International Research for Undergraduates: How do we make a research rich curriculum global?

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Benefits of Study Abroad Experiences

- Students recognize that international opportunities cost something, yet see the value and relevance of the experience.
- Students understand the connection between the on-campus and the global learning experiences.
- Students learn to appreciate cultural differences.
Challenge

- Study abroad experiences typically offer very little in the way of science instruction, especially in non-English speaking countries.

- In a global world it is becoming increasingly important for science students to have an international experience.
Summer Research Abroad

- Within science education a research-rich curriculum is now considered a best practice.

- Students conduct summer research at a host facility (not necessarily a university) in another country.

- Students bring that research back home, and maintain connections with foreign host.
The Hungarian Experience

- Research Institute for Solid State Physics and Optics of the Hungarian Academy of Sciences – Complex Fluids section.

- Student stipend, travel and living expenses from NSF-IRES Grant.

- Open to a total of 4 rising juniors and seniors.
Pre-departure- Spring semester

- Students enroll in Physics or Chemistry Independent Study – 2 credits.
- Develop skills necessary for laboratory work at host institution. Learn about fundamentals of complex fluids.
- Begin instruction in basic Hungarian.
Pre-departure - First four weeks of summer.

- Conduct guided research at home institution on relevant problems to be worked on in Hungary.
- Continue instruction in basic Hungarian, 2 hours per day (late afternoon).
- Cross-cultural experience instruction.
Arrival

First week in Budapest.

- Get settled in dormitory, purchase public transportation pass.

- Orientation in Budapest.
Six weeks in Budapest!

- Students are assigned a laboratory based on interests and skills. They work on cutting edge research.

- Cultural activities are planned, including weekend excursions and the Night of the Museums.

- Students meet Hungarian students in the dorm. Get to use their Hungarian!
International Research Conference

- Towards the end, each student presents their work at a conference attended by students and scientists from other European and American Universities. This conference is typically in a city of cultural importance.
Shear Zone Geometry

- Shear zone geometry is dependent upon depth of granular material (H) and the radius of the rotating inner disk (R_in)
- Transition in shear zone geometry occurs when H/R_in = 0.65
- At lower H/R_in values, shear zone is trumpet shaped and reaches the surface
- At higher H/R_in values, shear zone is dome shaped and isn't visible at the surface

Note: Hoek et al PRL 2005
Back at Allegheny – Fall semester

- Students give on campus presentation of research done abroad and discuss experiences abroad.

- Students continue research started during the summer as part of the Senior Project.