InTeGrate

Interdisciplinary Teaching of Geoscience for a Sustainable Future

Building students' capacity for interdisciplinary research by changing the way we teach: *New resources from InTeGrate*

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What is **InTeGrate**?

InTeGrate is an NSF-funded STEP *(STEM Talent Enhancement Program)* Center, a 5-year community effort to improve geoscience literacy and build a workforce prepared to tackle grand challenges in environmental and resource issues. Our mission is to transform the what, how, and where of undergraduate geoscience teaching.

Students from San Juan College near Farmington, NM, exploring the intersection of geology, energy, economy, culture, and the environment at a coal-fired power-plant.

The Grand Challenges

By the time current undergraduates send their children to college, Earth's population will have increased to more than 8 billion. One or more major metropolitan areas in our increasingly crowded world will have experienced a devastating earthquake or volcanic eruption; sea level rise will be inundating low-lying coastal cities along with whole island nations; energy resources will be less available and more expensive; our climate will be warmer and characterized by more frequent extreme weather events. How we choose to plan for and attempt to mitigate these grand challenges will have consequences for individuals, nations, and our global socioeconomic and political systems. The geosciences (marine, Earth, and atmospheric sciences) that explain the workings of the Earth system provide critical insight into all of these challenges and, consequently, must be firmly integrated into educational pathways for all students. InTeGrate will promote that integration through engaging the geoscience community and their colleagues in allied disciplines in the development of high-quality educational materials and mechanisms by which they can be effectively brought to large numbers of students.

InTeGrate components

Project website *(http://serc.carleton.edu/integrate)*

Materials development

InTeGrate is engaging the broader community in:

- Creating materials to teach geoscience in the context of the grand challenges, using real data, highlighting the process of science, and building on pedagogical research;
- Linking creation of materials with assessment and evaluation;
- Building inter-institutional teams of 3-5 people to develop materials and document their use in a variety of different academic settings;
- Developing materials that span the curriculum and a variety of venues.

Program Implementation

Implementation programs go beyond a single course to the department, school, university, and even regional levels. We will be funding 20 programs by application from 2014 to 2016. With these programs, InTeGrate is:

- Seeking to infuse geoscience throughout the curriculum;
- Leveraging existing geoscience, environmental science and engineering programs to address solutions for societal problems;
- Engaging new audiences in the geosciences.

Professional Development

Through an extensive series of workshops, InTeGrate is:

- Documenting current practices as a base for development of needed materials and programs
- Building an interdisciplinary community invested in teaching geoscience in the context of societal issues
- Supporting effective teaching of geoscience in the context of societal issues throughout the undergraduate curriculum
- Disseminating project materials and outcomes.

Assessment of student learning, attitudes, and career goals.

Program Evaluation

CUR + InTeGrate

The grand challenges our society faces today are inherently interdisciplinary issues, requiring knowledge and skills from the natural sciences, social sciences, humanities, business, and engineering. Many undergraduate research programs seek to provide interdisciplinary research experiences that address these challenges. **But are our students prepared for rigorous interdisciplinary research and problem solving?** In order to develop undergraduates who excel in addressing these complex questions, we need to help them build interdisciplinary skills.

We want your input:

What should students **know** and be able to **do** in order to be successful in an interdisciplinary research project?

Which **grand challenges** are important to you and your students in your research and teaching?

What **connections** can you envision between your discipline and the geosciences?

How to **get involved**

Teachers developing new curricula that combines the study of streamflow with societal issues like flooding and erosion.

InTeGrate relies on active participation from faculty across the country. ***It is not just for geoscientists!*** There are many avenues for participation:

1. Join an inter-institutional, interdisciplinary team to create and test teaching materials and provide examples of their use in the classroom;
2. Apply for a grant to make innovative use of new curricular materials in your program (starting in 2014);
3. Attend a professional development workshop to contribute your knowledge and expertise and to learn about incorporating geoscience and sustainability into your teaching.
4. Join the e-mail list to stay in the loop with project announcements and news.

We **seek team members to develop interdisciplinary courses** in:

- Energy, Earth, and Us
- Geologic Hazards and Humans
- Coastlines and Coastal Hazards
- Water and Society
- Modeling the Earth System

Interested? Talk to Anne Egger

Workshops in 2013

- Teaching Environmental Justice
- Integrating Geoscience into other Science Courses
- Teaching Oceanography
- Systems and Sustainability at the Program Level

Interested? Get on the email list.

Interested?

Visit the **InTeGrate website** *(http://serc.carleton.edu/integrate/participate)* to

- Submit your own ideas for courses or modules for development
- Find out more information about work already in progress
- Find out more about who is already involved and how to get involved

or **contact CUR Councilor Anne Egger** *(eggera@cwu.edu)*

Sponsoring organizations

Consortium for Ocean Leadership · The Geological Society of America® · CoSEE Centers for Ocean Sciences Education Excellence · the IRIS Consortium · American Meteorological Society · AGI american geosciences institute · NAGT · AGU · On the Cutting Edge Professional Development for Geoscience Faculty

http://serc.carleton.edu/integrate