



College of Science and Engineering

"Scientific inquiry and industrial endeavors are inherently global in today's world. As a CSE graduate, you will work with colleagues from around the world regardless of your career path. By studying and researching abroad, you will grow personally and professionally while gaining skill sets desired by industry and graduate programs." –**Mos Kaveh, Dean, College of Science and Engineering**

History of Curriculum Integration at the University of Minnesota

In the late 1990s, the University of Minnesota (UofM) began a pilot project to test new ways to integrate study abroad into the curriculum. It offered a model for interactions with other academic units. Meanwhile, the UofM leadership placed priority on providing international perspectives as part of the undergraduate experience. Past presidents Mark Yudof and Robert Bruininks enthusiastically supported study abroad as one way to integrate international perspectives into the curriculum. Over the last 20 years, undergraduate experience abroad participation has grown from 861 to over 3,000, and learning abroad as a percentage of degrees granted reached 35% in 2019.

Career Integration

In 2012, the Learning Abroad Center (LAC) developed a campus-wide committee to apply the methodology of Curriculum Integration to a specific focus on career planning. Once again, the LAC partnered with campus colleagues to further integrate studying abroad into career advising structures and articulated individual program outcomes while further assisting students in maximizing career reflection and opportunities on site.

History of Curriculum Integration in the College of Science and Engineering

"We have seen what study abroad and global opportunities can do for a student, and that was something that was really missing for engineering and science students, and that wasn't just at Minnesota...There was a real lapse in opportunities for our science and engineering students."

–Susan Kubitschek, former Assistant Dean (engagement with curriculum integration from 2000–2021)

In 1997, the Learning Abroad Center (LAC) began working on curriculum integration efforts with the College of Science and Engineering, formerly the Institute of Technology (IT). The focus was on the long-term impact that a transformation of study abroad attitudes and behaviors could bring to IT and the University of Minnesota. IT proceeded by partially funding the salary of a study abroad professional with additional funds from the Department of Education's Fund for the Improvement of Postsecondary Education (FIPSE). This focus was to assess the match between professional degree programs and study abroad opportunities. IT majors were considered one of the most challenging majors with which to complete study abroad coursework and stay on track academically.

The LAC developed IT Study Abroad Major Advising Sheets, which outlined academic considerations and programs that would work best for each major. The academic considerations section in particular engaged faculty to determine guidelines for their students studying abroad. IT created a new position of Assistant to the Associate Dean for Student Affairs in 1999 with 30% of the associated responsibilities dedicated to study abroad. In 2007, the college committed to a full-time position to focus on international programming, and in 2015 the college again committed to expanding support for international programs by creating another full-time position within the Collegiate Life unit.

Undergraduate Student Participation

College of Science and Engineering (CSE) undergraduate participation grew exponentially from 15 students in 1997 to more than 263 in 2019 for credit-bearing and non-credit-bearing opportunities abroad.

One key part of this growth in study abroad numbers was identifying and developing international opportunities. IT needed both study abroad expertise—knowledge of

programs and programmatic potential—and close faculty relationships within the college structure to draw upon technical knowledge of degree programs and evaluate courses and institutions abroad. All of this included establishing a basic foundation by working with individual CSE departments to create study abroad materials and plans.

Program Development & Opportunities Based on Curricular Needs

CSE and the LAC have a strong program collaboration that includes a variety of program offerings, both credit-bearing and non-credit-bearing. The college continues its serious commitment to increasing the number of CSE students who study abroad.

CSE Global Campus Partner Programs & Custom Faculty-Led Programs

- CSE has offered more than 72 instructor-led programs since 2000
- Long-term programs include partnerships with ZHAW in Switzerland, NTNU in Norway, and a nonprofit organization, St. Paul Partners, in Tanzania
- A number of faculty members have led multiple groups abroad, including Matt Anderson (ME), Edgar Arriaga (Chem), Kyle Bantz (Chem), Catherine French (CEGE), Raymond Hozalski (CEGE), Paul Imbertson (ECE), Frank Kelso (ME), Susan Mantell (ME), Marvin Marshak (Physics), Gerald Sobelman (ECE), Bethanie Stadler (ECE), Kim Stelson (ME), and Paul Strykowski (ME)

CSE Exchange Programs

In the 1990s, the college began exploring bilateral exchange with key science and engineering partners, becoming an “inbound and outbound” student mobility unit. The college joined a multilateral exchange consortium in 2016, Global E3. Today, it maintains a catalog of direct exchange partners; exchanges represent affordable study abroad semester programs for CSE students with pre-approved curricular options.

CSE Non-Credit-Bearing Opportunities

An extremely successful development in the college was the start of a student chapter of the International Association for the Exchange of Students for Technical Experience (IAESTE)—a program of the Association for International Practical Training. This group focused on developing paid professional internships in the US for students from other countries and allowing students from the UofM to apply for paid professional internships abroad. Successful student organizations connected to the college—including Engineers

Without Borders, Innovative Engineers, and the Solar Car team—have sent hundreds of members abroad. CSE students have conducted non-credit research in countries like Germany, South Korea, and Switzerland. CSE was an early advocate for tracking and “counting” non-credit international student mobility within annual reporting on global activities, which had previously been connected only to credit-bearing experiences.

Learning Abroad Center Semester-Based Programs

The LAC has worked with CSE to identify additional program partners to fill gaps and curricular niches. Some of the most recent program additions include Engineering in France, University Study in Australia, University Study in Ireland: University of Limerick, and University Study in New Zealand.

Global Identity Course

In consultation with CSE, the LAC created a slightly modified version of the one-credit, online course *Global Identity* to guide students through their overseas summer internship experience. Since the immersive internships abroad did not include an accompanying class, *Global Identity* was key to mentoring students to better understand their own cultural identity, gain a more sophisticated understanding of their host-country culture, and be more likely to succeed during their internship. In addition to intercultural learning, the course helped students to make the connection between what they were learning abroad and tangible career skill gains.

On-Site Program Engagement Opportunities

Since the late 1990s, the LAC has engaged more than 450 campus partners on program reviews, familiarization visits, and program development opportunities. Of those, 16 participants have come from CSE. The college has made a priority of involving a broad range of staff in international opportunities: Academic advisers, Career Center staff, Collegiate Life staff, lab managers, and departmental staff have served as program co-leaders and site visit participants. These first-hand experiences build enthusiasm for and knowledge of international programming.

Ongoing Engagement with Curriculum Integration

The following summarizes CSE efforts in partnership with the LAC over the last 20 years to further acknowledge continued successes and engagement in learning abroad efforts. As we continue to forge ahead, it's important to recognize the many campus collaborations.

Integrating International Opportunities Into Advising & Instruction Structures

The expansion of the CSE International Programming team in the 2010s opened greater lines of communication between central academic advising, departmental advising, and international advising. CSE incorporated study abroad discussions into advising onboarding and trained staff in different areas of expertise, while technology advances like APLUS made real-time information sharing regarding specific students a reality. It added collegiate international staff to popular ongoing academic advising events such as *Welcome to the Major* nights and *Slice and Advice* (where pizza is offered along with answers to life's questions). The college added a discussion of international opportunities to new student orientation sessions, getting the message out up front.

These advances overlapped with the CSE First Year Experience course (CSE 1001) becoming mandatory for all new first year students in the college. The college added a discussion of international opportunities to the curriculum (taught across approximately 30 sections) and created new study abroad programs exclusively for CSE first-year students to extend the CSE 1001 curriculum. Today, every fall semester, the CSE International Programming staff each teach a section of CSE 1001, increasing contact with new students.

Women in CSE have consistently overrepresented themselves in study abroad and other international activities. Witnessing the global nature of science and engineering can inspire emerging professionals to persist in their chosen field of study despite challenges and setbacks. The CSE student group WISE (Women in Science and Engineering) embodied this mentality by creating a professional immersion program to Ireland in 2019. This program connected students with major companies that bridge Minnesota and Ireland, while creating a supportive and engaging community of emerging student leaders.

Course Equivalency Work

CSE has actively captured course equivalencies in its work with the LAC's U-Credit Abroad equivalency database. This database tracks curricular listings and highlights academic options for programs while providing a high level of searchability. Before the U-Credit system, international course equivalencies had focused solely on transfer students; study abroad students found the data challenging to search and understand. Now, all CSE departments are live in the U-Credit system and CSE academic departments quickly respond to course review requests from students, advisers, and staff.

Scholarships & Funding

CSE students regularly receive funding from the Learning Abroad Center. Scholarships include the LAC Study Abroad Scholarship, Financial Need Scholarship, and Diversity Abroad Scholarship.

CSE students are also eligible to apply for the innovative LAC Bridging Loan Program. "This program has made study abroad possible for underrepresented students and highlights a creative solution to an institutional economic barrier," according to former Senior Vice President for Academic Affairs and Provost Karen Hanson. Since 2013, more than 240 UofM students have received funds to cover program deposits and flight booking costs. The funds enable students to pay for these predeparture costs later with their financial aid package without added interest or fees. In addition, the UofM received an honorable mention for the 2015 Heiskell Award by the Institution of International Education (IIE).

LAC Committee Representation

Early curriculum integration efforts (2001–02)

- Freshman/Sophomore Advising Group
- Major Advising Group
- Undergraduate Department & Discipline Representatives

Recent Committee Engagement

- Career Integration Partnership Group
- COVID-19 Advising Leads
- Financial Barriers Group
- Global Health Advising Collaborative
- Learning Abroad Center Advisory Committee
- Multicultural Study Abroad Group
- U-Credit Abroad

Presentations

"Minnesota's Strategies to Increase Study Abroad Participation in Science and Engineering."

2004 Curriculum Integration Conference, Minneapolis, MN

Peter Hudleston, Co-Presenter

“Connections: Science and Engineering Students and Faculty on Non-Credit International Experiences.”

2012 University of Minnesota Internationalizing the Curriculum and Campus Conference
Adam Pagel, Session Chair and Presenter

“Using Goal-Based Education Abroad to Address Workforce Expectations for STEM Graduates.”

2014 Career Integration Conference, Minneapolis, MN
Adam Pagel, Co-Presenter

“Extending the Experience—Adding Study Abroad to CSE 1001.”

2015 Focusing on the First Year Conference, Minneapolis, MN
Adam Pagel, Session Chair and Presenter

“Marketing Your Learning Abroad Program.”

September 2015 Excellence in Leading Programs Abroad Series
Adam Pagel, Presenter

“Leveraging Relationships to Broaden the Impact of Internationalization in the College of Science and Engineering.”

2019 Learning Abroad Center Annual Meeting

Adam Pagel, International Programs Director, and Paul Strykowski, Professor and Associate Dean for Undergraduate Programs, Presenters

Publications

Hudleston, Peter. “Building Relationships: Case Study, the Institute of Technology.”

Internationalizing Undergraduate Education: Integrating Study Abroad into the Curriculum, Minneapolis, MN: The Learning Abroad Center, Office for International Programs, University of Minnesota, 2005.

Hudleston, Peter. “Curriculum Integration and Professional Programs.” Internationalizing Undergraduate Education: Integrating Study Abroad into the Curriculum, Minneapolis, MN: The Learning Abroad Center, Office for International Programs, University of Minnesota, 2005.

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