

International Scientific Experiences for Chemistry Students

Given the global nature of the chemical enterprise and the significant challenges facing humankind worldwide, it is more important than ever that chemists join forces across national boundaries. Through our unique molecular perspective and ability to synthesize novel compounds and materials, chemists are well-positioned to contribute solutions to a diverse array of global challenges that include addressing the causes and impacts of global climate change, the need to feed a growing human population while sustaining our natural environment, and developing a deeper understanding of human health and disease at the molecular level. Our interactions and collaborations with colleagues in other countries have economic and policy benefits, as well as scientific advances.

Today's chemistry students are the chemical professionals of the future. To be globally competitive, it is especially important that students are trained in a manner that develops the skills needed for international scientific competency. An international scientific experience helps to develop the skills needed for success in our global chemical enterprise and goes beyond the personal benefits of broadening our world-view through pleasure travel. These skills include the competency of engaging productively with scientists from different cultures, facility in overcoming barriers to communication in languages other than English, and an appreciation for the value that diverse points of view can bring to solving complex problems.

Developing International Competencies

In-person international experiences for students may range from short exchange programs to extended research projects. The most effective experiences start with thoughtful preparation, structure the experiences to develop skills and cultural competencies, and include reflection on the experiences. Two-way interactions or exchanges can maximize the impact both here in the US and abroad.

Chemistry degree programs should be structured to facilitate the development of international competencies in their students. Examples of ways programs can facilitate these skill include:

- Structure the course of study for chemistry majors to provide sufficient flexibility for students who wish to participate in study abroad programs
- Provide students with a guide summarizing campus resources and programs that support international activities, study and research
- Partner with your campus international or study abroad office to identify appropriate host institutions for chemistry students and work with the host campus to articulate curricula
- Promote the exchange of undergraduates through faculty research collaborations or through internships and international REU programs
- Create course curricula that involve international experience(s)
- Develop student skills in diplomacy, such as not criticizing cultural competence, political systems, ethical practices, and scientific competence

Adequate preparation can significantly enhance the impact and enjoyment of international scientific experiences. In addition to providing information, pre-travel activities can develop the ability to engage productively with scientists from different cultures, provide strategies for overcoming barriers to communication in languages other than English, and give an appreciation for the value that diverse points of view can bring to solving complex problems. The ACS International Center (<https://global.acs.org/>) offers information on a wide variety of international programs available to students (and faculty), including scholarships and travel awards.

Examples of activities that help students develop international scientific competencies:

Global awareness

- Interact with visiting professionals or students from abroad
- Attend a distinguished international speaker series
- Organize and participate in intercultural fairs, workshops, Olympiads, meetings, conferences, and colloquia on international issues

Cultural understanding

- Complete long- or short-term travel abroad
- Provide students with training related to the culture, history, religion, laws, and economic issues of countries participating in international partnerships
- Engage with students from a different country

Language skills

- Take a foreign language course
- Participate in a foreign language club through your university or community
- Engage a native speaker as a tutor

Working with culturally diverse teams

- Work as an intern for an international business or organization, either overseas or locally
- Volunteer for an internationally-oriented organization in the US
- Participating in intercultural team collaboration virtually (e.g., via Skype) or face-to-face
- Start or join a club or society related to international or cultural issues

Virtual International Interactions

Technology has greatly enhanced our ability to interact with colleagues in other countries. New relationships can be built and existing relationships enhanced by virtual seminar discussions, international journal clubs, and collaborative research projects. Such virtual models provide mechanisms for learning about research projects and identify opportunities to pursue chemistry study, research, or employment in foreign countries.

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