

College of Engineering and Applied Science University of Colorado

Semi-annual Report prepared 9/24/02 by Robert H. Davis, Dean and Patten Professor

Introduction

The College of Engineering and Applied Science at the University of Colorado at Boulder is dedicated to *Excellence in Education and Research*. Student excellence will be achieved through active learning, including team projects, research experiences, and industry internships. Faculty excellence will be achieved through synergistic research and teaching, both in core areas of engineering and applied science and in multidisciplinary initiatives. In this Semi-annual Report, I highlight major advances made by the College in the past six months toward these goals and report on progress made on initiatives and recommendations discussed in the previous meeting of the CU Engineering Advisory Council.

Faculty

The College welcomed four new department chairs this fall:

- JoAnn Silverstein in Civil, Environmental and Architectural Engineering
- Robert Erickson in Electrical and Computer Engineering
- Fred Ramirez in Chemical Engineering
- Ray Nettleton in Interdisciplinary Telecommunications

The College also welcomed several new faculty:

- Xinlin Li, Assoc. Prof., Aerospace Engineering Sciences
- Janet deGrazia, Sr. Instructor, Chemical Engineering
- John Black, Asst. Prof., Computer Science
- Michael Burl, Asst. Prof., Computer Science
- Henry Tufo, Assoc. Prof., Computer Science
- Paul Chinowsky, Assoc. Prof., Civil, Environ. and Arch. Engineering
- Dejan Filipovic, Asst. Prof., Electrical and Computer Engineering
- Olgica Milenkovic, Asst. Prof., Electrical and Computer Engineering
- Youjian Liu, Asst. Prof., Electrical and Computer Engineering
- Conrad Stoldt, Asst. Prof., Mechanical Engineering
- Oleg Vasilyev, Asst. Prof., Mechanical Engineering
- Robin Shandas, Assoc. Prof., Mechanical Engineering
- Derek Reamor, Instructor, Mechanical Engineering

Charbel Farhat of Aerospace Engineering Sciences was awarded the Computational Mechanics Award and elected a Fellow of the International Association of Computational Mechanics.

Bernard Amadei of Civil, Environmental, and Architectural Engineering received the Bank One Colorado Faculty Community Service Award of \$10,000 for his volunteer service and engineering expertise in the founding and operation of Engineers Without Borders.

Roop Mahajan of Mechanical Engineering was selected to receive the 2002 Heat Transfer Memorial Award from the American Society of Mechanical Engineers.

Christopher Bowman of Chemical Engineering was selected to participate in the National Academy of Engineering's eighth annual Frontiers of Engineering symposium. The Sept. 19-21 event brought together 84 engineers from industry, academia, and government who are performing leading-edge engineering research and technical work. Bowman also received the Colburn Award this past year from the American Institute of Chemical Engineers.

Students

Jeremy Zartman, an undergraduate chemical engineering and physics major, won a prestigious Goldwater Scholarship. Alan Greenberg of Mechanical Engineering has been his research advisor on NASA-sponsored work on defect formation in polymeric membranes.

Ryan Patterson, a Grand Junction teenager who took top honors in the nation's most prestigious science competitions, is a new freshman in the College, majoring in electrical and computer engineering. Ryan won the 2002 Siemens Westinghouse Science and Technology Competition, for his invention of a glove that translates American Sign Language into written words on a computer.

Several of our graduate students won NSF graduate fellowships, including Andria Lynn Bilich in Aerospace Engineering Sciences, Sara Ziesman and Dipa Shah in Chemical Engineering, John S. McCartney in Civil Engineering, and Courtney Roby in Electrical Engineering. The Chemical Engineering Department also recruited three NSF graduate fellows to its Ph.D. program this fall.

NASA Graduate Student Researcher Program Awards were won by three of our aerospace students: Ken Stroud, Mike Benoit, and Tom Hatfield.

Aerospace engineering student Ulrich Hetmaniuk was selected to win the Robert J. Melosh Medal Competition for the Best Student Paper on Finite Element Analysis, endorsed by the International Association for Computational Mechanics.

New Deans

Robert Davis was selected as Dean of the College of Engineering and Applied Science starting 01 July 2002. Davis, from the Department of Chemical Engineering at CU-Boulder, replaces Interim Dean Roop Mahajan. Stein Sture, of the Department of Civil, Environmental and Architectural Engineering at CU-Boulder, was appointed Associate Dean for Research, and John Bennett, of the Department of Computer Science at CU-Boulder, was appointed Associate Dean for Education, both effective 19 August 2002. Sture and Bennett replace Mel Branch and Jim Avery, respectively, who have returned to full-time teaching and research on the faculty. Jim Sherman is continuing as Assistant Dean for Students. A search is being initiated for an Assistant Dean for Administration.

New Fellowships

Michael Rauli of Aerospace Engineering Sciences and Chris Brotherton of Chemical Engineering were selected as the first recipients of the Sandia Doctoral Fellowship, a new fellowship supporting research in micro and nano systems at CU-Boulder established by Sandia National Laboratories. The fellowship provides \$20,000 a year in support for two years to each student and encourages research collaboration with Sandia via internships and other technical exchanges.

Michael Neylon of Aerospace Engineering Sciences was selected to receive the Teets Family Endowed Doctoral Fellowship, another new fellowship that provides \$14,000 per year for two years of study in a field related to micro/nano systems in engineering or life sciences.

Student Projects

The “Red Thumb” Aerospace Senior Design team received First Place in NASA’s MarsPort Deployable Mars Greenhouse Design Competition held at the Kennedy Space Center in Florida on May 14th and 15th. Team members included seniors Bob Gjestvang, Aaron Frey, Ryan Ries, Colleen Higgans, Kate Atkinson, Sara Lewandowski, Shawn Bockstahler, Ph.D. student Jim Clawson, and faculty advisor David Klaus.

CU architecture and engineering students are collaborating on the design of a model solar home as part of the Department of Energy’s “Solar Decathlon.” The competition pits 14 university teams against one another to design and build the best 800-square-foot home. The entries will be judged in 10 categories ranging from aesthetics and livability to energy efficiency. The CU home has recently been transported cross-country (via 3 flatbed trucks) to Washington, DC, where it is being assembled for the Sept. 26 – Oct. 5 competition on the National Mall. Engineering Professor Michael Brandemuehl is the lead advisor on the project.

Outreach Highlights

The Integrated Teaching and Learning Laboratory (ITLL) offered a new six-week “Girls Embrace Technology” internship for high school girls this summer, with 37 girls entering 9th-12th grades eager to learn how to apply technology to create multimedia software. The girls were paid a \$75 per week stipend for the part-time internship, funded by the ITLL’s CCHE “Program of Excellence” grant, in collaboration with CU-Boulder’s Women in Engineering Program and the Alliance for Technology, Learning and Society. The Xcel Energy Foundation and CU-Boulder Outreach Committee also provided financial support.

The fifth annual “Success Institute” was also held this summer for high school students in Boulder, St. Vrain and Denver schools who are underrepresented in the field of engineering. Sixty-six students participated in various hands-on engineering projects, and EAC member Dan Hernandez gave an inspirational closing talk. The Success Institute is a collaboration between the ITLL, Multicultural Engineering Program and Women in Engineering Program.

Department News

The Department of Mechanical Engineering will commemorate its 100th year in 2002-2003 with a variety of events, including an alumni picnic, open house and mechanical engineering symposium. Mechanical engineering alumni are invited to a special homecoming picnic lunch with department faculty and staff on Saturday, Oct. 5, and the department will host an open house on the morning of Oct. 18, in conjunction with the DLC Grand Opening celebration. The Department also is planning a symposium and dinner for the spring.

The Department of Chemical Engineering hosted the American Society for Engineering Education Summer School for Chemical Engineering in July 2002. Over 200 faculty from around the country gathered to present and discuss the latest advances in engineering education. Professor Robert Davis was presented with the ASEE Dow Lectureship Award at this summer school.

Student Enrollments

Official Fall Semester 2002 census date enrollment figures are now in for the College of Engineering and Applied Science. As projected, undergraduate and graduate enrollments are up from the Fall Semester 2001. Fall Semester 2002 undergraduate enrollment is at 2,681 students and graduate enrollment is at 1,075 students, up from 2,598 and 993, respectively. A check of college enrollment records indicates this year has the largest undergraduate enrollment known (the closest prior year was the fall quarter of 1947, with 2,644 undergraduate students). The number of new freshmen is 612, up from 561 last fall.

Enrollment is up in most areas: class size, masters and doctoral programs, women, and undergraduate underrepresented students. There are now 519 (19.4%) undergraduate women and 251 (23.3%) graduate women in the College. Underrepresented students at the undergraduate level are up in all areas, with 45 (1.7%) black students, 131 (4.9%) hispanic students, 25 (0.9%) native american students, and 227 (8.5%) asian students.

Engineering Development

The search for a new Engineering Development Director is continuing. The services of the Bryant Group, specializing in executive searches for philanthropy, was retained to help recruit top-level individuals. Chris Bryant, President of the Bryant Group, and Myrna Hall, Vice President for Development at CU-Boulder, report that 5-6 highly qualified candidates have indicated interest. Airport interviews and screening are being planned for October 2002, prior to bringing the finalists to campus for full interview schedules.

A Memorandum of Understanding (MOU) on a partnership between the CU-Boulder officers and the CU Foundation officers on reporting relationships, personnel decisions, and an integrated approach for development staff working in the colleges is being developed. An initial draft is being finalized after discussion and feedback, and the final form is expected to be ready for signature in the near future.

Despite the poor economy and incomplete staffing, Engineering Development had a very successful year. A total of \$16.9 million was raised for the College in FY2002, including \$4.9M in endowments, \$1.1M for capital, \$4.5M in current cash gifts, and \$6.4M in gifts in kind. The total received by the College in the first six years of the current seven-year campaign is over \$74 million, exceeding the \$54 million goal by nearly 40%. Gifts received by the campus as a whole during the first six years of the campaign are at \$238 million, compared to a goal of \$297 million for the entire campaign.

Discovery Learning Center

I am delighted to report that the Discovery Learning Center (DLC) is nearing completion. The building itself was completed last summer, and tenant finish and build-out are now in their final stages. The eleven research groups that will occupy the multi-laboratory space in the DLC completed their walk-through on September 12, and the contractors are working on the resulting "punch list". Equipment and furnishing move-in began on September 24. This process should proceed quickly, since all large equipment is already in place. We expect to receive the Certificate of Occupancy by the end of the first week in October, at which time students, faculty and staff will be able to begin using the building full-time. By the October 18 official opening, discovery learning activities in the DLC should be well underway.

As you are aware, the DLC is an absolutely unique facility. Virtually no other university in the country can offer a similar educational opportunity to its undergraduate students. Our goal is to have 250 students actively participating in vertically integrated research projects within the DLC. This unparalleled opportunity for undergraduate students to participate in cutting-edge and original research will enhance their critical thinking skills through teamwork and open-ended inquiry and discovery. Participation in these research projects will better prepare our students for either professional practice or advanced study.

As DLC transitions from the planning, design and construction stages to implementation of our discovery-learning vision, I have asked the two Associate Deans, John Bennett and Stein Sture, to lead the newly created DLC Task Force. The purpose of this task force is to establish and implement policies that will ensure that we fulfill the vision and goals of the Discovery Learning Center. We want to ensure that the enormous potential of the DLC is fully realized, that its day-to-day operation runs smoothly, and that its students, faculty and industrial partners are well served. The members of the Task Force include Mel Branch, Charbel Farhat, Clayton Lewis, Jackie Sullivan, Pat Sullivan and the two Associate Deans. Finally, we anticipate naming an Interim Director of the DLC within the next few weeks.

Fundraising for the DLC is continuing, as over \$2M are still needed for the building and its state-of-the-art video wall and conference center. In addition, significant funds will be needed for the ongoing operations and technology maintenance of the DLC.

Other Capital Projects

Planning for the new Engineering Research and Teaching Laboratory (ETRL) has continued, but architectural work on a formal program plan has been put on hold, pending campus input on possible funding models and input from the Engineering Advisory Council and Resource Development Committee on fundraising scenarios. Facilities Management has told us that a new building requiring state funds could not be built for approximately 15 years. The initial plan for the ETRL is 155,000 square feet at a total cost of at least \$62 million. The primary site for this building, which would house the micro/nano initiative and other programs, is off the main campus in the CU research park. I have asked Stein Sture to take the lead in representing the Dean's Office on this project.

The campus is negotiating to purchase an 85,000 square foot building from Exabyte for about \$8 million. This building is located on Discovery Drive near Arapahoe and Foothills in Boulder, and may be available for occupancy as soon as January 2003. Possible tenants include Computer Science and/or other college programs.

Potential space in the ground level of the Engineering Center has been identified for the proposed Infant Care Center. Initial estimates are that nearly \$400,000 would be required to renovate this 1400 square foot space to make it suitable for the Center, which is sized to care for eight infants at a time. Discussions with campus and community officials are

continuing. I have asked John Bennett to take the lead on representing the Dean's Office on this project.

Campus Budget Update

On the positive side, the campus has continued its commitment to bringing faculty salaries in line with those of peer institutions. For the second year in a row, the average raise pool was over 6%, and it is estimated that CU-Boulder faculty salaries now trail those of peer institutions by only 3-4%.

On the other hand, the projected shortfall in State of Colorado revenues has grown rapidly and is now in the range of \$500-600 million. While exact figures will not likely be provided until after the November elections, this shortfall is expected to result in a rescission of about 15% of the state funds appropriated for CU-Boulder. The reduction in state funds will be partially offset by increases in tuition, as enrollments campus wide are up 5% and tuition was increased 6.2% for residents and 9% for nonresidents. However, significant budget cuts will be passed on to the colleges and departments. We have already been informed of a \$363,825 cut for the College of Engineering and Applied Science, and are expecting another reduction later this semester.

This past summer, Clayton Lewis, Roop Mahajan and I submitted a differential tuition proposal for the College of Engineering and Applied Science. This proposal was set aside by the CU President, in favor of the Quality for Colorado tuition plan that she has submitted for the entire CU system. Both plans would increase tuition by approximately \$1,200-\$1,600 per year per student from current levels of approximately \$4,000 for residents and \$16,000 for nonresidents.

Intellectual Property and Technology Transfer

The CU Technology Transfer Office (TTO) published its Strategic Plan in June 2002. Strategic thrusts include:

- 1) Amplify the inventor base to increase the number of quality invention disclosures
- 2) Instill effective practices to identify licensees and ensure efficient transactions
- 3) Establish policies and procedures congruent with academic values and business practices
- 4) Promote service excellence by empowering a professional TTO staff
- 5) Enhanced communication and continued education of all audiences

The search for a Director of the CU-Boulder TTO is nearing completion, with final candidate campus interviews to be held in early October. Plans for a direct presence of TTO personnel in the College of Engineering and Applied Science will be established upon completion of the Director Search. Progress is being made on 'one-stop shopping,' with the CU-Boulder TTO responsible for working with faculty on technology generated in the College of Engineering and Applied Science. The CU system TTO then provides

general support on policies, patent administration, compliance, and business development. An intellectual-property educational series has been initiated. The heightened activities are beginning to have an effect: nine patent applications were filed by engineering faculty in the first quarter of FY2003, compared to 16 filings for all of FY2002. A new revenue-sharing formula has not yet been established; each campus is in the process of making recommendations on this issue.