among the institutions of higher education, local communities and other governmental entities  | 7                      | 6.0               |
| Provides a balance of applied research, product/process development and commercialization within a program area and within a program                                  | 7                      | 5.0               |
| Considers Colorado Industry needs for technical training at the: associate, baccalaureate, graduate levels, in-service and continuing education                       | 6                      | 3.0               |
| Competitiveness - Colorado has the potential to be a leader   | 6                      | 2.5               |
| Increases effectiveness in funding through elimination of costly duplication and gaps in infrastructure that cause the misuse of state resources                      | 5                      | 3.5               |
| Non-duplicative of other programs, particularly at the graduate level of instruction  | 3                      | 2.5               |
| Provides opportunity for rural areas of the state to economically benefit from development of technology  | 3                      | 0.0               |
| Provides opportunities for developing the necessary infrastructure to support: distance learning, telemedicine, support economic development, enhanced citizen access | 3                      | 0.3               |
|   | -----                  | -----             |
| <b>Total Scores</b>   | <b>100</b>             | <b>59.3</b>       |

**Colorado Advanced Materials Institute (CAMI)**

**Advanced Materials Program**

**Program Background:** CAMI is a consortium of Colorado industry, universities and state government that provides seed grants to implement the TAG mission in the selected technology area of advanced materials and processes. The Director of CAMI serves as the Advanced Materials Technology Area Director for TAG and also directly administers the TAG TIRE TAP program.

CAMI provides seed grants via a competitive Request for Proposals issued annually to qualified researchers at Colorado universities. The RFP includes a list of important materials research problems that are specifically generated by Colorado industry. These projects change each year and provide excellent opportunities for Colorado faculty and students to work on materials projects of vital concern to industry in the state.

In addition, CAMI has conceived and implemented other innovative university/industry partnership grant programs. In FY 2001 CAMI generated \$2,551,554 in federal, private and university matching funds from the original state funding of \$218,000.

**Program Plan FY 2002:**

- Goal 1: Provide unique technical assistance from university expertise to Colorado technology based companies to enhance their global competitive edge.
- Under the CAMI Seed Grant Program, competitively select and award academic researchers grants of \$10k each to provide applied research to industry guided problems in advanced materials and processing.
- Goal 2: Create and implement a Museum Technology Assistance Program (MTAP) that will enable the transfer of advanced materials technology and analytical techniques from Colorado universities to museums, archaeologists and conservators in the state.

**Budget:**

| Revenues   |                | Expenses (CCHE only) |                      |
|------------|----------------|----------------------|----------------------|
| CCHE       | \$ 218,000     | Personnel            | \$82,844 38.0%       |
| University | 139,470        | Operating            | 0 %                  |
| Federal    | 1,490,000      | Purchases            | 0 %                  |
| Industry   | <u>291,926</u> | Programs             | <u>135,156</u> 62.0% |
|            | \$1,747,970    | Total (CCHE only)    | \$218,000            |

| Program: <u>Center for Commercial Applications of Combustion in Space</u>   |                        |                   |
|---|------------------------|-------------------|
| Program Type: Applied Research  |                        |                   |
| Criteria  | Possible Maximum Score | Average of Scores |
| Industry involvement  | 13                     | 11.3              |
| Federal involvement   | 11                     | 10.7              |
| Has the potential for success and/or becoming self-supporting   | 10                     | 8.0               |
| Establishes centers of excellence in research and teaching, subject to annual appropriations  | 10                     | 9.0               |
| Has the potential for this program to take research in Colorado in a significant new direction  | 8                      | 6.3               |
| Builds on the institutions' strengths and previous successes  | 8                      | 6.7               |
| Encourages cooperation among the institutions of higher education, local communities and other governmental entities  | 7                      | 2.0               |
| Provides a balance of applied research, product/process development and commercialization within a program area and within a program                                  | 7                      | 5.3               |
| Considers Colorado Industry needs for technical training at the: associate, baccalaureate, graduate levels, in-service and continuing education                       | 6                      | 3.0               |
| Competitiveness - Colorado has the potential to be a leader   | 6                      | 4.0               |
| Increases effectiveness in funding through elimination of costly duplication and gaps in infrastructure that cause the misuse of state resources                      | 5                      | 3.3               |
| Non-duplicative of other programs, particularly at the graduate level of instruction  | 3                      | 2.7               |
| Provides opportunity for rural areas of the state to economically benefit from development of technology  | 3                      | 0.5               |
| Provides opportunities for developing the necessary infrastructure to support: distance learning, telemedicine, support economic development, enhanced citizen access | 3                      | 0.5               |
|   | -----                  | -----             |
| <b>Total Scores</b>   | <b>100</b>             | <b>73.3</b>       |

**Center for Commercial Applications of Combustion in Space (CCACS)  
Advanced Materials Program**

**Program Background:** CCACS is a NASA Commercial Space Center (CSC) located at the Colorado School of Mines and specializing in the area of combustion-related products and processes. The mission of CCACS is to conduct research and educate students in scientific areas related to combustion, with a special focus on those areas where the results can be applied to the development of commercial products and processes and where the research can benefit from the unique properties of space. The center was established in 1996 under a cooperative agreement with NASA at a base funding of \$1 million per year and with a pledge of \$125K per year, to be stable over the life of the NASA grant, in matching funds from CATI. The center is currently funded by NASA at a level of approximately \$4 million per year, which is projected by NASA to be stable through 2007, and receives an additional \$500K from industrial and university sources. Private in-kind contributions for the current year total more than \$4 million.

**Program Plan FY 2002:**

The overall goals of the center are to conduct combustion-related research in terrestrial and space environments that can lead to new and improved commercial products and processes. The research is conducted within four product focus areas:

Goal 1: Combustion and Processing

- Flame Synthesis of Ceramic Powders
- Catalytic Combustion
- Inorganic Membranes for Fuel Separation

Goal 2: Fire Safety and Suppression

- Water Mists for Halon Replacement

Goal 3: Advanced Materials

- Specialty Glasses for Optical and other Fiber Applications
- Porous Ceramics for Bone Replacement Materials
- High-Strength Diamond Cutters for the Petroleum Industry

Goal 4: Sensors and Controls

- Laser-Based Diagnostic Instrumentation for Combustion Experiments

**Budget:**

|            | Revenues       |                   | Expenses (CCHE only) |       |
|------------|----------------|-------------------|----------------------|-------|
| CCHE       | \$ 125,000     | Personnel         | \$ 16,928            | 13.5% |
| University | 97,100         | Operating         | -0-                  |       |
| Federal    | 4,680,327      | Programs          | <u>108,072</u>       | 86.5% |
| Industry   | <u>347,862</u> | Total (CCHE only) | \$125,000            |       |
|            | \$5,250,289    |                   |                      |       |

| Program: <u>Membrane Applied Science and Technology Center</u>  |                        |                   |
|---|------------------------|-------------------|
| Program Type: Applied Research  |                        |                   |
| Criteria  | Possible Maximum Score | Average of Scores |
| Industry involvement  | 13                     | 9.3               |
| Federal involvement   | 11                     | 9.7               |
| Has the potential for success and/or becoming self-supporting   | 10                     | 6.0               |
| Establishes centers of excellence in research and teaching, subject to annual appropriations  | 10                     | 9.0               |
| Has the potential for this program to take research in Colorado in a significant new direction  | 8                      | 4.3               |
| Builds on the institutions' strengths and previous successes  | 8                      | 6.0               |
| Encourages cooperation among the institutions of higher education, local communities and other governmental entities  | 7                      | 4.0               |
| Provides a balance of applied research, product/process development and commercialization within a program area and within a program                                  | 7                      | 3.7               |
| Considers Colorado Industry needs for technical training at the: associate, baccalaureate, graduate levels, in-service and continuing education                       | 6                      | 4.0               |
| Competitiveness - Colorado has the potential to be a leader   | 6                      | 3.7               |
| Increases effectiveness in funding through elimination of costly duplication and gaps in infrastructure that cause the misuse of state resources                      | 5                      | 3.7               |
| Non-duplicative of other programs, particularly at the graduate level of instruction  | 3                      | 2.7               |
| Provides opportunity for rural areas of the state to economically benefit from development of technology  | 3                      | 0.3               |
| Provides opportunities for developing the necessary infrastructure to support: distance learning, telemedicine, support economic development, enhanced citizen access | 3                      | 0.3               |
|   | -----                  | -----             |
| <b>Total Scores</b>   | <b>100</b>             | <b>66.7</b>       |

**Membrane Applied Science and Technology (MAST) Center**

**Bioscience Program**

**Program Background:** The Membrane Applied Science and Technology (MAST) Center is an interdisciplinary National Science Foundation Industry/University Cooperative Research Center. The research conducted by the MAST Center focuses on the development of advanced materials for membrane separations, novel strategies for membrane fabrication and applications technologies employing membranes.

An Industrial Advisory Board comprised of representatives from sponsor member organizations suggests and selects the industrially relevant research projects for Center funding. Graduate and under-graduate students supported by the MAST Center receive workplace experience via the opportunity to work on thesis research problems defined and mentored by MAST's industry sponsors. Sponsors receive timely results from 10-12 industrially relevant research projects that are being conducted simultaneously through leveraged financial support from sponsor fees, the NSF, the State of Colorado and the University of Colorado. The stability of our sponsor base reflects their long-term satisfaction with the MAST Center research results and the Industrial Advisory Board membership experience.

Program Plan FY 2002:

Goal 1: Basic Research

- Conduct basic research and related developmental activities for the use of membrane technology in separation processes

Goal 2: Technology Transfer

- Provide timely and effective technology transfer between the MAST Center and its industrial participants

Goal 3: Promote training

- Promote graduate and undergraduate education and training in the membrane technology area.

**Budget:**

| Revenues   |                | Expenses (CCHE only) |                     |
|------------|----------------|----------------------|---------------------|
| CCHE       | \$100,000      | Personnel            | -0-                 |
| University | 80,000         | Operating            | -0-                 |
| Federal    | 160,000        | Programs             | <u>100,000</u> 100% |
| Industry   | <u>210,000</u> | Total (CCHE only)    | \$100,000           |
|            | \$550,000      |                      |                     |

| Program: <u>Tire Recycling Technology Assistance Program</u>  |                        |                   |
|---|------------------------|-------------------|
| Program Type: Product or Process Development  |                        |                   |
| Criteria  | Possible Maximum Score | Average of Scores |
| Industry involvement  | 15                     | 11.7              |
| Competitiveness - Colorado has the potential to be a leader   | 12                     | 5.7               |
| Has the potential for success and/or becoming self-supporting   | 12                     | 3.7               |
| Builds on the institutions' strengths and previous successes  | 10                     | 7.0               |
| Increases effectiveness in funding through elimination of costly duplication and gaps in infrastructure that cause the misuse of state resources                      | 9                      | 7.7               |
| Has the potential for this program to take research in Colorado in a significant new direction  | 8                      | 3.3               |
| Encourages cooperation among the institutions of higher education, local communities and other governmental entities  | 7                      | 5.7               |
| Provides a balance of applied research, product/process development and commercialization within a program area and within a program                                  | 6                      | 4.7               |
| Non-duplicative of other programs, particularly at the graduate level of instruction  | 4                      | 3.7               |
| Considers Colorado Industry needs for technical training at the: associate, baccalaureate, graduate levels, in-service and continuing education                       | 4                      | 2.3               |
| Federal involvement   | 4                      | 1.7               |
| Establishes centers of excellence in research and teaching, subject to annual appropriations  | 3                      | 1.3               |
| Provides opportunity for rural areas of the state to economically benefit from development of technology  | 3                      | 1.3               |
| Provides opportunities for developing the necessary infrastructure to support: distance learning, telemedicine, support economic development, enhanced citizen access | 3                      | 0.3               |
|   | -----                  | -----             |
| <b>Total Scores</b>   | <b>100</b>             | <b>60.0</b>       |

**Tire Recycling Technology Assistance Program (TIRE-TAP) Advanced Materials Program**

**Program Background:** TIRE-TAP was conceived and is administered by CAMI to successfully implement the legislative intent in bills sponsored by Senator Ray Powers (SB-98-198) and Rep. Bill Swenson (HB 98-1176). This legislation was passed to foster research and development on tire recycling to help mitigate the enormous growing problem of waste tires in Colorado.

TIRE-TAP is a seed grant program that awards competitive grants to university/small business teams in the state. The grants provide technical assistance from university expertise to small businesses in the state to help them develop new technology for recycling waste tires into commercial, cost-effective products.

**Program Plan FY 2002:**

Goal 1: Provide unique technical assistance from university expertise in Colorado to small businesses in the state to develop new recycling technologies for waste tires.

- Under the TIRE-TAP seed grant program, competitively select and award academic researchers grants of up to \$45K each to provide technical assistance to small Colorado business companies to help them develop new commercial products and services using waste tires.

Fiscal Year 2001 projects included:

- A study on the Use of Recycled Tire Bales for Interstate Highway Sound Abatement Walls – Professor David R. Munoz, John P. Steele and Robert Knecht, Colorado School of Mines and Vernie Houtchens, Midway Tire Recycling.
- Adaptation of Waste Tire Rubber for Greenhouse Media and Zinc Fertilizers – Professor Steven E. Newman, CSU and Jan C. Menely, AgBio Development, Inc.
- Optimization and Performance of Tire Shred Reinforcement Embankments – Professor Jorge G. Zornberg, UCB and Richard K. Welle, Front Range Tire Recycling, Inc.

**Budget:**

|            | Revenues       | Expenses (CCHE only) |                      |
|------------|----------------|----------------------|----------------------|
| CCHE       | \$237,703      | Personnel            | \$ 45,871 19.3%      |
| University | 134,470        | Operating            | 11,832 5.0%          |
| Federal    | 150,000        | Programs             | <u>180,000</u> 75.7% |
| Industry   | <u>180,000</u> | Total (CCHE only)    | \$237,703            |
|            | \$702,173      |                      |                      |

| Program: <u>Rural New Economy Initiative</u>  |                        |                   |
|---|------------------------|-------------------|
| Program Type: Commercialization   |                        |                   |
| Criteria  | Possible Maximum Score | Average of Scores |
| Industry involvement  | 16                     | 3.7               |
| Competitiveness - Colorado has the potential to be a leader   | 12                     | 8.7               |
| Has the potential for success and/or becoming self-supporting   | 12                     | 8.3               |
| Considers Colorado Industry needs for technical training at the: associate, baccalaureate, graduate levels, in-service and continuing education                       | 10                     | 9.0               |
| Has the potential for this program to take research in Colorado in a significant new direction  | 10                     | 0.3               |
| Provides a balance of applied research, product/process development and commercialization within a program area and within a program                                  | 7                      | 3.7               |
| Provides opportunity for rural areas of the state to economically benefit from development of technology  | 7                      | 7.0               |
| Increases effectiveness in funding through elimination of costly duplication and gaps in infrastructure that cause the misuse of state resources                      | 6                      | 5.7               |
| Encourages cooperation among the institutions of higher education, local communities and other governmental entities  | 5                      | 4.3               |
| Non-duplicative of other programs, particularly at the graduate level of instruction  | 3                      | 2.3               |
| Builds on the institutions' strengths and previous successes  | 3                      | 2.3               |
| Establishes centers of excellence in research and teaching, subject to annual appropriations  | 3                      | 0.3               |
| Federal involvement   | 3                      | 0.3               |
| Provides opportunities for developing the necessary infrastructure to support: distance learning, telemedicine, support economic development, enhanced citizen access | 3                      | 2.7               |
|   | -----                  | -----             |
| <b>Total Scores</b>   | <b>100</b>             | <b>58.7</b>       |

## **The Rural New Economy Initiative**

**Program Background:** The Rural New Economy Initiative (RNEI) strives to build the capacity of rural Colorado to respond to increased opportunities of the New Economy, particularly those that are being advanced by the MNT and Beanpole initiatives.

RNEI is a year-old consortium of 14 rural higher education institutions reaching more than 800 rural community members, including small business owners, locally-elected officials, health care workers, seniors, and college faculty with new education opportunities geared specifically to rural needs for New Economy opportunities. Programs have received excellent ratings and participation rates demonstrate strong community interest in preparing for digital opportunities.

RNEI is currently increasing resources to communities, while cutting costs. By building a statewide team that shares the costs of new program development, they have met local needs at a fraction of the cost that would be incurred if each institution worked alone. New offerings and delivery options have been developed for programs in health care, rural policy leadership for telecommunications, and small business training and support. Additionally, RNEI has created a web-based system to facilitate sharing of curriculum and best practices. Through alignment with partnering departments they have extended the reach of existing resources. (Partners are DOLA, Department of Economic Development and International Trade, Governor's Commission on Science and Technology).

In the first year of activity, the Rural New Economy Initiative focused on expanding the target audience. It developed a collaborative capacity, serving small business, local governments, and county agencies. With the Beanpole and MNT moving into place, RNEI proposes to continue support the above groups, and add service to two new audiences: the technical workforce and the educational workforce (the latter of which will improve student performance).

### **Program Plan FY 2002:**

- Goal 1: To leverage economies of scale to develop or acquire new services to meet local needs for assessment, training, and education.
- Identification of high priority statewide *needs* that are not being addressed through existing programs. This will include review of needs of IT infrastructure support workforce and education workforce.
  - Identification of local *assets*, including existing training and education programs, which help prepare key audiences (such as the local IT infrastructure support workforce) to support and facilitate optional use of new beanpole and MNT resources.
  - Acquisition of new training and education resources, including online courseware.
  - Piloting of new curriculum and delivery.
  - Taking proven approaches to scale through train-the-trainer activities and support.
  - Evaluation of statewide participation and impact.

Goal 2: Ensure rural access to high quality assessment, training and education customized to meet individual rural community needs.

- Identification of local needs and opportunities.
- Delivery of local workshops and training based on local priorities and needs.
- Participation in statewide consortium to ensure broad benefit from lessons learned in local application.

Goal 3: Evaluate the process, the impact and make recommendations for future direction.

- Impact evaluation: To what degree does expanded provision of New Economy education and training result in economic development for rural Colorado?
- Process evaluation: To what degree did the RNE construct a valuable and ongoing forum to enable the quick deployment of quality training solutions? To what degree did it help to build the knowledge of community team members? To what degree did this initiative succeed in avoiding unnecessary duplication of programs?

**Budget:**

|          | Revenues  |                   | Expenses (CCHE only) |        |
|----------|-----------|-------------------|----------------------|--------|
| CCHE     | \$500,000 | Personnel         | \$ 0                 | %      |
| CC of C  | 57,950    | Operating         | 0                    | %      |
| Federal  | 0         | Programs          | <u>500,000</u>       | 100.0% |
| Industry | <u>0</u>  | Total (CCHE only) | \$500,000            |        |
|          | \$557,950 |                   |                      |        |

Attachment D

## **Belsten & Associates, LLC**

9197 S. Sugarstone Circle  
Littleton, CO 80130-4433

303/471-6100 (office)  
303/470-7058 (fax)  
[laurabelsten@att.net](mailto:laurabelsten@att.net)

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*Laura A. Belsten, Ph.D.*

May 28, 2001

Mr. Tim Foster  
Executive Director  
Colorado Commission on Higher Education  
1380 Lawrence Street, Suite 1200  
Denver, CO 80203

Dear Tim:

As you requested, I have reviewed the third-quarter interim reports submitted by TAG grant recipients to determine whether the activities contracted for are being (or have been) accomplished. Please note that this review does not assess whether the research being conducted under the TAG program is the most relevant or strategically-important research possible for the State of Colorado. Such a determination of the optimal research agenda for CCHE-TAG is beyond the scope of this evaluation, and should ideally be undertaken by a panel of researchers representing industry as well as academia. This assessment simply evaluates the quality of the third-quarter interim reports to determine whether the entities which CCHE-TAG has contracted with are fulfilling their contractual obligations.

Following are my general observations:

1. In general, grantees are fulfilling their contractual obligations to CCHE-TAG and performing the research they originally proposed. Some programs are recommended for sunseting, while others are recommended for continued support. See specific recommendations in the following pages.
2. The RFPs for CIRB and CRC are essentially the same, and the list of proposals received are the same in the interim reports from both CIRB and CRC, making it difficult for the reviewer to distinguish which proposals were submitted to CIRB and which were submitted to CRC. The origin of matching funds is also unclear in the reports from these entities.
3. It is my recommendation that CCHE-TAG strengthen the program selection criteria to favor projects with strong student involvement, serving to strengthen CCHE's mission of

stimulating greater student access to higher education and its mission of being student-centered.

4. It is my recommendation that CCHE-TAG strengthen the program selection criteria to favor projects initiated by industry, and require proposals to make the research benefit to industry more clear. Faculty-initiated research tends to perpetuate long-standing research interests of university faculty, while industry-initiated research would serve the longer-term economic interests of the State of Colorado, as well as result in greater student placement in technology-based jobs.
5. To stimulate stronger ties between CCHE-TAG and industry, CCHE-TAG staff should participate to the maximum extent possible in industry-related networking and technology meetings, conferences, and other industry-sponsored research events. CCHE-TAG staff need to be current on industry research needs in order to keep the TAG program as current and relevant as possible, and be in a position to better evaluate research proposals.
6. It is my recommendation that the CCHE-TAG staff review and possibly streamline the reporting requirements of the TAG program, while still maintaining grantee accountability. For example, it is unclear to grant recipients what the difference is between the Third-Quarter Progress Report and the Third-Quarter Interim Program Report, both of which are due at essentially the same time. It is in the best interests of all concerned to ensure any potentially bureaucratic requirements are kept to a minimum, while at the same time ensure grant recipients are held accountable for their use of public funds.

The following pages contain specific reviews of each of the programs for which I had third-quarter interim reports. If you have any questions, please call me at 303-471-6100.

Sincerely,

Laura A. Belsten, Ph.D.

Attachments: Reviews of the following programs:

- BTI
- CIRB
- CRC
- New Rural Economy
- TIRE-TAP
- CAMI
- CBC
- CAPT
- CASI
- CCACS
- CPOP
- MAST

### Colorado RNA Center (CRC)

#### **Contracted Activities and Deliverables**

##### Goal #1: Sponsor RNA Technology Seed Grants

- ◆ Issue at least 8 seed grants
- ◆ Receive at least \$200,000 in direct matching funds
- ◆ Engender at least \$750,000 in follow-on contracts

##### Goal #2: Sponsor Biotechnology and RNA Technology Small Grants

- ◆ Award at least 8 small grants
- ◆ Receive at least \$100,000 in matching funds

##### Goal #3: Facilitate Communications Functions

- ◆ Sponsor biweekly meetings of RNA Club
- ◆ Organize/sponsor mini-symposium on RNA research
- ◆ Publish one RNA-related article in newsletter of CIRB

##### Goal #4: Facilitate Biotechnology Internships

- ◆ Hold annual Biotechnology Internships Mini-symposium
- ◆ Facilitate at least 5 student internships
- ◆ Receive at least \$50,000 in matching funds

#### **Accomplishments Reported in Third-Quarter Interim Report**

According to the Third-Quarter Interim Report, all activities listed above were accomplished with the following exceptions:

- ◆ Goal #1: there is no mention of \$750,000 in follow-on contracts engendered to date
- ◆ Goal #3: the RNA-related article is not yet published, but planned “for spring 2001.” The date of the interim report is 4/24/01. When is the spring 2001 issue due out and is the article now published?
- ◆ Goal #4: the report narrative states that 10 student interns were placed in summer 2000, but only 7 are listed in the Appendix. It appears that 11 more are expected for summer 2001 (after this program year expires). The report is somewhat confusing in terms of the matching funds. It appears that in summer 2000, the “ten student interns were placed (three with matching funds from CIRB, and seven with matching funds from CRC).” Does this mean that the matching funds for CRC come from CIRB, and the CIRB matching funds come from CRC? And are all these matching funds derived originally from TAG/CCHE funding?
- ◆ Goal #4: the report states that at least \$50,000 in matching funds will be received; however, to date, \$40,000 in industry cash matching funds for CRC are reported. There is no mention in the report regarding how or whether the \$10,000 difference will be derived.

### **Independent Reviewer Assessment**

It is not clear from the interim report how many student interns are funded by this program during this fiscal year. The report also lacked clarity on matching funds. The CRC program appears closely linked with the CIRB program, and it is not clear from the report whether matching funds for CRC come from CIRB, and whether matching funds for CIRB come from CRC, and whether the matching funds from both programs are derived originally from CCHE-TAG.

All required interim report sections are contained within the report except one. The report contains the following sections: (1) achievements for past reporting period, (2) changes in personnel, and (3) plans for the coming period. The report does not address “deviations from plan or schedule.”

It is not possible for the independent reviewer to make a recommendation concerning the continuation of this program based on a review of the third-quarter interim report. It is recommended, however, that CCHE-TAG undertake a thorough review of this program prior to continuing funding.

### Colorado Institute for Research in Biotechnology (CIRB)

#### **Contracted Activities and Deliverables:**

##### Goal #1: Sponsor Biotechnology See Grants

- ◆ Award at least 8 seed grants (receive at least 20 applications)
- ◆ Receive at least \$150,000 in direct matching funds
- ◆ Engender at least \$750,000 in follow-on contracts

##### Goal #2: Sponsor Communications Functions to Achieve Synergy Among Academic, Industrial, and Government Biotechnology Research Groups in Colorado

- ◆ Achieve attendance of 300 people at Annual Colorado Biotechnology Symposium
- ◆ Co-sponsor at least 2 other symposia or workshops
- ◆ Issue a CIRB Newsletter twice/year with at least 1250 subscribers

##### Goal #3: Provide Student Training Opportunities

- ◆ Award at least 10 CIRB fellowships
- ◆ Receive at least \$120,000 in matching funds
- ◆ Hold Biotechnology Internships Minisymposium, with at least 10 participating companies
- ◆ Provide matching funds for at least 3 student internships
- ◆ Internships to be matched with at least \$15,000

#### **Accomplishments Reported in Third-Quarter Interim Report**

According to the Third-Quarter Interim Report, all activities listed above were accomplished with the following exceptions:

- ◆ Goal #1: the goal was to award 8 seed grants with CIRB funds; 7 were awarded.
- ◆ Goal #1: the objective was to receive at least 20 seed grant applications; 21 were received, *jointly with CRC*.
- ◆ Goal #1: the objective of engendering at least \$750,000 in follow-on contracts is not addressed.
- ◆ Goal #3: the report indicates a 2:1 match of CIRB funds by “industry funds and by the biotechnology training program of UCB.” It is unclear how much match is provided by industry and how much is contributed by UCB.
- ◆ Goal #3: the report indicates that that 10 student interns were placed in summer 2000, 3 with matching funds from CIRB, and 7 with matching funds from CRC. It is unclear as to whether TAG-derived funds awarded to CRC are used to match CIRB internships, and similarly, whether TAG-derived funds awarded to CIRB are used to match CRC internships.

#### **Independent Reviewer Assessment**

It is not clear from the interim report whether or how the goal of acquiring \$750,000 in follow-on funding will be achieved. CIRB expected to receive at least 20 seed grant applications. Twenty-one were received *jointly with CRC*. It is not clear which applications were directed to CRC and which to CIRB. The report states that CIRB funds are matched at least 2:1 by industry funds and by the biotechnology training program of UCB; however, it is not clear from the report how much comes from UCB and how much comes from industry. The report also lacked clarity on

matching funds. The CIRB program appears closely linked with the CRC program, and it is not clear from the report whether matching funds for CRC come from CIRB, and whether matching funds for CIRB come from CRC, and whether the matching funds from both programs are derived originally from CCHE-TAG.

All required interim report sections are contained within the report except one. The report contains the following sections: (1) achievements for past reporting period, (2) changes in personnel, and (3) plans for the coming period. The report does not address “deviations from plan or schedule.”

It is not possible for the independent reviewer to make a recommendation concerning the continuation of this program based on a review of the third-quarter interim report. It is recommended, however, that CCHE-TAG undertake a thorough review of this program prior to continuing funding.

### **Boulder Technology Incubator (BTI)**

#### **Contracted Activities and Deliverables:**

Goal #1: BTI Technology Transfer/Commercialization Program (establishing “effective systems for interacting with the University Technology Corporation and with the University of Colorado,” identifying mechanisms for selecting faculty, establishing marketing protocols to encourage university technology transfer and commercialization, exploring marketing programs for university technology to US industry)

Goal #2: BTI Business Development for CCHE-TAG Programs (creating a new process for advising CCHE-TAG programs in appropriate business development models)

Goal #3: BTI Entrepreneurial Training/Workshop Program (providing training in early stage technology business practices in real world setting)

#### **Accomplishments Reported in Third-Quarter Interim Report**

- ◆ Goal #1: While BTI “has initiated a new program for Tech Transfer and Commercialization,” it is unclear as to whether the agreements and documents related to the process of commercialization have been approved by, or are being used by, the proposed parties. It appears that documents have been drafted, a process for commercialization has been outlined, and meetings have been scheduled, but have not yet been held. However, it is not clear whether “an effective system for interacting with the University Technology Corporation and UCB” has been established.
- ◆ Goal #2: It does not appear that this goal has been accomplished. A meeting was held with TAG staff in July 2000 to “identify two CCHE programs which could potentially benefit from assistance in developing a strategic and/or business plan.” No discussions have yet been held with either of these two programs (CAPT or CBC), and no strategic plan or business plan has been developed for either program.
- ◆ Goal #3: BTI established the BTI Education Foundation to provide educational programs, hired a non-profit specialist to organize the educational programs, and is working to develop curriculum. The question arises as to whether curriculum development is an appropriate and authorized use of TAG/CCHE funds.

#### **Independent Reviewer Assessment**

Each of the three goals include objectives relating to “establishing an effective system for interacting with” various parties. It is not clear to this reviewer what is actually being accomplished by establishing these “effective systems for interacting.” The reviewer questions whether it is appropriate for TAG funding to be used to pay for the Boulder Incubator to “interact.” It is not clear from this interim report what actual outcomes and accomplishments have resulted from this TAG-supported program. It is recommended that CCHE-TAG undertake a thorough review of this program prior to continuing funding.

### **Center for Commercial Applications of Combustion in Space (CCACS)**

#### **Contracted Activities and Deliverables**

The CCACS interim report provides a brief overview of the program goals and objectives for the entire \$3,750,000 program of the Center for Commercial Applications of Combustion in Space, a NASA Commercial Space Center at the School of Mines. CCHE-TAG provides matching funds in the amount of \$125,000, as required by NASA.

The report lists numerous projects currently underway by CCACS including carbon dioxide separate from Martian atmosphere, extraction of volatiles on lunar and Martian surfaces, laser flame diagnostics, thin-film combustion synthesis, inorganic membranes, porous ceramics for filters, insulation, structures and bone implants, glass ceramics for fiber optics, opto-electronic circuits, dental implants and insulation, and more. The report also provides a list of industrial, government and industrial partners.

#### **Accomplishments Reported in Third-Quarter Interim Report**

The report states that all objectives set for the current year have been achieved except where hardware delivery was set back because of delays within NASA.

The report provides a very brief overview of achievements for the past reporting period, plans for the coming period, and deviations from plan or schedule. It does not address changes in personnel.

#### **Independent Reviewer Assessment**

It is not possible to determine from the interim report which activities are directly supported by CCHE-TAG funding. To the extent that the purpose of the CCHE-TAG funding is to serve as a required match for NASA funding, it appears that the CCHE-TAG funds are being used for their intended purpose. The independent reviewer concurs with CCHE-TAG personnel in recommending continued funding through the end of the NASA grant.

### Colorado Bioprocessing Center (CBC)

#### **Contracted Activities and Deliverables:**

##### Goal #1: Market the services of the Center

- ◆ Increase the number of clients so that the Center is operating at 80% or more capacity
- ◆ Participate in trade shows, mail brochures and revise the Center's website

##### Goal #2: Develop a comprehensive business plan for the Center

- ◆ Describe the financing and operation of the Center as a self-sufficient business, without CCHE-TAG support funds
- ◆ Establish a business plan that includes a mission, identifies research and development services and other sources of revenue, outline how CBC can maintain an educational role while attaining self-sufficiency, describe a marketing plan, and plan for modernizing equipment, capabilities and capacity

##### Goal #3: Perform contract services for a minimum of 5 Colorado companies

##### Goal #4: Increase contract revenues to build toward self-sufficiency – generate \$300,000 in revenues

##### Goal #5: Upgrade the control and data acquisition systems in the pilot plant to increase capability and ease-of-use, and to permit remote access

- ◆ Purchase 2 new computers and upgraded software

##### Goal #6: Incorporate the ability to monitor cell mass concentrations in pilot scale bioreactors without having to physically take a sample

- ◆ Purchase 2 cell density probes and monitors and connect them to data acquisition system for remote access

##### Goal #7: Develop programs/experiments and provide opportunities for undergraduate and graduate students for training in bioprocess development research.

##### Goal #8: Develop a program to provide bioprocessing training to scientists/workers in the biotechnology industry

#### **Accomplishments Reported in Third-Quarter Interim Report**

- ◆ Goal #1: CBC has made plans to attend trade shows in June, July and October; and has engaged in networking activities at BioBreakfasts, the Colorado Biotech Association meetings, and the CIRB Symposium. No mention is made in the report concerning updating the web site or mailing brochures.
- ◆ Goal #2: The business plan is being drafted and is expected to be complete by the end of the fiscal year.
- ◆ Goal #3: Contract work has been performed for 3 Colorado biotechnology companies, and discussions are underway with 2 others.

- ◆ Goal #4: The Center has completed \$234,123 in contract services to date, with additional work in process. The Center has operated at 80% or more of capacity for most of the year.
- ◆ Goal #5: Computers have been purchased and control and data acquisition software has been upgraded to the latest version.
- ◆ Goal #6: The purchase of cell density probes has been postponed and the money allocated for repair and replacement of equipment damaged by a student employee.
- ◆ Goal #7: To date, the Center has employed 2 undergraduate students and 2 graduate students. The Center's staff scientists also developed and conducted a lecture and laboratory experiment in ultrafiltration for 10 CSU students during this past quarter, bringing the total number of students that the Center has run experiments for or lectured to during this fiscal year to 87.
- ◆ Goal #8: A course outline is being prepared.

#### **Independent Reviewer Assessment**

It appears the CBC is on track to achieve its goal of self-sufficiency. The interim report provided a thorough overview of achievements to date, plans for the coming period, and deviations from plan or schedule, and mentioned changes in personnel in terms of student employees. CBC has made major progress in obtaining contracts outside CCHE-TAG support, and the independent reviewer supports the decision of CCHE-TAG staff in discontinuing support for CBC.

### **Colorado Advanced Photonics Technology Center (CAPT)**

#### **Contracted Activities and Deliverables:**

Objective #1: Build awareness of CAPT programs, and increase industrial memberships to 42 by June 2001.

Objective #2: Bring photonics telecommunications center on line by January 2001, with training by June 2001.

Objective #3: bring photonics environmental test capability on line by April 2001.

Objective #4: Identify, plan and begin implementation of micro optics fabrication and assembly capability.

Objective #5: Coordinate, prepare and deliver short courses to industry personnel, accumulating 1800 student/attendee contact hours from July 1, 2000 to June 30, 2001.

Objective #6: Increase industrial use of resources, achieving 29% level of self-funding through fees charged to industry.

#### **Accomplishments Reported in Third-Quarter Interim Report**

All contracted activities have been completed with the exception of the completion of the build-out of the CAPT facility which was originally targeted for completion in October 2001, and is now slated for early 2002 due to unanticipated personnel shortages from November 2000 to March 2001 and long industry lead times.

- ◆ CAPT has 54 active memberships (though no list is provided in the report).
- ◆ The photonics telecommunications center came on line a month early (in December 2000), and training programs are scheduled for June 2001.
- ◆ The vibration and temperature test ability was anticipated to be on line in May, 2001 and the thermal shock capability is anticipated for June 2001. The interim report cites long lead times from equipment vendors and a poor response from HEAT center on facility modifications resulting in slight delays of lab facility.
- ◆ Micro optics fabrication plan is completed; however long lead times for equipment has pushed back the completion of the March 2001 date for the lab to November 2001 when 75% is expected to be on line.
- ◆ Self-funding is at 39.7% (where 29% was projected).

#### **Independent Reviewer Assessment**

CAPT has exceeded the number of active memberships anticipated, and completed other tasks ahead of schedule. Self-funding is ahead of projections, and the program appears to be well-administered. The interim report addresses achievements to date, plans for the coming months, deviations from plan and schedule, and personnel. The report indicates that the Center is under budget in several areas including salaries, benefits, operations and capital expenditures due to inability to staff positions and acquire necessary capital. It appears that the CAPT Center is focused on an important industry sector for Colorado, and the independent reviewer recommends continued support.

### **Colorado Photonics and Optoelectronics Program (CPOP)**

#### **Contracted Activities and Deliverables:**

Goal #1: Focus the seed-grant program to develop a broad range of opportunities for student researchers...with high potential to help Colorado photonics companies.

- ◆ Each project should have at least one graduate student who performs the research
- ◆ Projects will address a broad range of photonics areas being developed in Colorado
- ◆ Achieve a total of 11 photonics projects
- ◆ Distributed between four Colorado research universities

Goal #2: Increase the university participation in CPOP in the southern part of Colorado's Front Range high technology corridor.

- ◆ Include participation to include University of Colorado at Colorado Springs
- ◆ Explore possible participation by Air Force Academy researchers

Goal #3: Identify and develop fertile areas for technology transfer from Colorado universities to Colorado businesses.

- ◆ Look for high potential focus areas of photonics technology in Colorado industry
- ◆ Increase the impact of research expenditures to industry

Goal #4: Develop a broad recognition in Colorado of value and opportunities associated with its photonics cluster.

- ◆ Meet with officials to identify strategic technologies
- ◆ Make them aware of the uniqueness of Colorado's photonics cluster
- ◆ Work with agencies to leverage earlier investments in photonics

Goal #5: Improve the infrastructure for Colorado's emerging photonics industry.

- ◆ Support the activities of the Colorado Photonics Industry Association
- ◆ Assess collaboration with the new Colorado Information Technology Institute

#### **Accomplishments Reported in Third-Quarter Interim Report**

All contracted activities and deliverables have been accomplished

- ◆ CPOP awarded 11 projects that were selected for Exploratory Project funding.
- ◆ Research participants included students from CSU, CSM, CU.
- ◆ A wide range of photonics areas were addressed in the CPOP projects, including biomedical, optics, lasers, liquid crystal materials, fiber optics, adaptive optics, device fabrication, scanning probe microscopy, extended depth of focus, and miniature display.
- ◆ CPOP queried students and companies about their experiences with CPOP research projects. The following was reported:
  - 80% of the responding students felt they were learning industry relevant skills
  - 56% of the responding companies said research results would contribute to their company products
  - 82% of the responding students, faculty and companies were satisfied with the program.

- ◆ CPOP anticipates that UCCS will be a participant in CPOP by the end of this fiscal year.
- ◆ CPOP has talked with members of the U.S. Air Force Academy about their research activities, interactions with industry and possible involvement with CPOP.
- ◆ During this fiscal year there has been incredible activity in the fiber optics telecommunications industrial sector leading to company expansions, robust student hiring, and healthy interactions between the universities and industry.
- ◆ CPOP is continuing to focus on biomedical applications in photonics.
- ◆ Two major companies in Colorado Springs have participated with CPOP in the past two years – Spectranetics and Datex-Ohmeda.
- ◆ A CPOP researcher – Carmen Menoni of CSU, was nominated and awarded recognition for the Technology Transfer Award this year for work in developing photonics material deposition technology that is being transferred to Astralux, Inc.
- ◆ CPOP is working closely with the Colorado Photonics Industry Association, Front Range Community College and various economic development agencies to strengthen and unify the photonics cluster.
- ◆ CPOP is collaborating with the CU Business Advancement Center to submit a proposal to the National Science Foundation for funding of a program to enhance technology transfer and improve photonics student education. The current CCHE-TAG funding would provide the state match for this grant, if awarded.
- ◆ CPOP recruited undergraduate students to participate in summer or school year internships with supplemental CCHE-TAG funding.
- ◆ CPOP established a functional linkage between CPOP researchers and the CAPT Center to encourage university researchers to use facilities at CAPT. CAPT will provide up to \$10,000 in equipment/facilities rental services to researchers working on CPOP projects.

### **Independent Reviewer Assessment**

This program appears to be an effective, well-run program that engages students and industry in emerging photonics research. Colorado is gaining national recognition as an important photonics industry cluster. This program appears effective in deciding what research will be conducted. The reviewer recommends continued support for CPOP from CCHE-TAG.

### Colorado Advanced Software Institute (CASI)

#### **Contracted Activities and Deliverables:**

Objective #1: 7 technology transfer seed grants

Objective #2: Seed grant programs will receive timely support and provide timely project reports

Objective #3: Solicit new seed grant proposals for FY 2002

Objective #4: Engage undergraduate students in research projects, support 6 students at \$2,500 each

Objective #5: Solicit and process new undergraduate research proposals

Objective #6: Require cash and in-kind support from business and industry, continue charging membership dues

Objective #7: Provide a matching service to match the needs of industry with, and provide direct contracts between industry and the universities

Objective #8: Conduct meetings in accordance with the CASI Charter

Objective #9: Maintain follow-on funding match

#### **Accomplishments Reported in Third-Quarter Interim Report**

All contracted activities and deliverables have been accomplished

- ◆ CASI awarded 7 technology seed grants providing research opportunities for 18 student researchers.
- ◆ CASI conducted individual kick-off meetings for each seed grant project in a timely manner, and all grant recipients have completed their final reports (all are published on the CASI web page). All projects involved students.
- ◆ CASI issued a new RFP for FY02 Technology Transfer projects and received 12 new proposals. These were reviewed and 7 new projects have been approved. All projects involve cost-sharing with industry.
- ◆ CASI's undergraduate research program awarded 6 undergraduate researchers \$2,500 each. Projects are still ongoing and project reports will be completed in July 2001.
- ◆ CASI published an RFP for new undergraduate research proposals, received 10, and is funding 6.
- ◆ CASI continues to receive cash support from business and industry through membership dues (though the report does not indicate the dollar amount).
- ◆ CASI provides a matching service that matches the needs of business and industry members with university researchers. CASI received 12 new research agenda items as a result of its matching service, and could have received more if the budget could have accommodated them. CASI's web page is updated regularly.
- ◆ CASI has been successful in pursuing follow-on funding matches. This fiscal year's match ratio is 10:1.
- ◆ CASI has been successful in attracting additional funding through federal grants, including a proposal to NSF which pays an extra stipend to low income students. CASI's proposal seeking \$7,000,000 in federal funding to develop a Software Clinic appears promising.
- ◆ CASI established a Mentored Internship Program which provided for 21 mentored internships at 4 Colorado universities.

- ◆ CASI's policy of self-renewal is successful. CASI seeks to "graduate" existing CASI members and involve new companies and maintain a high turnover rate. In CASI's words, high "program turnover is desirable if companies leave because they have received the solutions to their business needs." CASI's turnover rate ranges from 53% to 78% per year (for the years 1997-2001).

### **Independent Reviewer Assessment**

This program appears to be an effective, well-run program that engages students, obtains strong matching funds from industry and federal sources, and continually seeks new programs and projects to fund through its seed grant programs. This program appears quite effective from the standpoint of examining industry needs and making industry needs the determining factor in deciding what research will be conducted. This program could serve as a model for other Centers funded by CCHE-TAG. The reviewer recommends continued support for CASI from CCHE-TAG.

### **Rural New Economy Initiative (RNE)**

#### **Contracted Activities and Deliverables:**

Objective #1A: Extend availability of assessment tools to determine rural needs and resources

Objective #1B: Extend availability of current educational offerings for targeted groups

Objective #1C: Provide new services to local teams based on need, targeted to small business, rural healthcare, and elected officials

Objective #2: Evaluate the RNE process and impact, and make recommendations for future direction

Objective #3: Staff the Rural Telecom Conference

#### **Accomplishments Reported in Third-Quarter Interim Report**

All contracted activities have been completed.

- ◆ Twenty-one Rural New Economy members received training on assessment tools at a day-long forum on e-commerce in rural communities. One of the primary tools was a survey of over 1230 rural small businesses in Colorado.
- ◆ A scan of training needs of 15 elected officials was also completed.
- ◆ Thirteen member colleges conducted local assessments and developed proposals for local community projects to reach targeted audiences. Over 800 individuals in rural Colorado participated in workshops through grants of \$7,000 to each of 13 member colleges. These colleges developed and delivered 54 workshops/classes. The RNE Initiative is now engaged in a second round of local grant activity.
- ◆ RNE created a small business curriculum databank, a rural healthcare seminar pilot, and programs for elected officials.
- ◆ RNE conducted an evaluation session on April 13, 2001, to assess the value of the RNE program for local communities and identified future needs.
- ◆ RNE staffed the Rural Telecom Conference.

#### **Independent Reviewer Assessment**

This program appears to be effective and well-administered. It seeks first to assess the needs of rural Colorado, and funds local colleges in meeting local technology training needs. Although the program includes a training and curriculum development component, the program supports the Governor's agenda for ensuring access to technology to rural Colorado, and the program has strong ties to CIT. The Rural New Economy Initiative is fulfilling its mission of building the capacity of rural Colorado to participate in the opportunities of the New Economy, and the independent reviewer recommends continued support from CCHE-TAG.

### Membrane Applied Science & Technology Center (MAST)

#### **Contracted Activities and Deliverables**

MAST receives its primary funding from the National Science Foundation and annual fees of \$40,000 from seven industry sponsors. CCHE-TAG provides matching funds to MAST for two projects:

Goal #1: Synthesis of an ECTFE Membrane by a TIPS Process

Goal #2: Develop Methods to Detect the Onset of Oxidative Degradation of Polyamide Membranes and Explore Possible Ways to Inhibit Degradation

#### **Accomplishments Reported in Third-Quarter Interim Report**

It appears from the report that contracted activities have been completed with the following results:

- ◆ A provisional patent for ECTGFE membrane fabrication was filed in October 31, 2000, and research results since then have been sufficiently encouraging to warrant the submission of a full patent application.
- ◆ The research on polyamide membranes also appears promising, and was recognized by a major research award, and appointment of the major student researcher to a position with one of the industry sponsors of MAST.

#### **Independent Reviewer Assessment**

The MAST program appears to be effective and well-administered. It receives strong support from NSF and from seven industry sponsors, each of whom contribute \$40,000 per year to the Center's ongoing operations. Over the years, MAST has supported 58 graduate students and 158 undergraduate students. A primary function of the MAST Center is "to provide a meaningful workplace experience for both graduate and undergraduate students." All students receive formal training in communication skills in addition to their research opportunities. It appears the work of these students is highly valued by the industry sponsors, and many of these students go on to full-time employment with sponsoring companies. The MAST program report points to significant spin-off funding (over \$5.1 million to date) and 7 patents granted, with 2 patent applications in process. The independent reviewer favorably recommends continued support from CCHE-TAG for the MAST Center.

### **Colorado Advanced Materials Institute (CAMI)**

#### **Contracted Activities and Deliverables**

CAMI (at the Colorado School of Mines) provides seed grants of \$10,000 each to support materials research meeting industry needs.

Goal #1: Provide technical assistance from university expertise to Colorado technology companies to enhance their global competitive edge.

Goal #2: Create and implement a Colorado Partnerships for Innovation program that will enable the transformation of knowledge created by Colorado's research and education enterprises into innovations that create new wealth, build strong local and state economies and improve technology education opportunities for students.

Goal #3: Provide effective transfer of advanced materials technology knowledge within the state's business and academic community.

#### **Accomplishments Reported in Third-Quarter Interim Report**

All contracted activities are in various stages of completion.

- ◆ CAMI received 10 proposals for technical assistance seed grants, and a review committee selected 6. Participating industry and federal sponsors include Johns Manville, NREL, NIST, and Lexmark International.
- ◆ CAMI submitted a proposal to NSF for its Partnerships for Innovation program in the amount of \$598,611 (over a performance period of 24 months). The proposal received an "excellent" and a "good" rating from NSF reviewers, but was not funded on the first attempt. CAMI will resubmit the proposal with changes recommended by NSF reviewers, and is also pursuing other funding. If NSF funding is forthcoming, matching funds from CCHE-TAG are not required.
- ◆ CAMI published and distributed the CAMI newsletter to approximately 400 individuals in the Colorado materials community, and is currently updating the Directory of University materials Researchers in Colorado. One undergraduate student is working on the Directory and also beginning a summer job with a CAMI industry member.

#### **Independent Reviewer Assessment**

The CAMI program was late in getting started due to delays in getting contract language modifications concerning intellectual property rights from CCHE, and delays in receiving final contracts from the state controller. Seed grant projects are nevertheless proceeding on delayed schedule. The program appears to be well-administered. The report states that 20 student researchers are being supported and that 34 students are participating in the program overall.

The CAMI program appears to have relatively good support from the federal sources (NREL and NIST) and at least two industry sources (Johns Manville and Lexmark International). Federal matching cash support in the amount of \$712,453 and \$238,800 in private matching cash support has been acquired.

CAMI has received substantial funding from the U.S. Department of Energy in the past (almost \$2.7 million over 5 years), funding 28 research proposals for small, emerging technology

companies; however, the DOE support ended in 1999. CAMI is now 2 years post-DOE funding, and needs to find alternative funding sources. One of these alternative programs is the "TIRE-TAP" program funded by the Colorado General Assembly, and another is a research partnership with the Denver Art Museum and other Colorado museums to provide university technical expertise and research on selected objects in museum collections.

The independent reviewer agrees with the decision of the CCHE-TAG staff in reducing administrative overhead support and continuing to encourage CAMI to seek funding from multiple private- and federal-sector sources.

### **Colorado Advanced Materials Institute (CAMI) TIRE-TAP Program**

#### **Contracted Activities and Deliverables**

TIRE-TAP is a seed grant program funded by legislation passed by the Colorado General Assembly which levied a fee on tires at the time of disposal. The funds derived from HB 98-1176 and SB 98-198 were designated to, in part, foster research on tire recycling to help mitigate the enormous growing problem of waste tires in Colorado. The goals of the program include:

Goal #1: Provide technical assistance from university expertise in Colorado to small businesses in the state to develop new recycling technologies for waste tires.

Goal #2: Create a new CCHE equity-type program to implement the legislative intent of HB00-1430 to provide research, development and technology transfer with regard to waste diversion and recycling strategies or environmental alternatives.

#### **Accomplishments Reported in Third-Quarter Interim Report**

- ◆ Three seed grants were awarded to university researchers (from CSM, CSU and UCB) to study uses for waste tires. University researchers are required to work in partnership with private businesses. The private businesses include Midway Tire, AgBio Development, Inc., and Front Range Tire Recycle, Inc. Results of the research have demonstrated promising new uses for waste tires.
- ◆ CAMI has not been successful in creating an “equity-type program to implement the legislative intent of HB 00-1430.” A proposal to CCHE-TAG to use the funds generated by this legislation was not funded. This proposal would have provided seed grants for waste diversion, recycling and finding environmental alternatives for waste products in Colorado.

#### **Independent Reviewer Assessment**

While the TIRE-TAP program appears to be effective and well-administered, and research outcomes are promising, CAMI has been only partially successful in meeting its goals thus far this fiscal year. The TIRE-TAP program has supported 14 student researchers, and has had a total of 55 students participating. The interim report states that 9 jobs have been created as a result of the TIRE-TAP program, though no details are provided as to the nature of these jobs nor their long-term viability. The independent reviewer recommends continued funding of the seed grants for research on uses for used, waste tires provided suitable proposals can be solicited.

Attachment E

RURAL TECHNOLOGY INITIATIVES OF THE  
COLORADO COMMISSION ON HIGHER EDUCATION  
1984 TO PRESENT

**Colorado Supernet** – 1984 – 1999. Colorado Supernet was founded by a consortium of Colorado universities in 1984 as a way to share supercomputer resources. No one knew at the time that the Internet was about to be born. Over the years, Colorado Supernet grew to a network providing local dial-in and dedicated access statewide, aggressively involving K-12, higher education, libraries, and the private sector. Supernet's early start helped pave the way to Colorado's ranking as the state with the highest per capita Internet usage. The sale of Supernet netted \$15 million for the State, distributed to the universities that started the program and the State itself. The \$3 million State share was used to finance the Beanpole Bill.

**Colorado Rural Telecommunications Program** – 1991 – 1999. Long before the “digital divide” was a household term, this program was helping promote community and economic development in rural Colorado through telecommunications. Over 25 communities received pilot grants in its 10-year history. The annual meeting of this program has become the premier national conference on rural telecommunications, RuralTeleCon, held each October at the Aspen Institute in Aspen, Colorado.

**Technology Learning Grant And Revolving Loan Fund** – 1996 – 1999. In 1996 the Colorado General Assembly appropriated \$20 million to provide public and private institutions of higher education, schools, and public libraries funding for the development of distance learning and technology-assisted learning programs. Just as the Internet was taking hold nationally, this program promoted a timely step-up in K-12 technology infrastructure in Colorado, including classroom computers, school LANs, wide area school networks, and applications of computers to instruction. Through this program, the Arkansas Valley Technology Project deployed 450 miles of fiber optic cable to connect over 50 partners including two community colleges, 22 school districts, 11 libraries, 4 hospitals, 6 county extension offices, and 5 universities.

**“Beanpole” Bill** – 1999 – present. As an outgrowth of the Colorado Rural Telecommunications Program, the Beanpole program was designed as the “sister” program to the Multi-Use Network. The MNT's focus is on backbone infrastructure to each county seat. Within and throughout the communities of each county, the Beanpole Bill is focused on “last mile” infrastructure to homes, businesses, and public offices. Both programs use the public sector as “anchor tenant” to stimulate private sector telecommunications investment. While State agencies are the main anchor tenant of the MNT, schools, colleges, hospitals, libraries, municipal, and county offices are the anchor tenants for the Beanpole program. The goal is to connect all 3,000 estimated public offices in Colorado to a high-speed digital network, and in so doing, provide the incentive for the necessary local infrastructure investments to make broadband available to every home and business.

**Colorado Biotechnology Center/Colorado RNA Center.** 1987 – 2001. These programs provide seed grants to projects in biotechnology and support students. Agricultural

Biotechnology has long been a significant component with emphasis on diseases that affect farm animals and crops, crop improvement through biotechnology, and bioprocessing of agricultural products. In 1999-2000, 19% of the projects fell into this category, and in 2000-2001 33% of the projects

**Rural New Economy Initiative** – 2000 – present. The global economy has changed from an industrial to a digital economy. Over half GNP is now produced by knowledge workers. How can rural Colorado best participate in this new economy? Demonstrating answers to this question is the goal of this program. Infrastructure is necessary – but not sufficient – to promote community and economic development. Infrastructure must be used. This program will help rural communities mine the rich vein of economy opportunity of the digital age.

**TOPIC:                   TEACHER EDUCATION APPEALS**

**PREPARED BY:       SHARON M. SAMSON**

**I.       SUMMARY**

CCHE policy states that any governing board may file an appeal at the June meeting if it wishes to challenge the Commission's action on a particular degree program decision. At the time of agenda publication no appeals were filed with the Commission. However, in keeping with the spirit of the policy, a governing board may file an appeal by 5 pm, June 6, 2001. If a governing board files an appeal, the Commission must act on the appeal prior to June 30, 2001, to approve the request or discontinue the degree program.

**TOPIC: TEACHER EDUCATION AUTHORIZATION**

**PREPARED BY: DIANE LINDNER**

**I. SUMMARY**

CCHE, in conjunction with Colorado Department of Education, has reviewed teacher education programs offered by fifteen public and private Colorado colleges and universities. To receive recommendation for teacher authorization, the degree programs needed to meet the criteria defined in statute and clarified in policy as performance measures. During the past year, CCHE received 93 requests for elementary education authorization, 182 requests for secondary, 14 requests for Special Ed, and 174 requests for K-12, second endorsements, Special Services, and Administration. The Commission has authorized over three hundred degree programs for teacher education. The following table lists the undergraduate degree programs that are approved for initial licensure. It is sorted in descending order of number of students who are recommended for licensure.

|                                 | <b>Elementary</b> | <b>Secondary</b> | <b>Special Ed</b> | <b>K-12/Other</b> |
|---------------------------------|-------------------|------------------|-------------------|-------------------|
| University of Northern Colorado | 1                 | 14               | 1                 | 4                 |
| Metropolitan State College      | 5                 | 13               | 3                 | 8                 |
| University of Colorado Denver   | Na                | na               | na                | Na                |
| University of Colorado Boulder  | 19                | 23               | 0                 | 1                 |
| Colorado State University       |                   | 16               | 0                 | 3                 |
| University of Colorado Springs  | 6                 | 7                | 7                 | 0                 |
| Adams State College             | 1                 | 9                | 0                 | 4                 |
| Regis University                | 16                | 26               | 1                 | 3                 |
| Fort Lewis College              | 1                 | 9                | 0                 | 4                 |
| University of Southern Colorado | 1                 | 8                | 1                 | 3                 |
| Mesa State College              | 1                 | 6                | 0                 | 4                 |
| University of Denver            | 1                 | 9                | 0                 | 3                 |
| Colorado Christian College      | 1                 | 4                | 0                 | 1                 |
| Western State College           | 5                 | 11               | 1                 | 4                 |
| Colorado College                | 1                 | 12               | 0                 | 2                 |
| <b>TOTAL</b>                    | <b>59</b>         | <b>167</b>       | <b>14</b>         | <b>44</b>         |

In summary, the Commission has approved 284 undergraduate degree programs, 45 post-baccaluareate programs for initial licensure, and an additional 79 degree programs for special licensure or a total of 408 teacher education programs.

## **II. BACKGROUND**

The Colorado Legislature instituted significant changes one year ago requiring teacher education institutions to adopt a performance model for preparing teachers and demonstrate that the graduates of the degree programs possess content knowledge and have mastered the skills needed to teach. The legislation moved approval authority for teacher education from the Colorado Department of Education to the Colorado Commission on Higher Education. The Colorado Department of Education maintained review responsibility for licensure skills. The agencies were asked by the legislature to work together to review all teacher education programs to ensure:

- Programs had an admission system which includes ongoing screening and counseling
  - Ongoing screening and counseling of teacher candidates occurred regularly by faculty or practicing teachers
  - Course work and field-based training were integrated to include both practice and theory
  - Each teacher candidate spent a minimum of 800 hours of supervised field experience linked to learning standards
  - Each candidate demonstrates the skills required for licensure
  - Ongoing assessments of the teacher candidate's subject matter and professional knowledge occur during the education program
- Programs that were not re-authorized by the Commission by July 2001 would sunset.

Responding to this legislation (C.R.S. 23-1-121), the Commission adopted a new Teacher Education Policy in March 2000. The policy establishes the requirements for teacher preparation programs offered by institutions of higher education. The key features of the policy include:

- Makes quality the primary driver of teacher education authorization.
- Requires a well-designed curriculum that integrates general education, content knowledge and professional knowledge.
- Increases the number of hours that teacher education candidates spend in the field and the number of hours that faculty spends with the students.
- Develops a strong assessment system for students and to measure the quality of the teacher education program.

Each section of the policy supports the quality goal -- defining performance measures, processes for assessing the quality of teacher preparation programs, and data systems that support broad teacher education accountability to the legislature and the general public. Under this policy, CCHE is responsible to ensure that each program is designed to meet the quality standards for content, assessment, and field experience and has the capacity to provide the data for a performance model.

The review of the teacher education programs was rigorous. The reviews began in late September 2000 and the last site visit was completed in February 2001. The 15 teacher education institutions and superintendents of schools nominated reviewers --- persons that taught in a standards-based environment and had a reputation as a leader. Dick Elmer, CDE Deputy Commissioner, and Tim Foster, CCHE Executive Director, interviewed all nominees and selected individuals to serve on the curriculum review team or the site review team. The interview process extended over two months. The curriculum review team was composed of higher education faculty and administrators who often had both K-12 and higher education experiences. The site team reviewers were predominately K-12 educators although each review team included at least one higher education faculty representative.

At the end of summer CCHE hosted two orientation sessions for the review teams. Lou Solmon of the Milken Foundation facilitated the orientation sessions. The first day focused on the teacher education authorization criteria defined in statute and the second day focused on the review process defined in policy. The Commission and two representatives from each of the governing boards participated in a separate orientation session in August, focusing on content standards and how to determine if a degree program provided sufficient content knowledge for a prospective teacher to be prepared to teach.

## **II. ANALYSIS**

The future of teacher education in Colorado rests with the ability of the colleges and universities to continue implementation of their new education programs: teaching revised curriculum that aligns with standards, continued strong leadership to involve arts and science faculty and strengthened partnerships with K-12 schools. The on-site review team reports made recommendations to each institution that, if implemented, will correct some areas of concern found by the team. The Eisenhower grants awarded at the last Commission meeting fund partnerships between institutions to allow sharing of the strengths of programs that meet needs at other institutions. They also fund innovative research programs that will benefit programs on a statewide basis.

Staff reviewed the strengths of programs, which are highlighted for the Commission. These are strengths that can be replicated in other programs statewide and that can continue to make Colorado a leader in quality teacher education programs. The following summarizes the program strengths and characterizes the magnitude of changes made to teacher education programs (both public and private) throughout the state:

- Some programs hired new leadership to design and implement the Commission's policy on teacher education and prepare for the reviews
- Colleges and universities limited the number of degrees appropriate for teacher education candidates; some institutions offer only one degree for elementary educators with the breadth and depth needed to teach K-6 grade-level children

- In all cases, much of the curriculum was rewritten to include the Performance Based Standards for Teachers. These standards include literacy, mathematics, assessment, technology, classroom management, content knowledge, individualization of instruction and democracy and educational governance. One of the most critical changes in curriculum was the inclusion of mathematics in subject area content.
- Curriculum became more focused and prescriptive. In many cases, general education was narrowed to reflect the content standards in the K-12 classrooms. For example, where students could have selected from any number of courses in an array of content areas, focus is now placed on subject matter that includes history, geography, English and mathematics.
- Coursework is aligned with field experiences, linking theory to practice with theory often taught on-site at the public school
- Arts and Science faculty became more involved in education curriculum and learned both the Model Content Standards and Performance Based Standards for Teachers
- Some institutions embraced and supported teacher education. From the President on down, teacher education became an institutional priority and responsibility
- Partner school relationships increased and intensified, making teacher education more classroom and practice oriented rather than theory oriented
- To ensure that teacher candidates enter the classroom with the knowledge required to successfully teach, assessment became more meaningful at many levels, including general education, content and in-class skill in Performance Measures

#### Next Steps:

While the authorization was an intensive effort, the performance based teacher education initiative continues on three levels.

The statute mandates a five-year review cycle of all institutions ensuring that the performance-based teacher education model that has been designed and implemented during the last year is successful. The Commission staff is working with the Deans of Education to develop a review schedule that will incorporate follow up of issues raised by the review team members and the ongoing activities in teacher education schools and colleges. For example, Fort Lewis College hosted both the state site review team and the TEAC review team simultaneously. They received Commission approval for their teacher education programs in March and TEAC accreditation this month. The timing of a joint review allowed Fort Lewis to prepare documentation, organize and schedule meetings for site team members and collect data once instead of duplicating their work for two site visits. Commission staff has agreed to pilot two NCATE joint site reviews during 2002-2003. Negotiations begin next month with NCATE, UNC, CSU, CCHE, and CDE.

Staff recommends the review of teacher education programs be continued on a rotating schedule of four institutions per year for the next four years. Additionally, institutions can request technical assistance visits prior to the site review; these visits will be focused on predetermined issues, bringing in experts from the K-12 schools and higher education.

The most critical element is building the performance model for future authorizations. The data file is designed for collecting the data. CCHE is currently seeking an assessment policy officer to construct the model and focus on student learning.

Development of assessment compliments the data collection efforts. Some institutions are piloting assessment in general education, other institutions are hosting conferences, and others are exploring national measures for content assessment. CCHE sponsored several grants to assist in this effort.

The final piece is the first and third year survey is the assessment activities. CDE and CCHE are collaborating on increasing the response rate.

**TOPIC:                   DEGREE PROGRAM NAME CHANGE: UNIVERSITY OF  
NORTHERN COLORADO**

**PREPARED BY:    SHARON M. SAMSON**

**I.    SUMMARY**

This agenda item describes the degree program changes that the Executive Director has approved during the month.

In November 1997, the Commission adopted a policy requiring Commission approval of name changes that involve substantive changes to the curriculum, a different target market population, or expansion of the scope of the degree program. CCHE staff analyzes the impact of each submitted name change request. If non-substantive, the Executive Director approves the requested change. This agenda item serves as public confirmation of an approved name change unless the proposed action is not acceptable to the Commission.

- A.    Institution:                   University of Northern Colorado
- Current Program Name:       Technical and Resource Management (B.A.T.)
- Revised Program Name:       Resource Development

Rationale:

After CCHE approved this new degree program in June 2000, the university discovered that the title created confusion between the B.A.T. degree and the business management degree program in the School of Business. The revised program name with its emphasis on development reflects the content of the B.A.T. program, but resolves the conflict with management. Technical clarification only.

Scope of Proposed Change:

Curriculum and degree requirements remain the same.

Proposed Action by the Executive Director:

Approve the name change as requested, effective immediately.

**TOPIC:                   PROGRAMS OF EXCELLENCE REPORT**

**PREPARED BY:       JOANN EVANS**

**I.       SUMMARY**

In 1988 the Colorado General Assembly established the Program of Excellence Award to encourage and recognize excellence in public postsecondary education. Article 1 of House Bill 88-1243, enacted in the 1988 session of the Colorado General Assembly, directs the Colorado Commission on Higher Education, after consultation with the governing boards, to develop and employ criteria for identifying Programs of Excellence in state-supported higher education institutions. A Program of Excellence is defined as an academic program, or consortium of programs, of a state-supported institution of higher education distinguished by the quality of the educational experience that it offers and by the quality of the faculty and students it can attract."(C.R.S. 23-1-118)

The Program of Excellence initiative has had a significant impact on Colorado's higher education system by providing an opportunity to identify the quality in the higher education system and to elevate quality standards in education.

**II.      STATUTORY AUTHORITY**

C.R.S. 23-118 (1) The governing boards of state institutions of higher education may nominate, in order of importance, selected programs at their institutions to be designated as programs of excellence. For nominations made in 1992 through 1997, the governing boards shall give special consideration to both undergraduate and graduate programs in schools of education that represent significant and innovative responses to the major reform of the Colorado educator licensing system as set forth in article 60.5 of Title 22, C.R.S. Program nominations by the governing boards shall be submitted to the commission at a time to be prescribed by the commission. As used in this section, "programs of excellence" means any academic program or consortium of programs of a state-supported institution of higher education that directly enrolls students and is distinguished by the quality of the educational experience that it offers and by the quality of the faculty and students it can attract.

(2) The commission, after consultation with the governing boards, shall develop and employ criteria for identifying programs of excellence in state institutions of higher education. Employing the criteria adopted, the commission shall designate programs and centers of excellence, which shall number not more than five percent of the academic programs offered in state-supported institutions of higher education. Programs of excellence designations shall be reviewed annually by the commission.

[Attachment](#): 2000 Report

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COLORADO COMMISSION ON  
 **HIGHER  
EDUCATION**

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ACCESS TO HIGH-QUALITY, AFFORDABLE EDUCATION FOR ALL COLORADANS

**PROGRAMS OF EXCELLENCE  
2000 REPORT**

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1380 Lawrence Street, Suite 1200 • Denver, Colorado 80204 • (303) 866-2723  
TIMOTHY E. FOSTER, EXECUTIVE DIRECTOR

## Programs of Excellence 2001 Executive Summary

In response to the Colorado General Assembly's mandate in 1988, the Colorado Commission on Higher Education annually awards to academic programs or consortia of programs at state-supported institutions of higher education the designation of Program of Excellence. These programs are distinguished by the quality of the educational experience for students as well as the quality of the faculty and students associated with the program. A program designated as excellent receives additional funding from the Commission for five years.

In 1999-2000, the Commission awarded \$895,158 to five new programs of excellence and \$3,546,325 for twenty programs designated in earlier years. The on-going nature of the award is to encourage these programs to identify strategies to enrich the existing program and to secure outside funding to assure continuation of the program after the Commission's funding expires. During the past five years, the Commission has designated 26 programs at 16 institutions as programs of excellence.

The most important effect of the designation is on students. They are directly involved in research projects and have opportunities to foster initiative and leadership. They experience an educational opportunity that surpasses all others in the quality of the curriculum and could not be obtained anywhere else.

The Commission provided \$876,373 to six programs in their final year of funding:

### Adams State College

The Biology Department used its funds to purchase laboratory equipment. The award was also used to engage undergraduate biology majors in independent capstone research projects. The Program of Excellence designation assisted in attracting \$40,000 in extramural funding.

### Colorado State University

The Music Therapy program purchased keyboard and percussion instruments to aid arm/hand rehabilitation and provided undergraduate and graduate research scholarships. The funding supported unique teaching and research on auditory-motor interactions and applications of rhythm to neurological rehabilitation. The Program of Excellence awards have assisted in providing free community-based therapy for stroke patients who would not otherwise have received treatment and international training institutes in the USA, Canada, Italy, Spain, Germany, Brazil, Korea and Japan.

### Red Rocks Community College

The Fire Science Program, highly recognized by fire departments, has evolved dramatically. Instructors have made use of new equipment, online curriculum delivery systems, distance learning, technical support, technical equipment, and classrooms on wheels.

#### Trinidad State Junior College

Because of Program of Excellence funding, the Occupational Safety Technology program makes greater use of technology and offers a health internship.

#### The University of Colorado at Denver

The Educational psychology program now partners with the Stanley British Primary School to create an alternative licensure program and Make a Mess and Make-Believe School. The grant also supported teacher preparation for students with autism.

#### The University of Colorado at Boulder

The award to the Space Grant Consortium has stimulated numerous improvements in Colorado space education, research, outreach and communications. The program makes K-12 students more aware and involved in space science and engineering.

The Commission provided \$876,373 for five programs in their fourth year of funding:

#### Aims Community College

The Aviation Technology program purchased state-of-the-art flight-training devices and established internship alliances with several airlines. The program now also emphasizes minority recruitment.

#### Adams State College

The Music program has upgraded the Music Lab and Electro-Acoustic Music Studio with upgraded equipment. Other program resources were then used to raise funds to expand the music program.

#### Colorado School of Mines

The Computer Aided Chemical Engineering Educator program introduced molecular level concepts in chemical engineering throughout the entire undergraduate curriculum. Funding allowed the redesign of the Molecular Perspectives course and piloted new learning materials. The National Science Foundation recognized this program.

#### University of Colorado at Boulder

The Department of Aerospace Engineering Sciences reformed its undergraduate curriculum to insure integrated hands-on, design-build-test education essential for leadership positions in the aerospace industry. Funding also supported the operation of the Student Nitric Oxide Explorer satellite.

#### Colorado State University

The Professional Veterinary; Medicine program pioneered a number of applications of new information technology: hypertext information web pages, 3-D digital modeling, a neurobiology course on CD and a website that received national and international acclaim. Several of these technologies were later incorporated in other courses.

The Commission provided \$1,236,175 for seven programs that completed their third year of funding in 2000.

#### The University of Southern Colorado

The Chemistry Department implemented reform of undergraduate research plans with computational chemistry becoming part of the chemistry curriculum. This program graduated 10 students in 1999-2000 including 5 women and 3 Hispanics. The award generated additional outside funding which enhanced delivery of high quality programs in chemistry and applied natural science and provided dedicated laboratories for advanced learning as well as K-16 instruction.

#### Fort Lewis College

The department of Anthropology now has a mini-lab with state-of-the-art software and equipment. The award also assisted with a pilot course in Computers in Anthropology, four new websites and equipment. The Department will also establish a new minor in Cultural Heritage Preservation.

#### University of Northern Colorado

The Theatre program used its award to have guest artists work on productions, expand web pages and options for renting scenery, properties and costumes. The newly renovated Norton Theater now has new lighting and sound technology, the Langworthy Theater has acoustical and sound technology, and scenic shops are now safer and healthier for students working in them.

#### Colorado State University

Counseling Graduate Program and Tri-Ethnic Center for Prevention Research now have cutting-edge technological research equipment, graduate training in research and training has been enhanced and the Health Care Colloquium Series has expanded access to the Department of Psychology's activities. The award was also used to update video recording and editing capabilities, provide stipends for six graduate students and attracted a five year NIDA Center Grant of \$750,000.

#### The University of Colorado at Boulder

The K-16 Integrated Engineering Outreach program provides engineering, science and technology opportunities for students, teachers and the public. Undergraduate graduate students and faculty interacted with the K-12 community and attracted national attention. The Engineering in Everyday Life: K-12 Teacher and Student Workshops included five weeklong programs ranging from interactive kinetic sculptures, to youth museum exhibits on Newton's law, and projects demonstrating the societal benefits from engineering.

#### The University of Colorado at Boulder

The award provided the Colorado Center of Excellence in Telecommunication with expanded course offerings, several visiting fellows, new laboratory experiments, additional technical equipment and strengthened the international Center for Standards Research.

#### University of Colorado Health Sciences Center

The School of Medicine's program in Studies of Clinical Performance has used its award to develop clinical cases to assess medical student skills. Using actual patients trained to simulate signs and symptoms of specific ailments, students are better prepared for licensure examinations.

The Commission awarded \$540,579 to three programs that completed their second year as programs of excellence.

#### The University of Colorado at Boulder and at Denver

The Applied Mathematics programs were able to purchase new technology equipment and accelerated efforts to integrate computing in the curriculum through innovative compute laboratories. The program also involves K-12 teachers in the use of computing in novel settings. The award also allowed for the expansion of the CU-Succeed Gold program where 25 high schools teach CU approved mathematics courses that allow high school students to succeed in technical college level fields.

#### Colorado School of Mines

The Multi-disciplinary Engineering program allows for interaction between undergraduate students, industry and K-12 students. The award has allowed the program to integrate advanced technologies to enhance instruction and take into account student learning levels.

Five new programs received first year funding of \$895,158 in 2000.

#### Western State College

The award will extend the hands-on approach of the Thornton Biology Program into inquiry-based and experimental activities in the introductory level and to expand upper division students' research opportunities.

#### University of Northern Colorado

The Kenneth W. Monfort College of Business will expand its programs in the nonprofit/human services area using emerging business technologies.

#### Adams State College

The Counselor Education Program will use its award to expand the Counselors-in-training program. Through an unprecedented amount of attention through individual clinical supervision and faculty-student interaction, student development blends the individual's academic and personal development with professional training.

#### Community College of Denver

The Graphic Design program offers real-world educational experience because of its unique market alignment. The use of websites, television and Hallmark movies makes this program learning-centered and community connected.

### The University of Colorado at Colorado Springs

The Geography and Environmental Studies program uses technology, three courses online and computer teaching through the IMAGE lab. An active and responsive assessment program will be pursued which will include optional senior and honors theses and a required exit examination.

### Morgan Community College

The Physical Therapist Assistant Program provides a quality education experience for its students as demonstrated by a nearly perfect completion rate, a 92% passing rate on state board examinations and a 95% job placement rate.

## Programs of Excellence Report 2000

### **Introduction**

The Program of Excellence is Colorado public higher education's highest honor. It is awarded to academic programs that have demonstrated a long-term commitment to excellence and have achieved outstanding performance records. These programs serve as models for other programs in the state and the nation. The Colorado Commission on Higher Education annually recognizes Colorado's outstanding higher education academic programs that encourage innovative approaches to learning and that surpass all others in the quality of curriculum, students and faculty. A program is considered excellent if it provides the student with an educational experience he or she could not receive anywhere else. Designation of an academic program as a Program of Excellence is a lifetime honor.

The annual Program of Excellence Awards recognizes Colorado public postsecondary education academic programs that excel in the achievement of educational quality and innovation. In 1988 the Colorado General Assembly established the Program of Excellence Award to encourage and recognize excellence at public postsecondary education. Article 1 of House Bill 88-1243, enacted in the 1988 session of the Colorado General Assembly, directs the Colorado Commission on Higher Education, after consultation with the governing boards, to develop and employ criteria for identifying Program of Excellence in state-supported higher education institutions. A Program of Excellence is defined as an academic program, or consortium of programs, of a state-supported institution of higher education distinguished by the quality of the educational experience that it offers and by the quality of the faculty and students it can attract."(C.R.S. 23-1-118)

The Program of Excellence initiative has had a significant impact on Colorado's higher education system by providing an opportunity to identify the quality in the higher education system and to elevate quality standards in education.

The higher education governing boards submit their recommendations of exemplary programs from their institutions. An external review panel, composed of noted professionals in the arts, business, engineering, health, humanities, science and technology, evaluates the proposals from which a list of top ten semi-finalists is selected. The Commission sub-committee reviews the semi-finalist proposals and makes a recommendation to the Colorado Commission on Higher Education that makes the final awards.

To be selected as a Program of Excellence recipient, the educational program must demonstrate a commitment to:

- ✓ Quality of the educational experience
- ✓ Quality of the faculty

- ✓ Quality of the students

This 2000 Program of Excellence Report is made up of two sections: Section I focuses on the program funding, and Section II provides brief abstracts of programs that received funding during 1999-2000.

### **Section I: Report on Programs Funded in FY 1999-2000**

The funding for the Program of Excellence is appropriated by the General Assembly to the Colorado Commission on Higher Education (CCHE). The Commission carefully screens applications and selects an unspecified numbers of outstanding programs based on the availability of funds for that year. In 2000, five new programs were selected as Program of Excellence and received a total of \$895,158 for newly funded programs and \$3,546,325 for twenty continuation programs.

When an academic program is selected as a Program of Excellence, the program is awarded funding for five years.

In 2000 six programs were in their final (fifth) year of funding. This does not mean that these six programs will be discontinued. They will continue to operate because one of the stipulations of the Program of Excellence award is that the program continues to secure outside funding to assure continuation of the program beyond the five-year funding period.

### **Description of Progress and Accomplishments**

While each program was a strong academic program prior to receiving the Excellence Award, there is no question that with the award, these programs have been able to develop new strategies to enrich the components of the program. The most important impact of the Program of Excellence designation is the effect it has on the students by directly involving them in research projects, fostering student initiative and leadership, and continuing to provide the best education opportunities for Colorado's students.

Following is a brief summary of all the Program of Excellence funded in 2000.

#### **Fifth and Final Year Funding Programs:**

There were six programs in the final year of their funding for a total of \$876,373. Following is a brief summary of the programs:

- In 2000 Adams State College's Biology Department used their Program of Excellence funds to purchase laboratory equipment. The program focused on engaging undergraduate Biology majors in independent capstone research projects. Because of the Program of Excellence designation, the Biology Department has received additional extramural funding of \$40,000 to augment the program.

- Colorado State University Music Therapy program is located in the Center for Biomedical Research in Music. With funding from the Program of Excellence this program was able to purchase keyboard and percussion instruments to aid arm/hand rehabilitation, provided undergraduate research scholarships to outstanding music therapy students, and two graduate students. The funding supported new and unique avenues in teaching and expanded scientific activity related to understanding auditory-motor interactions in the brain and applications of rhythm to neurologic rehabilitation through scholarship funds, extended teaching and mentoring staff, and new resources in teaching technology. The physical training programs have become an important part of community-based therapy free of charge to the long-term stroke patients who do not receive therapeutic services any longer. One of the most path-breaking projects is the start of international training institutes in neurologic music therapy with close to 100 certificants to date and participants from the USA, Canada, Italy, Spain, Germany, Brazil, Korea, and Japan.
- The Red Rocks Community College Fire Science program learning experience has significantly changed for the better. New equipment, curriculum delivery systems, distance learning, technical support, technical equipment, classrooms on wheels has all allowed instructors to be creative and innovative in the delivery of classes. Students have interactive computer classes, online research and immediate feedback from instructors. The hazardous materials training trailer-on-wheels supports advanced technician level training. Professional development for instructors prepared them to teach with new technology. Instructors also developed the full degree program for emergency management on-line. Students can now receive instruction in high-tech classrooms, on the Internet or through video connections. The department also has mobile classrooms that take training programs to rural communities. The twenty-seven-year-old fire science program is highly recognized by fire departments.
- At Trinidad State Junior College the Occupational Safety Technology program students are now able to apply and register on-line. The program has seen exponential growth in distance learning courses development and delivery of the program. An occupational safety and health internship course has been added to the available on-line courses.
- The University of Colorado at Denver Educational Psychology program established a partnership with the Stanley British Primary School, a unique private school in Denver committed to public outreach, developmentally appropriate learning, diversity, student and parent empowerment, and teacher preparation via an alternative licensure program. A second partnership was established with the Make a Mess and Make Believe School. The grant also supported preparation of teachers to nurture the school experiences of, and outcomes for, children with autism.
- University of Colorado at Boulder Space Grant Consortium is a consortium made up of fifteen member higher education institutions and public schools. The funds have stimulated numerous improvements in Colorado space education, research, outreach, and communications. Each of the consortium members have expanded science and space studies opportunities for students, with an effort to make students at K-12 schools throughout Colorado aware that space science and engineering is within their reach. Colorado students are developing experiments for flight on NASA rockets, balloons, the KC-135, small

spacecraft and the Space Shuttle. Students acquire hands-on experience with real space experiments.

There were five programs in their fourth year of funding in 2000:

- The Aviation Technology Program at Aims Community College purchased flight-training devices to assure that the students are trained on the state-of-the-art flight simulator equipment. The Program of Excellence Grant has been the major catalyst in advancing Aim's reputation with the airlines throughout the country. The college is building alliances with several airlines to establish internship arrangements. One of the goals of the program is to establish a formalized minority recruitment program. A linkage has been established with local school districts to provide lessons and activities that include properties of air, Newton's Laws, Bernoulli's Principles, forces of flight, weather and other aviation related topics. The children are free to check books out. In addition, the programs provided an opportunity to expand faculty expertise in the area of Cockpit Resource Management.
- The Music program at Adams State College has been able to upgrade the computer equipment, purchase new and upgraded software programs for the Music Lab and the Electro-Acoustic Music Studio, purchase digital audio and video recording equipment. All of which would not have been possible without the Program of Excellence grant. As a result, the Music Department has been able to raise funds through their Friends of Music supporters and patrons to expand the music program.
- The main objective of the Colorado School of Mines Computer Aided Chemical Engineering Educator program was to introduce molecular level computer aided chemical engineering concepts in the entire undergraduate curriculum. This year the capstone Molecular Perspectives in Chemical Engineering course was redesigned and piloted; new learning materials were developed, new state-of-the-art molecular simulation software was acquired, new curriculum was approved by the National Science Foundation, and the program received national and international attention.
- The Department of Aerospace Engineering Sciences (AES) at the University of Colorado at Boulder completed its third year as a CCHE Program of Excellence marked a milestone for the department. The reform of AES's undergraduate curriculum was completed and its first class graduated in spring 2000. The graduates of AES Curriculum 2000 were the first class to experience the newly created sophomore curriculum in their sophomore year. Program funds from CCHE and Lockheed Martin supported the reform, and also provided funds for the operation of the Student Nitric Oxide Explorer satellite, launched in February 1998 by the Laboratory for Atmospheric and Space Physics (LASP). The curriculum was revised to ensure that students have the integrated, hands-on, design-build-test education essential for leadership positions in the aerospace industry. The goal of the curriculum reform is to ensure that the graduates have a good understanding of (1) engineering science fundamentals: mathematics (including statistics), physical and life sciences, and information technology (far more than "computer literacy"). (2) A good understanding of design and some knowledge of manufacturing processes. (3) A multi-disciplinary, system perspective; (4) A profound

understanding of and commitment to team work. (5) A basic understanding of the context in which engineering is practiced (economics, history, environment, customer and social needs).

- The Professional Veterinary Medicine (PVM) program is in the College of Veterinary Medicine and Biomedical Sciences at Colorado State University (CSU). CSU leads the nation's veterinary medical colleges in several research categories and is also the leading grantor of graduate degrees in veterinary medicine. The program incorporated information technologies into the instruction, developed a series of hypertext information web pages for pathophysiology of the digestive and endocrine systems, achieved preliminary investigation of 3-D digital modeling of anatomical specimens, produced a series of CDs and a website to provide neurobiology course materials and teaching beef cattle production management. As a result of these activities, there was a spillover effect into a number of other courses resulting in increased awareness and exploration of new applications of information technology. The neurobiology CD program received national and international acceptance.

Seven programs completed their third year of funding as a Program of Excellence in 2000:

- The University of Southern Colorado Chemistry Department was able to execute their enhancement plan including continuation of a prominent undergraduate research program and incorporation of curriculum reform initiatives including computational chemistry into the chemistry curriculum. The program graduated 10 students with a bachelor's degree in chemistry during 1999-00 and those students are filling many important niches for chemistry based professions across the U.S. (Eli Lilly) and within Colorado (Ashland Chemical). Fifty percent of those graduates were female and thirty percent were Hispanic. Additional outside funding allowed the Chemistry Department to implement its strategic plan to enhance the curriculum and delivery of high quality programs leading to the bachelors in Chemistry, and masters in Applied Natural Sciences. Dedicated laboratories have been provided for advanced learning in biochemistry, organic, environmental, physical, inorganic, and analytical chemistry, as well as K-16 instruction.
- The Department of Anthropology at Fort Lewis College has (1) a strong Southwest expertise in prehistoric, historic, and contemporary anthropology; (2) inclusion of Native peoples in promoting anthropological reform; and (3) excellent experience in student applied and collaborative research. The department created a plan to build upon these three points. The mini-lab is now fully established with state-of-the-art software and equipment. They designed and piloted a course in Computers in Anthropology. There are four new web sites associated with the program that was partially funded by the Program of Excellence grant. Equipment was acquired that will enable the continuation of the positive technical education beyond the life of the grant. The department is working toward establishing a new minor in Cultural Heritage Preservation.
- In the third award year of the University of Northern Colorado Theatre program, they expanded the quality and visibility of the program and opportunities for Colorado students in a number of ways. Guest artists worked on productions and have spread the good word about UNC's programs. The expanded web pages with photos of new design lab and options for renting scenery, properties and costumes have recorded and reflected the progress.

Further funding will be used to continue this process, with the hope that UNC's Department of Theatre Arts and Dance will continue to provide students with every possible advantage as they pursue their performing arts dreams. They added lighting and sound technology to the newly renovated Norton Theater, enhanced acoustical and sound technology in the Langworthy Theater, introduced guest artists in the classroom and performance situations to work with students; and enhanced health and safety concerns in the scenic shops.

- Through the Program of Excellence award Colorado State University's (CSU) Counseling Graduate Program and the Tri-Ethnic Center for Prevention Research has greatly enhanced the educational and research activities in Department of Psychology. The department successfully completed site visits by the National Institute on Drug Abuse (NIDA) and the American Psychological Association (APA), resulting in the renewal of the NIDA Center Grant of \$750,000 per year over five years and a seven-year re-accreditation from APA. The site reviewers were impressed with the CCHE enhancement funds for the purchase of cutting-edge technological research equipment, the support of graduate training in research and practice and the dissemination of knowledge through the CCHE Health Care Colloquium Series. Funds were used to update the video recording and editing capability, provide stipends for six graduate students placed in advanced practica, and purchase state-of-the-art technological equipment.
- The University of Colorado at Boulder's K-16 Integrated Engineering Outreach program provides intriguing and fun engineering, science and technology opportunities and programs for K-16 students, teachers and the general public. These activities engaged CU undergraduate and graduate students and faculty with a broader K-12 community of learners. The Program of Excellence fund was leveraged to attract outside support for the program. The results of the grants have catapulted the K-12 engineering outreach program into the national spotlight to become a model for engineering colleges nationwide. The *Engineering in Everyday Life: K-12 Teacher and Student Workshops* provided five weeklong engineering workshops for teachers and children. Ranging from interactive kinetic sculptures for elementary school lobbies to exhibits for youth museums that demonstrate principles such as Newton's law, projects demonstrate that engineering is about creating things for the benefit of society. Project this past year included developing a prosthetic shoulder and arm for a 13-year-old land mine victim and a refined, self-propelled "Handi-Swing" for children with multiple disabilities. Projects in this area will continue in the future as they seek new opportunities to serve the communities with engineering creativity.
- The Colorado Center of Excellence in Telecommunication located in the College of Engineering and Applied Science at the University of Colorado at Boulder has attracted top graduate students from across the U.S. and around the world. The program has expanded the course offerings, welcomed several temporary faculty "visiting fellows," created new laboratory experiments, secured additional technical equipment, strengthened the international Center for Standards Research (ICSR), and streamlined the application/admission/outreach/alumni relations processes. During the past year, the ICSR sponsored several invitational presentations, supported research and related papers, and established an Optical Lab. The Optical Lab allows the students to see and work with the components that are described in class. Eight innovative laboratory experiments using both

new and existing equipment were designed and tested in preparation for the offering of a new wireless laboratory course developed by ITP students.

- The Program in Studies of Clinical performance at the University of Colorado Health Sciences Center School of Medicine focuses on three areas: assessment, research and learning technologies. In the area of assessment the program continues to develop a collection of clinical cases that utilize standardized patients (individuals trained to simulate signs and symptoms of specific ailments or behaviors) to assess medical students' skills. Students interact with a standardized patient just as they would with an actual patient to take a history, perform a physical exam, counsel and educate the patient, or negotiate a treatment plan. The research efforts continue to develop around the evaluation work. This means being able to train for and implement a large test for licensure using standardized patients and examination tools and then studying how the students perform individually, as a group, nationally and compared to their other performance measures in medical school. Learning technology is focused on small group education using standardized patients to assist students in developing problem solving and communication skills. The School's educational excellence is reflected in its preparation of today's medical students to succeed as tomorrow's physicians.

There were three programs that completed their second year as a Program of Excellence.

- The Applied Mathematics programs at the University of Colorado at Boulder and at Denver is designed to bring undergraduate students, graduate students, postdoctoral researchers/instructors and faculty together through a novel Vertical Integration program by employing collaborative tetrahedra as a mechanism to enhance education with the central theme of the active use of computation. The goal of the departments is to enhance the educational, computing and research infrastructure in Applied and Computational Mathematics. With the Program of Excellence funding they were able to purchase new technology equipment and accelerated their efforts to integrate computing in the curriculum, especially via innovative computing laboratories in undergraduate education. An important part of the program is the K-12 outreach efforts through organized special programs for K-12 teachers that explore the use of computing in novel settings. For nearly a decade, a number of CU mathematics courses have been taught by approved local high school teachers at their own high schools, through the CU-Succeed Gold program. This program has now expanded to about 25 high schools in the Denver metropolitan area. The courses carry CU credit, encourage high school students to believe that they can succeed in technical fields at the college level, and foster continuing relationships with the public schools.
- The Colorado School of Mines Multi-disciplinary Engineering program focuses on connections with K-12 and industry. The primary goals of the program are to provide students with a solid foundation in engineering fundamentals, the skills to adapt to rapidly changing and advanced technologies and an aptitude for life-long learning. Uniqueness of the program is evident with respect to its multidisciplinary span, use of advanced technologies to enhance instruction and consideration of student learning levels/abilities. The K-12 teacher enhancement program at CSM offers the opportunity to participate in a new program featuring modern software and instrumentation based on the Multidisciplinary

Engineering Laboratory (MEL). Teachers gain a better understanding of the engineering profession and improve their skills as well as helping them to develop curriculum that will provide their students with opportunities to learn mathematical analysis and concepts.

There were five new programs awarded as Program of Excellence in 2000 with a total funding allocation of \$895,158. Because this was their first year there are no annual reports on these programs. However, following are abstracts of the programs.

- Western State College's Biology program provides undergraduates with research opportunities in close mentorship with faculty. Since the establishment of the Thornton Biology Program, students have had increased research opportunities and have presented research results at regional and national meetings. The college has a new science building, with undergraduate student research laboratories, new integrated lecture/laboratory facilities, and will provide the means to deliver inquiry-based activities. With the requested equipment and personnel, they are now positioned to extend the hands-on approach of the Thornton Biology Program into inquiry-based and experimental activities in the introductory level lecture and laboratory classes and to expand the upper division students' research opportunities.
- The Kenneth W. Monfort College of Business at the University of Northern Colorado offers highly focused technology-rich, comprehensive, undergraduate business programs. The College is an acknowledged leader in business school technology and employs a nationally recognized faculty. It is a place where students work closely with seasoned professors, and emerging business technologies are integrated into all aspects of its programs. The College offers six areas of study within the Business Administration major: Accounting, Computer Information Systems, Finance, General Business, Management, and Marketing. The college proposes to further develop its programs in the nonprofit/human services (humanics) area.
- The Adams State College Counselor Education Program offers a superior education for Counselors-in-training, uniquely blending the development of the individual, both academically and personally, with the development of the professional. Students in the program receive an unprecedented amount of attention through individual clinical supervision and constant interaction with professors. Extensive community partnership allows students the opportunity to gain real-world experiences with diverse clientele in a variety of human services settings. The Counselor Education Program has been at the forefront of distance learning for over 18 years. The excellence of the program revolves around the strong commitment to: (1) the delivery of a high quality academic program to rural and under-served areas; (2) the development of the individual; and (3) the development of the professional.
- Community College of Denver's (CCD) Graphic Design program offers a real-world educational experience in a rapidly expanding and highly visible field. It also meets the four cornerstones established by the Colorado Community Colleges and Occupational Education System. CCD's Graphic Design program is accessible, learner and learning-centered, community connected and market-aligned. CCD student-generated designs have won major contests, introduce prospective students to academia via the CCD Web site and beckon

television viewers to Hallmark movie adventure. CCD's Graphic Design program is a Program of Excellence – an urban Mecca for creative center-city, Colorado and international students who are looking for an educational opportunity with a competitive edge in today's and tomorrow's job market.

- Geography and Environmental Studies is an undergraduate program at the University of Colorado-Colorado Springs. The program quality is exceptional. For example, the program is a leader in the use of technology, including the offering of three courses as Web-based classes. Computer teaching/student research with the IMAGE lab was implemented in 1987 and has continued to be updated. Additionally, several computer modules were incorporated in a wide variety of classes in the grant-funded cartography laboratory. As one indicator of exceptional teaching, the faculty in the program received FCQ scores consistently higher than those for the campus as a whole, and have garnered four teaching awards at the college and university level. There is an active and responsive assessment program to include optional senior and honors theses and a required exit exam.
- Morgan Community College's (MCC) Physical Therapist Assistant Program provides a high quality educational experience for its students as demonstrated by a nearly perfect completion rate, a 92% passing rate for students taking state board exams, and a job placement rate of 95%. The program is innovative and MCC was the first in the state to submit a proposal for PTA education in the state.

**TOPIC:                   REPORT ON OUT-OF-STATE INSTRUCTION**

**PREPARED BY:       ANDREW BRECKEL III**

**I.       SUMMARY**

The Commission holds statutory responsibility to approve instruction offered out-of-state beyond the seven contiguous states. By action of the Commission in 1986 the Executive Director may act for the Commission to approve or deny requests from governing boards for approval of courses and programs to be offered by their institutions. This agenda item includes additional instruction that the Executive Director has certified as meeting the criteria for out-of-state delivery. It is sponsored by the Board of Regents of the University of Colorado.

**II.      BACKGROUND**

Prior to 1983, instruction out-of-state was offered at will by Colorado institutions, primarily through the Extended Studies Program, but an Attorney General opinion of July 3, 1980, concluded that there was no authorizing legislation and out-of-state programs were discontinued. In 1983, the General Assembly enacted legislation that authorized non-state-funded out-of-state instruction but also required governing board approval. When the instruction is beyond the contiguous states, Commission approval is required as well.

At its meeting of May 2, 1986, the Commission delegated authority to the Executive Director to determine when out-of-state instruction beyond the contiguous states complies with statutory requirements. In June 1986, the Commission received the first notification of out-of-state instruction certified by the Executive Director. Additional approved out-of-state instruction is reported to the Commission as it is received and reviewed.

**III.     ACTION**

The Executive Director has approved the following out-of-country and out-of-state instruction.

The Board of Trustees of The State Colleges in Colorado has submitted a request for approval for courses to be delivered out-of-country by Western State College in Puebla, Mexico from May 27 through June 23, 2001.

- SPAN 490      Workshop in Mexico, Civilization and Culture of Mexico or**  
**SPAN 497      Workshop in Mexico, Civilization and Culture of Mexico II**  
**(This course is for students returning to Mexico for a second time.)**
- SPAN 490      Workshop in Mexico, Language and Society or**  
**SPAN 497      Workshop in Mexico, Language and Society**  
**(This course is for students returning to Mexico for a second time.)**

The Board of Trustees of The State Colleges in Colorado has submitted a request for the approval of a series of seven out-of-state courses to be delivered by Adams State College in Wailuku, Hawaii.

- ED 589      The Dynamics of Classroom Interaction, July 30–August 3, 2001**  
**ED 589      Quality Teaching/Quality Living, October 15–20, 2001**  
**ED 589      Health Personality Types, October 22–27, 2001**  
**ED 589      Dealing with Change, January 21–26, 2002**  
**Ed 589      Healthy Interventions for High Risk Behaviors, January 28–February**  
**2, 2002**
- ED 589      Getting Along with Different Personality Types, March 18–23, 2002**  
**ED 589      Positive Communications, March 25–29, 2002**

The Board of Trustees of The State Colleges in Colorado has submitted a request for the approval of an out-of-state course to be delivered by Adams State College in Wheatland, Iowa.

- ED 589      Promoting Higher Order of Thinking Skills, August 13–17, 2001**

The Board of Regents of the University of Colorado has submitted a request for an out-of-state instructional program, which was delivered by the University of Colorado Health Sciences Center.

**Resistance and Sequencing of Antiretroviral Therapy”** which has been scheduled to be offered in New York, New York; Miami, Florida; and Houston, Texas; on April 28, 2001, May 19, 2001, and June 2, 2001, respectively.

**Appendix A**

**STATUTORY AUTHORITY**

The Commission is given responsibility for approval of out-of-state instruction beyond the contiguous states in C.R.S. 23-5-116.

**TOPIC: CONCEPT PAPERS**

**PREPARED BY: WILLIAM G. KUEPPER**

**I. SUMMARY**

This agenda item presents the concept papers submitted to the Commission during the past month, including:

*M.A. Degree in Applied Geography at the University of Colorado at Colorado Springs*

This report includes a summary of the issues identified by CCHE staff and a copy of the concept paper. No action is required of the Commission at this time, but if the Commission wishes to have additional issues addressed or questions answered in the full proposal, these can be added to those in the staff report.

**II. BACKGROUND**

Approval by the Commission of a new degree program proposal is a two-stage process. The governing boards submit a concept paper to the Commission that provides an opportunity for the Commission to identify potential state issues prior to developing the full proposal. In contrast, the full proposal includes details about curriculum, financing, capital construction needs, and other implementation details.

**Stage 1: Concept Paper**

Before an institution develops a full proposal, the governing board or its staff shall submit a short concept paper to CCHE that outlines the proposed program goals, the basic design of the program, the market it plans to serve, and the reasons why the program is appropriate for the institution and its role and mission. CCHE policy does not require the governing board to approve the concept paper.

After the Commission staff reviews the concept paper, a staff member meets with representatives of the governing board to discuss issues and concerns related to the proposed degree. The staff presents the issues that need to be addressed in the full degree program proposal. A concept paper may be submitted by the governing board at any time and may be included on any Commission agenda.

### **Stage 2: Full Degree Proposal**

The full proposal for a new degree program reaches the Commission only after undergoing review by, and receiving approval from, the governing board. The request for new degree approval must include:

- A complete degree program proposal as defined by the governing board policy.
- The institution's responses to the peer review comments.
- Tables of enrollment projections, physical capacity estimates, and projected expense and revenue estimates.
- An analysis by the governing board of the potential quality, capacity, and cost-effectiveness of the proposed degree program.
- The governing board's response to the issues identified in the Commission's review of the concept paper.

In addition, graduate degree programs require review by an external consultant. The Commission staff selects and contacts the external consultant; the governing board staff reviews the list of potential reviewers.

Once the governing board approves a proposal, the Commission staff prepares an analysis of the proposal, an institutional profile giving additional context for the institution's capacity and market demand, and a recommendation based on the statutory criteria.

The Commission only considers degree proposals at its January or June meetings. This provides the Commission an opportunity to examine the proposals in the context of statewide need.

**TOPIC: MASTOR'S OF ARTS IN APPLIED GEOGRAPHY SCIENCE AT THE  
UNIVERSITY OF COLORADO AT COLORADO SPRINGS**

**PREPARED BY: SHARON M. SAMSON**

**I. SUMMARY**

The Regents of the University of Colorado have submitted a concept paper for a Master's of Arts degree in Applied Geography at the University of Colorado at Colorado Springs. The program is intended to meet employer demands for professionals with skills to address environmental issues. The proposed degree complements the strengths of the GES faculty and builds on UCCS's B.A. in Geography and Environmental Studies. Areas of emphasis will be:

- Natural hazards mitigation and policy issues
- Physical systems, including geomorphic, climatic, biologic, and hydrologic processes
- Population and society, including urban community development
- Applied uses of Geographic Information Systems (GIS) and remote sensing

The institution is proposing this degree program because of its strength at the undergraduate level in this field and the number of students enrolled in the Master of Basic Science who complete the Geography track. After researching the issue, UCCS concludes that the MBS degree, in comparison, is less structured, appeals to teachers seeking career advancement, and does not have a strong identity with industry. The identified market for the proposed degree is graduate students who wish to focus their study in geography and public sector issues.

There are no issues identified with this concept paper.

**II STAFF ANALYSIS**

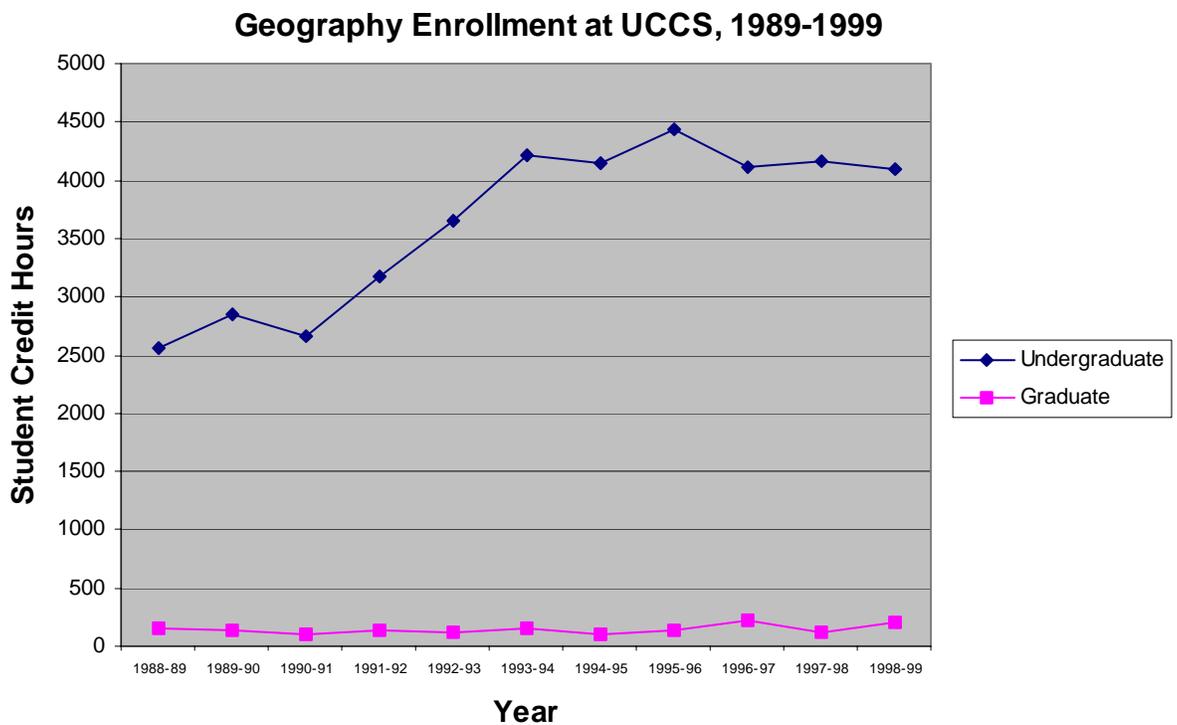
In reviewing the concept paper, the Commission staff considers role and mission, program duplication, and market demand.

As stated in the UCCS's statutory mission statement, the Colorado Springs campus "shall provide selected professional programs and such graduate programs as will serve the needs of the Colorado Springs metropolitan area, emphasizing those professional programs not offered by other institutions of higher education." UCCS is one of two institutions that offer graduate programs in southern Colorado. The proposed degree program is not offered by other institutions of higher education.

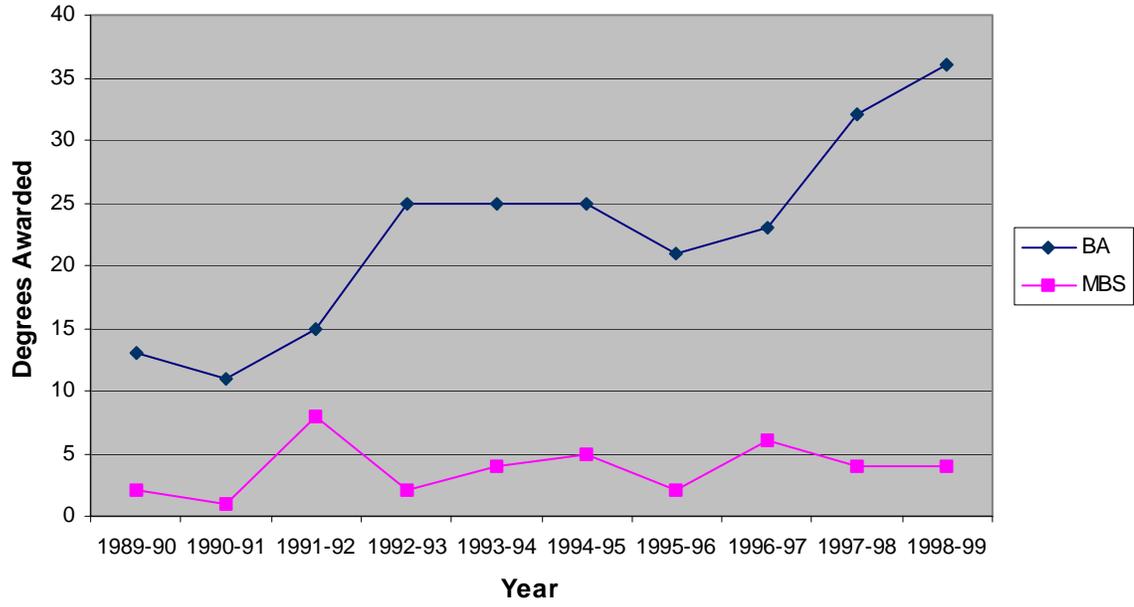
Graduate students already conduct geographic research at UCCS through the Master of Basic Science (MBS) program, a multidisciplinary graduate degree offered for six departments in the College of Letters, Arts, and Sciences. The MBS degree served students who sought a master's degree for geographic (and other) research while this university was small, but with changes in GES faculty and technology, the program has become increasingly restrictive for the needs of graduate students in geography. The MBS is mainly attractive to teachers who wish to advance their knowledge in science without specializing in one field.

As 1999-2000, the MBS program enrolled 34 GES students, comprising 33% of the graduate enrollment in this degree. During the past five years (1996 – 2000), enrollment in the geography MBS option averaged exactly 6 new students per year. A recent survey indicates that about 8 new Master of Arts students would enter the program each year from UCCS graduates alone. Therefore, UCCS proposes to split off the geography track in the-existing MBS graduate program into a stand-alone program housed in the geography department, and offer a more recognized Master of Arts in Applied Geography.

Staff find this proposal to be consistent with the institutional mission and the college's vision statement, non-duplicative, and with sufficient indication of student demand.



### UCCS Geography Degrees Awarded, 1990-1999



**Proposal for the Master's of Applied Geography  
in the  
Department of Geography and Environmental Studies  
University of Colorado at Colorado Springs  
  
Concept Paper**

**Program goals**

The faculty of the Department of Geography and Environmental Studies (GES) at the University of Colorado at Colorado Springs (UCCS) proposes establishing a Master of Arts degree in Applied Geography. As outlined below, the proposed program fits within the UCCS mission to serve the Pike's Peak Region and southern Colorado and is designed to meet student and employer demands for professionals with skills to address environmental and societal needs. The proposed degree provides a needed connection between geographic education at UCCS and specific training for leadership positions in community problem solving.

The goal of the proposed program is to provide graduate level education to address community needs through applied geographic knowledge and research. Since the subject matter of geography is the surface of the earth, graduates with a Master of Arts in Applied Geography will have integrative skills that link human activity to natural systems, and that apply a spatial perspective to human and natural processes. The proposed degree complements the strengths of the GES faculty and builds on the BA in Geography and Environmental Studies. Areas of emphasis will be:

- Physical systems, including geomorphic, climatic, biologic, and hydrologic processes.
- Natural hazards mitigation and policy issues
- Population and society, including urban community development
- Applied uses of Geographic Information Systems (GIS)<sup>1</sup> and remote sensing

The focus of the Master of Arts in Applied Geography will be to educate professionals to work in the community in both government and private sector employment. This program will provide students with specific scientific and communication skills necessary to be leaders in their area of expertise. Graduates of this Master of Arts in Applied Geography program will have the following skills and competencies to work on community issues:

- An understanding of and appreciation for the interactions between the human and natural world
- Skills to synthesize, analyze, and evaluate diverse social and physical information
- Ability to conceptualize spatial relationships for problem solving
- Communication skills to clearly present solutions or recommendations
- Technical skills to deal with the ever-changing employment landscape

All Master of Arts in Applied Geography applicants will participate in a graduate seminar on geographic research during their first year. This seminar (GEOG 501) is already in place and being offered each fall semester. Additionally, we will require competency in the various quantitative methods needed by someone with an advanced degree in geography. This requirement may be met by taking the already in place GEOG 500 course. Students will then select a faculty mentor to guide them through the graduate program, from developing a research topic to course

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<sup>1</sup>GIS are computer systems that allow users to manage and analyze spatial information. They are a powerful tool that link maps to a database, used extensively in urban and environmental planning, business location analysis, habitat analysis and assessment, criminal pattern analysis, transportation planning, data visualization, and more.

selection to completing the degree. The faculty maintain strong relationships with community employers, and students will be encouraged to develop research topics in conjunction with these and other agencies to address government policy, community issues, and business needs.

Graduate students already conduct geographic research at UCCS through the Master of Basic Science (MBS) program, an umbrella degree offered for six departments in the College of Letters, Arts, and Sciences. The MBS served students who sought a master's degree for geographic (and other) research while this university was small, but as outlined below, with changes in GES faculty and technology, the program has become increasingly restrictive for the needs of graduate students in geography. This proposal seeks to formalize the already-existing graduate program in geography into a stand-alone program housed in our department, and offer a more recognized Master of Arts in Applied Geography that will be attractive to potential students and marketable to potential employers.

### **UCCS Mission**

As stated in the UCCS Mission Statement, the Colorado Springs campus "shall provide selected professional programs and such graduate programs as will serve the needs of the Colorado Springs metropolitan area, emphasizing those professional programs not offered by other institutions of higher education." Also included in the general mission statement is the goal to "emphasize quality teaching while encouraging research and creative work, and service to the University and community." UCCS is the Pikes Peak Region's only state-supported university, and has defined a vision statement that states: "we will link the university more closely with the community we serve."

Clearly the proposed Master of Arts program in Applied Geography will serve to strengthen ties between the University and the community. Currently graduate students in GES (in the MBS program) are working on the following projects:

- Crime mapping and analysis with the Colorado Springs Police Department
- Environmental justice in the location of homeless shelters in Colorado Springs
- Gully erosion modeling in subalpine grassland meadows
- Analyzing Colorado Springs growth patterns for sustainable development
- Database encoding, quality verification, and product distribution for the Colorado Springs Engineering Division
- Flood hazard mitigation in Manitou Springs
- Development of a community-wide online natural hazards clearinghouse
- Housing and services multiplier effects of high-tech industry relocation to Colorado Springs
- Resource management at the new Cheyenne Mountain State Park land
- Wildfire hazard modeling in the Colorado Springs foothills
- Site suitability for expansion on UCCS property

A Master of Arts in Applied Geography, rather than the current MBS we offer, will further attract graduate students interested in applied programs for community improvement. Based on records at the CU Foundation, of 354 departmental alumni, 75% live and work in Colorado, 65% in the Colorado Springs area. We are dedicated to bettering our community, region, and state.

### **Student Demand**

Geography at the national level has witnessed strong growth. The GES department has approximately 110 undergraduate majors. Enrollments in graduate programs have increased 47.5% between 1985 and 1996 (National Center for Education Statistics 1998) (Fig. 1). Bachelor's degrees awarded have gone up 33.7% in the same time span, and master's degrees awarded increased by 34.5% (National Center for Education Statistics 1998) (Fig. 2). The discipline has outpaced higher education as a whole in the increase of bachelor's and master's degrees granted. Reasons for the increased popularity of geography include a rising public concern with environmental and international problems, greater attention to geographic education at the pre-collegiate levels, and technological advances in GIS that provide new geographers with highly marketable skills (Gober *et al* 1995a). Over the last two years we have had a three-fold increase in the number of out-of-state students requesting information about our

graduate program. Once they learn it is the MBS instead of a Master of Arts, most of these students decline to come here. The lack of GES having its own recognizable degree is central to their decision.

Our degrees granted also match national trends, with BAs awarded increasing 177% from 13 to 36, and MBS degrees increasing 100%, from 2 to 4 between 1989-90 and 1998-99 (Fig. 4). The Colorado Commission for Higher Education (CCHE) requires that graduate programs graduate 3 students per year, or 5 over three successive years. We have averaged 4.2 MBS degrees awarded in the Geography option each year over the last 5 years (1994-1998). For any given three year interval over the last 10 years, we have graduated between 11 and 14 MBS students in the Geography option (12.13 average), more than double the CCHE requirement. With the approval of a Master of Arts in Applied Geography, we fully expect to increase these numbers.

From a recent questionnaire completed by 44 UCCS geography alumni, 39% were enrolled in or had already received graduate degrees. Of those that had not returned to graduate school, 22% said they would like to enroll in a Master of Arts program in Applied Geography at UCCS. These sample results indicate that about 8 new Master of Arts students would enter the program each year from our graduates alone. Over the last five years, new student enrollment in the geography MBS option averaged exactly 6 per year, and we expect this to increase with a Master of Arts specific to geography. With the rapid growth of Colorado Springs, the increasing attraction of UCCS to out of state students, and the growing number of students graduating with bachelor's degrees from our department, the pool for potential master's students also increases. We have already recorded an increase in requests from out of state students for a Master of Arts in Applied Geography. We also continue to serve the military, specifically Air Force personnel using global positioning systems and other navigation tools in the mapping sciences. This Air Force link will only get stronger with the increased importance of Peterson AFB and Schriever AFB in U.S. space operations.

### **Current Restrictions**

There are numerous reasons for creating our own MA degree program including the large number of MBS students we have, the restrictions placed on us by the MBS program, the insistence of our latest outside review, and the identity crisis a student with an MBS degree faces. GES is very strong in the MBS program, offering graduate degrees that emphasize geography. As of September 1999, the 34 GES students comprise 33% of the MBS program, and geography has always been one of the program's most popular options (see Appendix I for MBS theses approved). We have increased enrollment over 60% in our undergraduate program between 1988-89 and 1998-99, from 2560 student credit hours to 4103, and over 36% in our MBS program, from 147 student credit hours to 200 (Fig. 3).

Our MBS graduation numbers show that we in fact already have a graduate program, but without formal recognition. A major problem with the current MBS program, apart from not offering a Master of Arts in Applied Geography, is the restrictions on related coursework that applies to the degree. Currently only classes in biology, anthropology, mathematics, physics, economics, and chemistry apply. With changes in faculty expertise that include biogeography, hydrology and climate, GIS, urban issues, and cultural change, plus the rapid technological changes associated with GIS, our students continue to work on more diverse community-related projects. We need more flexibility in course offerings and criteria for acceptance than the MBS program offers. For instance, existing courses in environmental history, urban sociology, database analysis and design, information systems, or JAVA programming could all be practical and relevant to geography graduate students, yet none of these courses contribute towards the MBS degree. Geography by necessity requires breadth in scholarship and competency. This is the driving force for our application to formally recognize our graduate instruction as a stand-alone program housed in our department.

The last external review of the GES department, in December 1994, found that instruction, research, and service were strong, but recommended that we establish a formal, stand alone Master of Arts program in Geography. The time has come to formalize the Master of Arts program within Geography, rather than remain in the more restrictive and less recognized MBS umbrella program.

Prospective graduate students may be at a disadvantage because an MBS is a degree that is virtually unknown outside of the closed CU-system. Employers and other graduate programs for geographers do not know what this Masters of Basic Science degree means. They do, however, know what a Master of Arts in Applied Geography is and the skills and competencies that this degree brings with a student who has earned a Master of Arts in Applied Geography. Our graduates will be much more marketable in both the private sector of the economy and the non-profit/governmental sector with the Master of Arts in Applied Geography. They will also be better prepared to enter Ph.D. programs elsewhere in Geography. We, as a department, will be more competitive and attractive to potential geography graduate students if we can offer a Master of Arts in Applied Geography.

### **Market Demand**

The Front Range, from Fort Collins to Pueblo, has an internationally recognized concentration of GIS and remote sensing employers, and is also an ideal site for research on environment-society interactions due to the rapid population growth. One could easily make the case that the Front Range region, including Colorado Springs and southern Colorado, is the “center of the universe” for spatial data creation and analysis. The demand for qualified applied geography professionals is not being met in Colorado Springs. Merrick & Co., a Denver-based GIS firm, is an example of the expanding potential for employment. They are rapidly increasing operations in Colorado Springs and want to enter into a cooperative arrangement with the GES department to fill positions with qualified professionals. They have already given cash gifts to GES and hired interns in anticipation of their increased involvement in our program. We routinely have military students not only in GIS and remote sensing graduate classes but as matriculated students in the current MBS program, and this will increase as the Air Force concentrates their space operations, particularly Global Positioning Systems, in Colorado Springs. We have had serious discussions with the U.S. Air Force Academy faculty who are very interested in sending prospective faculty to us to get their Master of Arts in Applied Geography so that they are qualified to teach in the geography program for USAFA cadets.

A recent survey of geography graduates at the national level found that approximately two-thirds were employed in fields directly related to geography, whereas only 16% of all social science bachelors degree recipients work in closely related fields (Gober *et al* 1995b). Worldwide, there is a deficit of 350,000 professionals in GIS and the mapping sciences, one of the highest growth fields in the high tech industries (ESRI 1998). Nationwide the predicted market demand for new GIS analysts is 75,000 graduates per year. The shortfall in the U.S. for GIS analysts with advanced degrees is estimated to be 3,000 to 4,000 per year (ESRI 2000). The Commerce Department estimates that high tech industries will need another 1.3 million workers by 2006, and recommends that existing companies focus on continuing education for existing workers and more involvement with universities (Martinez 1999). Geography at UCCS is well situated to assist the local GIS community in this regard, building on our tradition of providing degrees to returning and non-traditional students. The new addition of the Southern Colorado Geodata Laboratory and a full-time lab manager will also be critical to our program.

As employers want people able to use data for analysis, not just information compilation (Farnham 1993), the ability to solve problems and make decisions in a wide range of employment situations is crucial. Corporate sponsors of the Association of American Geographers stated that geographers are valued for their mix of technical skills with a broad based, multidisciplinary background: “It is clear that geographers’ niche in the labor market comes from the ability to combine technical expertise with a broad training in the liberal arts stressing decision making, communication, and critical thinking” (Gober *et al* 1995c: 216).

Many local agencies hire our graduates, including city and county planners, Aerial Data Reductions (ADR), Merrick & Co., Colorado Springs Utilities, Analytical Surveys, Inc., the U.S. Environmental Protection Agency, and the Colorado Geological Survey. We have both verbal endorsements and written letters of support for an MA in Applied Geography from the Colorado Springs Department of Parks and Recreation, El Paso County Planning Department, Colorado Springs Utilities, Colorado Springs Water Resources Department, and from dozens of other private companies and agencies with whom we deal. We plan to collect survey data from many of these organizations in the final proposal phase of this request to show the strength of support and need in the local/regional market. New markets for GIS and related spatial analysis tools are opening in real estate, transportation planning, groundwater management, industrial location, hazard mitigation, and more. This community will benefit from highly trained professionals with applied geographic skills.

### **Geography Graduate Programs at Other Colorado Institutions**

A Master’s Degree in Geography is offered at only two institutions in Colorado, and the proposed Master of Arts program in Applied Geography does not overlap with either of these existing programs. The University of Colorado at Boulder Geography Department is among the nation’s elite, attracting students from around the world. Because of this, they have only limited graduate openings each year with competition from a national undergraduate pool. Also, they promote a Master of Arts program geared to students who intend to continue towards a Ph.D. and careers in academia, with a focus on theoretical research and less emphasis on applied topics. Many well qualified, potential Colorado resident applicants to a Masters degree who would be attracted to our proposed program would not apply to Boulder because the theoretical emphasis would not appeal to them. The Boulder program is highly selective, and our best students can certainly compete for their program, however, the restricted number of accepted applicants is problematic.

The University of Denver (DU) offers an MA and Ph.D. in geography, and an MS in Geographic Information Science. In addition to graduate education geared toward research and academic positions, they help serve the huge demand for GIS courses in the Front Range. They are, however, can only satisfy a small portion of the demand for advanced graduate research, especially for students from southern Colorado. Most of our potential students for a Masters program are established in the community with families and jobs. The advantages for them to obtain their advanced degree from a state institution in their local area versus a private and expensive university are evident. This includes the distinct possibility of local internships and part-time employment in the local industries and organizations that they will be hired by after they finish their degree programs. With a population approaching 500,000 for El Paso County alone and additional population in the rest of southern Colorado, we will have more than sufficient demand to keep this program active and healthy.

### **Proposed Curriculum**

Our proposed application criteria will be a 3.00 GPA or higher as an undergraduate, 40 credits in geography and selected courses in science, mathematics, or computer science, and a cumulative score (for the 3 segments of the exam) of at least 1500 on the GRE. The Master of Arts program in Applied Geography will consist of 30 credits, with both a thesis and non-thesis option. All students will take GEOG 501: Geographic Research, in their first year, and make up any deficiencies in cartography, and introductory human and physical geography courses. Students will also need a background in statistics or take our GEOG 500 statistics course. They must maintain a 3.0 GPA and complete a written comprehensive exam prior to graduation. We propose to allow up to 9 graduate credits from related disciplines to count towards the Master of Arts in Applied Geography. This flexibility is crucial to graduate work in geography, especially at an institution of our size. All other UCCS graduate school rules apply.

### **New Resources Needed**

We envision no demand for significant additional resources. UCCS has a site license from the Environmental Systems Research Institute (ESRI), which provides the industry-leading GIS software. We also enjoy a cartography lab and an NT lab for GIS, plus the critical mass of faculty and journals in the library to maintain a viable Masters program. One faculty member will oversee the graduate program and serve as students' initial advisor until their committee is selected.

One critical factor in our ability to offer this degree without significantly increasing our resources from state funds is the recent addition of the Southern Colorado Geodata Laboratory (SCGL) to the department. This laboratory was begun when GES received a CCHE Program of Excellence grant in June 2000. This grant established the lab and provided funds for the laboratory director for five years. One of the stated goals of the lab is to solicit grants and projects from local and regional organizations and companies to do spatial data analysis, using students as research associates. This does two things for the students involved. It will give them invaluable experience working on real-world/applied research that may eventually lead to thesis research topics. It also will provide funding for both the students to continue their education and to the SCGL to continue the work of the laboratory.

### **Conclusion**

GES is a strong department at UCCS with an active graduate program that serves the Colorado Springs Region. This proposal seeks to formalize a graduate degree in geography that will strengthen our program. The Master of Arts in Applied Geography will serve community needs without a commitment of additional resources and without duplicating efforts at other universities. We are responding to recommendations from outside reviewers of our department, to changes in our discipline, to growth at the university and region, and to increasing student and market demand. This request is largely a call for a restructuring of the existing graduate curriculum in geography, since graduate study in geography already exists at UCCS. To remain competitive and attract more students, we need the flexibility to administer a Master of Arts in Applied Geography through our department, rather than working through the oversight of an umbrella MBS graduate degree. Our faculty and institution are committed to excellence in research on community issues, which is the goal of the Master of Arts in Applied Geography.

### **Citations**

ESRI. 2000. *GIS Educator*. Redlands, CA: Environmental Systems Research Institute.

ESRI. 1998. Unpublished Human Relations Report. Redlands, CA: Environmental Systems Research Institute.

Farnham, A. 1993. Out of College, What's Next? *Fortune* July 12:58-64.

Gober, Patricia, Amy K. Glasmeier, James M. Goodman, David A. Plane, Howard A. Stafford, and Joseph S. Wood.  
1995a. Employment Trends in Geography, Part 1: Enrollment and Degree Patterns. *Professional Geographer* 47(3):317-328.

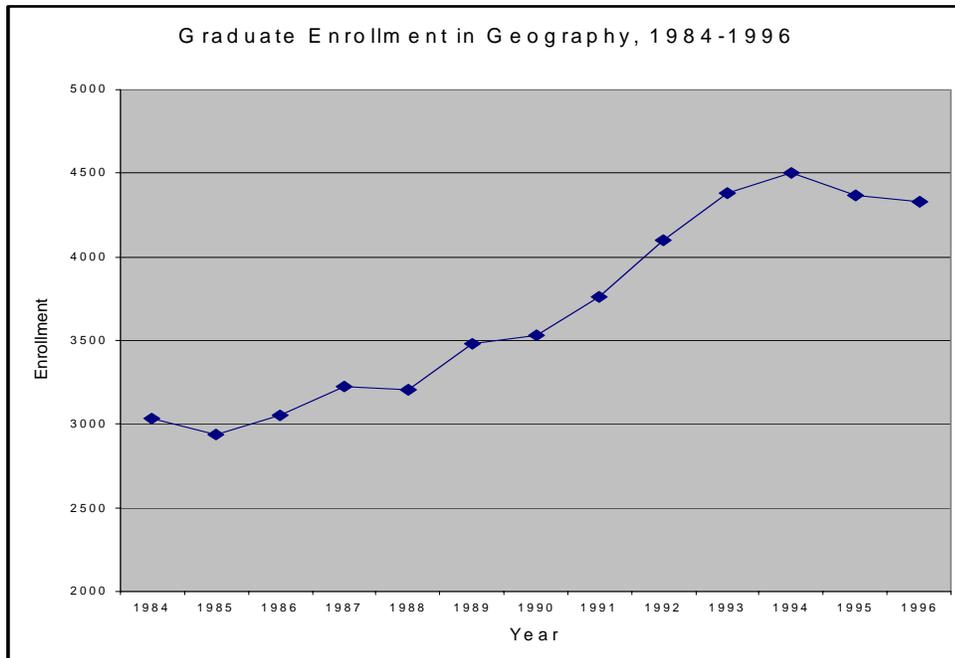
Gober, Patricia, Amy K. Glasmeier, James M. Goodman, David A. Plane, Howard A. Stafford, and Joseph S. Wood.  
1995b. Employment Trends in Geography, Part 2: Current Demand Conditions. *Professional Geographer* 47(3):329-336.

Gober, Patricia, Amy K. Glasmeier, James M. Goodman, David A. Plane, Howard A. Stafford, and Joseph S. Wood.  
1995c. Employment Trends in Geography, Part 3: Future Demand Conditions. *Professional Geographer* 47(3):336-346.

National Center for Education Statistics. 1997. *Digest of Education Statistics, 1998*. U.S. Department of Education, Office of Educational Research. Washington, DC: Government Printing Office.

Martinez, Michael J. 1999. High Tech Labor Shortage Deepens. *ABCNEWS.com*, July 1.

**Figure 1.** Graduate Enrollment in Geography, 1984-1996. Source: National Center for Education Statistics, *Digest of Education Statistics, 1997*.



**Figure 2.** Degrees Awarded in Geography, 1985-1996. Source: National Center for Education Statistics, *Digest of Education Statistics, various years*.

