Narrative: Nomination of the University of Colorado at Boulder's College of Engineering and Applied Science for a 2010 Andrew Heiskell Award for Innovation in International Education

In the last decade our College of Engineering and Applied Science has gone from expressing minimal interest and providing minimal support for international programs to leading the campus in internationalization. What is most outstanding is that they have a menu of international programs and do not depend on just one program alone. It is the scope of the many extraordinary offerings that speaks best about the internationalization efforts of the College. They offer programs for faculty and for students, at the undergraduate and graduate levels, in conjunction with other Schools and Colleges at the University, and in the classroom and the laboratory.

Internationalization and global initiatives are an integral part of the College's 2020 strategic plan that articulates their vision as follows: "Our vision is to be a world leader in engineering research and education, with an emphasis on integrated and discovery learning and on engineering for global society." In tandem with this, the University of Colorado at Boulder recently adopted a new strategic plan for the whole institution, "Flagship 2030 - Serving Colorado, Engaged in the World," which identifies global engagement as a cornerstone of the University's future activities. This has developed in a number of ways on campus, but most directly through a Task Force on Internationalization that is examining campus efforts to build on the solid programs that already exist. The task force is a part of the American Council on Education's internationalization laboratory and is raising the profile of international activities across the campus. Nowhere on campus though has seen a more dramatic change in international engagement than the College of Engineering and Applied Science.

International Administration
In recognition of the fact that engineering is a global endeavor, the College has expanded its international programming in a variety of ways to meet the needs of its students (both undergraduate and graduate) and its faculty. The College also serves the wider community by educating engineers who are preparing to work in an international environment and faculty who collaborate on international projects that benefit all mankind.

In order to coordinate their various international efforts, the College has designated an administrator, Dr. Sherry Snyder as the Director of Student Programs and International Affairs. Dr. Snyder provides coordination, consolidated information and expertise, and advocacy for international programs. She works closely with students as they determine which international experience is right for them and with faculty who wish to establish new partnerships with international colleagues. Dr. Snyder also works closely with the staff in the Office of International Education regarding the establishment and continuance of international programming, and she is a member of the Study Abroad Committee, a faculty oversight committee that approves study abroad programs and sets policy for those programs on behalf of the campus administration.

International Engineering Certificates
A particularly successful program in the College is the International Engineering Certificate program for undergraduates. The purpose of the certificates is to provide engineering students training in language and culture, giving them the skills necessary to work effectively with engineers in multi-national teams and to succeed during overseas assignments in today’s global marketplace. The promotional materials for the program express the importance of international understanding for engineers in the following way: "As technology expands our horizons and connects the world with increasing speed, tomorrow’s engineer must be able to work internationally. This means understanding not only science and technology, but also languages and cultures."

The International Engineering Certificate is designed to enhance the bachelor of science degree in all engineering fields offered at the University. Certificates are currently available in German, French, Spanish, Italian, Chinese and Japanese. Forty students have completed the certificates since their inception in 2003 and 86 students were engaged in the program in the last year.

The International Engineering Certificate is structured to allow students to complete it during the four years of their undergraduate programs. The requirements of the program vary by language area, but generally include the following: three courses in the target language, two courses in culture or literature, an engineering design course or equivalent, and a corporate or university internship in an appropriate host country. Examples of internship placements include Airbus Deutschland GmbH and BMW in Germany, Abengoa and Universitat Politecnica de Catalunya in Spain, and Carlo Gavazzi Space S.p.A. and the Politecnico di Torino in Italy.
The Mortenson Center in Engineering for Developing Communities (MC-EDC)

MC-EDC provides a unique track for engineers who both learn about and contribute to the relief of problems faced by developing communities worldwide. The Center takes an integrated and participatory approach to humanitarian development and seeks to contribute to the UN Millennium Development Goals. MC-EDC encompasses education, research, and service related to sustainable community development, and all EDC students work on real projects. The program serves to educate engineers for the 21st century where they will play a critical role in contributing to peace and security in an increasingly challenged world. This year the program received a $5 million endowment from the M.A. Mortenson Company, whose chairman is a CU Engineering graduate. The gift is a vote of confidence for CU's ongoing efforts towards sustainable development, and its strategic goals of transcending geographic boundaries and supporting a culture of diversity and engagement.

The College offers an undergraduate degree track in EDC in the Civil, Environmental and Architectural Engineering Department. Graduate tracks are also available in the MS/PhD program in Environmental Engineering and the MS/PhD program in Civil Systems.

The CU Student Chapter of Engineers without Borders – USA (EWB-CU)

Engineers without Borders is a non-profit humanitarian organization created by CU-Boulder Engineering Professor Bernard Amadei in 2001 when he conceived the idea of harnessing the power of professional and student engineers to complete low-tech, high-impact projects in developing countries. EWB-CU operates as a student organization on the CU-Boulder campus. The chapter had 56 active student members in 2008-2009 and three active projects in Nepal, Peru, and Rwanda. Faculty advisors support the student chapter in its project endeavors.

International Dual Degree Programs and International Graduate Studies

In the area of dual degree programs, the College of Engineering has been a trend setter for the campus. They have initiated the very first dual degree programs at the University and currently have four such programs. They are graduate programs established in cooperation with the University of Leoben in Austria, Pontificia Católica de Chile in Chile, Fudan University in China, and the University of Trento in Italy. A number of others are currently in development. This is a new and exciting area in which the College of Engineering is blazing new international trails.

The College also offers its graduate students research internships with institutional partners in 7 different countries. By participating in these internships and taking internationally focused engineering and management courses, graduate students can earn a certificate signed by both the University of Colorado and the host institution and notations on their transcripts.

Study Abroad

Thirty years ago, engineering students at the University of Colorado at Boulder did not study abroad. Then in 1974, one engineering student ventured to the Instituto Tecnológico y de Estudios Superiores de Monterrey in Mexico for an academic year. In those days, the official word from the College was that while students could study abroad, it really wasn't encouraged. Students were told that study abroad would slow their progress towards getting a degree and advisors also cited engineering licensing requirements as a barrier to study abroad and a reason why students should take all of their courses in Boulder.

Nonetheless, engineering students began studying abroad in increasing numbers. By 2008-2009, 46 students (a 4500% increase since 1974) were studying abroad on 27 different programs and in more than 15 different countries. And not only are engineering students studying abroad; they now have the full support of the College and their academic advisors. Engineering students can take required courses abroad, and if they plan well, they can graduate on schedule.

Three Engineering faculty members also now lead Faculty-Led Global Seminars abroad. Two of the seminars are taught by faculty members from the Herbst Program of Humanities for Engineers: a program in Italy focusing on "Culture Wars in Rome" and a program (that has received funding from the Freeman Foundation and the Tang Fund) that focuses on cultural identity in Xi'an, China. The third Global Seminar focuses on small-scale sustainable community planning and development and is being offered in partnership with the Technion Israel Institute of Technology in Haifa, Israel (their students and ours will work together on sustainable development projects).
**Student Exchanges**
One way to successfully internationalize a college is to offer reciprocal exchange programs that not only send students to host institutions abroad, but bring in students from the host institutions. The incoming students work with students in the U.S.; thereby internationalizing our classrooms and laboratories. Until last year, we had 12 comprehensive exchange programs that offered some engineering courses, but these were not exclusively engineering exchanges. In the last year, the College, in conjunction with the Office of International Education, has initiated five new exchange programs that focus on engineering.

Since all of the new exchange programs are strong programs for engineers, the College is actively preparing students for these experiences - including enthusiastically encouraging the students to begin early study of the languages of the host countries in order to achieve the appropriate levels of proficiency. The exchanges have also been chosen to allow undergraduate engineering students to spend a semester or an academic year at the host universities where they can take required engineering courses and still graduate in four years. Some of the exchanges also have options for graduate student exchanges. This is really ground breaking territory as our academic departments until now have been fairly reluctant to offer graduate credit for course work taken at other institutions. Engineering is on the forefront of this area - encouraging graduate students to earn some of their credit abroad.

To give you an idea of the level of support in the College for the exchange of engineering students, here is an excerpt from the letter of support written by Professor JoAnn Silverstein, Chair of the Department of Civil, Environmental, and Architectural Engineering, for one of the new exchange programs:

> The student exchange experience will improve our students’ career opportunities as well as their awareness of the global dimensions of civil, environmental, and architectural engineering practice in the future. Our students are very much aware of the need for education programs that address these concerns. This August, I spoke to incoming freshmen in civil engineering, and the two questions most often asked by the new students were about whether they could do study abroad and how it would affect the time required for their BS.

The new engineering exchanges are with the following partner universities: Newcastle University in England, the Ecole Speciale des Travaux Publics (ESTP) in France, the Technische Universität Darmstadt in Germany, and Tokushima University in Japan. In addition, our institution joined the Global E³, Global Engineering Education Exchange, consortium, administered in the U.S. by the Institute of International Education. As a member of Global E³, we are now able to send our students to 49 more partner institutions in 16 countries and receive students from those institutions as well. The College's plan is that the new exchanges will not just be student exchanges, but faculty will also build partnership with host university faculty as well.

**International Students**
The College of Engineering student body is quite diverse in terms of country of origin. In Fall 2008, the last term for which complete statistics are available, 80 of the 3020 undergraduates in Engineering were international students. This is more in absolute number and percentage (2.6%) than in any of the University's other schools and colleges. Even more impressive is the number of international graduate students. In Fall 2008, 409 (or 39%) of the 1049 Engineering graduate students were international students. The presence of these students creates an international environment in the Engineering Center and stimulates the creative environment as these students share their perspectives, knowledge, and research with others. The graduate students, in particular, have also brought connections to their professions at home to which faculty here have been able to develop linkages. The College is welcoming to its international students and greatly appreciates what they give and receive to students and faculty.

**Faculty in Residence Summer Term (FIRST)**
FIRST is a grant-funded program designed to bring prominent scholars to the Boulder campus during the summer. The scholars teach our students and may also offer departmental colloquia and public lectures. Since 2005, Engineering has brought in four FIRST scholars (two from Italy, one from Germany, and one from Spain).

**Outreach**
Finally, the College is not shy about sharing their successes in the international arena. They work closely with our office of University Communications to share their stories within the university and to the general public.