Enhancing Learning with HIPs Cocktail: Combining Undergraduate Research with International Travel-study

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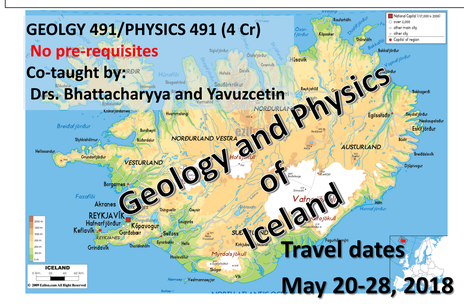
Introduction

The unique geological setting of Iceland makes it ideal as a natural science laboratory. A course based in Iceland can be used to engage students in deep learning and promote scientific curiosity.



Course Expectations

Students were expected to:

- Identify an authentic research question related to topics covered in the course
- Write a competitive undergraduate research proposal
- Work collaboratively with others on the research project
- Present their research to a general audience

LEAP ELOs addressed

- Knowledge of human cultures and the natural and physical world
- Critical and creative thinking skills
- Inquiry and analytical skills
- Written and oral communication skills
- Teamwork and problem-solving skills
- Synthesis across different disciplinary approaches to address research questions

Participants

- Mostly second- and third-year students
- Little or no previous research experience
- Wide range of majors

Majors	Number
Computer Science	1
Environmental Science	1
Geography (General)	4
Geography (Geology emphasis)	2
Physics	2
Total	**10**

"…This class has been different than any other science class I've taken at Whitewater. Generally my classes are filled with lectures, equations, and applying concepts. Instead this semester has been about learning from each other and learning what we bring to the class ourselves."

-Comment from student-self assessment report

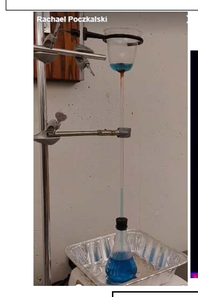
Acknowledgements

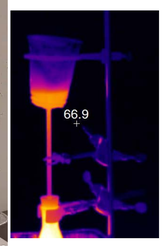
We acknowledge the Undergraduate Research Program, Ólafur Jón Arnbjörnsson and GeoCamp Iceland, the Center for Global Education, and the International Education Committee for their help with various aspects of this course.

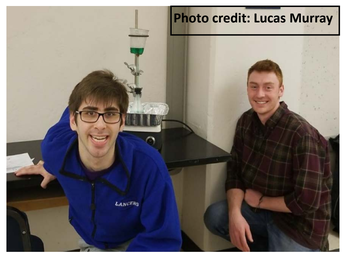
Course activities:

On campus before departure (Spring 2018)

- Meeting twice a week during Spring semester 2018
- Hands-on activities in lab, complemented by short lectures and discussion
- Guest presentation by representative from outdoor adventure store (REI)
- Collaborative group work for formulating research questions
- Students reviewed each others' research proposals and provided peer feedback







Students explore the mechanics of geyser activities using models in lab

Modeling pahoehoe lava flow using brown sugar

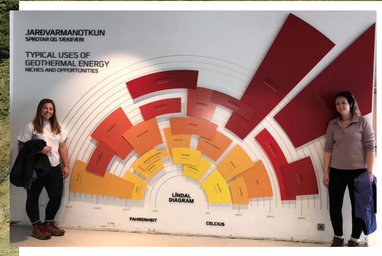
"…we recreated an actual geyser in a classroom setting in order to investigate and research an actual geyser. Rather than simply looking at videos on YouTube or taking notes on how a geyser functions, we made the geyser function with our own hands. This is an important take-away, as all problems can be "scaled down to size" in order to understand them fully. Sometimes you just have to take away the variables and focus on the problem/topic at hand, and that's exactly what our geyser research taught us to do. This is an important lesson in daily interactions and global problems."

-Comment from student-self assessment report

Dr. Stephen Solheim of the Biology Department passed away on Monday, February 18, 2019. As a member of the International Education Committee, he reviewed and approved this course. RIP Steve. You will be missed.

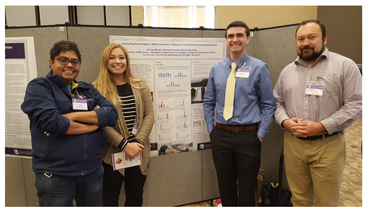
In Iceland

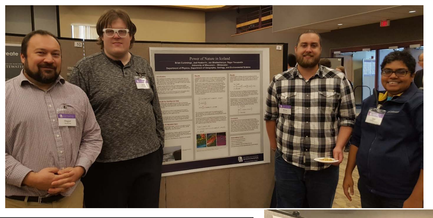
- Visit unique geological and cultural sites
- Data collection and analysis for research projects
- Present preliminary results to our Icelandic partner GeoCamp.



"…I believe that all of the (lessons learned) will be critical for me in my future career. As a teacher, I will have to be able to create experiments, and change lesson plans as I go, as classes do not always go as smoothly as one would like. I will also have to understand my students strengths and be able to use those to help them progress through their lessons."

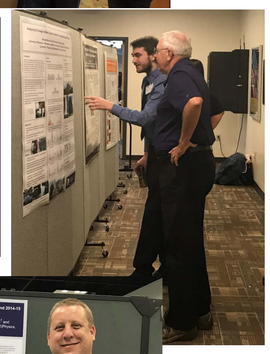
-Comment from student-self assessment report

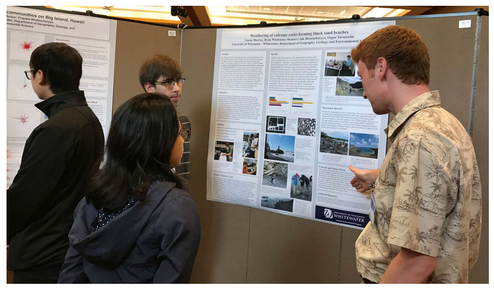


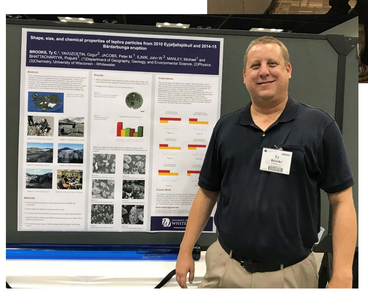


Since returning (Summer 2018-Spring 2019)

- Students presented their projects to the general public on- and off-campus, including at the 2018 Geological Society of America Annual Conference
- Several students will present their projects at the 2019 NCUR and UW System Symposium

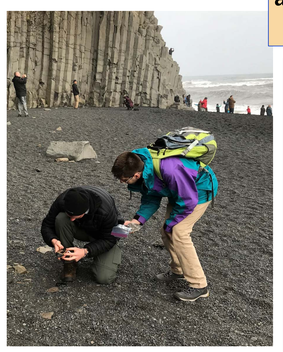






"…Another thing I learned is how to organize this information into a poster that I can present in a clear precise way. This is important because the experience presenting this research both to the class and in the future at fairs and conferences is good practice for later on in life."

-Comment from student-self assessment report



"…I learned from this class is how to work as a team and work together better and listen. This is important because in the future I will work with a lot of people varying from people that annoy me to people I never talk to, this will help me work as a team and understand how people work."

-Comment from student-self assessment report

Discussion: What did the students learn?

Comments from student self-assessment reports show that, besides content knowledge, students learned:

- Teamwork and collaboration skills
- How to design and successfully execute a project
- Communication skills
- Real-life problem solving skills

"…Most importantly this semester I learned how to build an experiment. Generally I've been given instructions to follow and expected results, but in this class, we had a rough plan for the experiments, and had to decide on what we were going to look for."

-Comment from student-self assessment report

Conclusions

- Most of the student participants have not previously considered conducting mentored undergraduate research projects, and they were introduced to research in the context of this course.
- Students from different disciplinary backgrounds worked together in small groups, exchanged ideas, and supported each other in their projects.
- This course provided an opportunity for students with a wide range of physical ability levels to participate in field-based scientific research that otherwise would not have been available to them.
- The interdisciplinary aspect of this course helped students to discover the interconnections between different disciplines, such as physics and the geosciences.

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