



Showcasing Successful Strategies for Supporting Minority Students in the Geosciences

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InTeGrate
Interdisciplinary Teaching about Earth for a Sustainable Future

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Increase the Diversity of your Graduates:

Recruiting and supporting minority students in STEM disciplines

Support the Whole Student
Multifaceted approaches to supporting students in STEM majors are the most effective strategies regardless of the student population but especially important for increasing the success of underrepresented minority students in STEM. Faculty, departments, and institutions have a number of options when it comes to creating a sense of belonging, strengthening mentoring and advising, and helping students feel comfortable seeking help.

Attract Minority Students to STEM
In order to persist in STEM majors, students must first be attracted to them. The state of minority participation in STEM majors has shown improvement over the last decade, but more can be done. There are a number of proven strategies faculty and departments can use to increase student interest in STEM majors.

Drawing on research into what works in supporting minority students, InTeGrate has created online resources to help STEM departments and geoscience programs increase the diversity of their graduates. We highlight some strategies that have been shown to be effective in helping minority students persist in STEM disciplines.

A - Supporting the Whole Student involves looking beyond coursework to help students succeed. For example:

- Generate a sense of community and belonging.
- Strengthen students' motivation to pursue a career.
- Provide academic support in a variety of forms.
- Get students involved in research.

B - Attracting Minority Students to major in geoscience and STEM more broadly also requires work outside the classroom.

- Work with elementary/high schools to get and keep students interested.
- Strengthen the teaching in introductory courses.
- Use societal issues to engage students' drive to change the world.

A Support the Whole Student

Jump Down To: [Develop Student Motivation](#) | [Provide Academic Support](#) | [Engage Students in Research](#) | [What does it mean to Support the Whole Student?](#)

Build a Sense of Community
Research shows that students who feel they 'belong' have a higher degree of intrinsic motivation and academic confidence (Leiman, Anderson and Jensen, 2007) (Anderson and Leim, 2005). Establishing this sense of community in a class or in a department is one of the most important recommendations coming out of the 2011 report from the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine - Expanding Underrepresented Minority Participation: America's Science and Technology Talent at the Crossroads.

"Undergraduate and graduate STEM education programs should incorporate social inclusion strategies that include peer-to-peer support, study groups, program activities fostering social integration, and tutoring and mentoring programs."
- NAS et al. (2011) p. 184

What does it mean to Support the Whole Student?
July and others (2004) conceptualize programs that support the whole student as addressing three major components: engagement, capacity, and continuity. Citing from their article:

- **Engagement:** Having an orientation to the sciences and/or quantitative disciplines that includes such qualities as awareness, interest, and motivation.
- **Capacity:** Possessing the acquired knowledge and skills needed to advance to increasingly rigorous content in the sciences and quantitative disciplines.
- **Continuity:** Institutional and programmatic opportunities, material resources, and guidance that support advancement to increasingly rigorous content in the sciences and quantitative disciplines.

A Sense of Belonging - A Critical Underpinning to Engagement
For students of color, having a sense of belonging in the science community can be one critical aspect of persistence (Mama, 2003; Johnson, 2002; Slaton, 2012). It is difficult to remain engaged in the study of a STEM field if one feels an outsider to the learning community or cannot imagine oneself as successful in the profession. Many aspects of course work, departmental culture, or research experiences can strengthen or diminish a student's sense of belonging. Cultors that give students opportunities to develop meaningful relationships with other students and key STEM faculty have been used successfully to help students from underrepresented in the sciences develop the sense that they belong in the sciences. Undergraduate research experiences are another mechanism for building a student's sense of themselves as a scientist, a critical step in feeling as if you belong in the sciences.

Academic Support - Building Capacity
A student's academic success is central to building capacity. Institutions and departments have a wide variety of approaches to supporting their students' academic success from advising to help centers to student networks. These programs are an essential part of supporting the whole student. Equally important is attending to the barriers that may exist for students from underrepresented groups in making use of these programs. The challenge of seeking help is closely connected with students' comfort and belonging in the science community. Students may have a reluctance of asking for help in class or in office hours. They may fear that seeking help will label them as less prepared or ill-equipped.

Mentoring and Advising - A Source of Continuity
Continuity of learning experiences, and robust professional experiences, depends heavily on mentoring and advising from that peers, their professors, and their professional mentors. For students of color, peer mentors are more than a source of training or advice on course selection.

B Attract Minority Students to STEM

Jump Down To: [Introductory Courses](#) | [Use Societal Issues](#) | [What is the current demographic situation?](#)

Start Early
One problem with attracting students to STEM majors is that by the time they reach college age, they have lost interest in science and math, been turned off by a bad experience, or been convinced that they aren't good at them. One way to counteract this is to target resources at the middle and high school years to help keep young people engaged in science, technology, engineering, and mathematics (STEM) education.

Recruitment Strategies
The Building Strong Geoscience project has developed recruitment strategies suggested by participants at various meetings and strengthened by your Geoscience Department.

Introductory Courses
An increasing body of research is pointing to the important role of students into a major or driving them away. The quality of teaching students can be very influential in bringing students into the major. In this effect "majoring in a profession." Conversely, a faculty member doesn't actively engage students in an introductory course can turn away, not only from majoring in that subject but from science as a whole.

On the Cutting Edge: Introductory Courses
The On the Cutting Edge project courses through a series of project ideas for designing a new course.

Student Demographics

In STEM
According to NSF statistics, in 2010 just over 250,000 students graduated with Bachelor's degrees in STEM disciplines and about 144,000 of them (57.3%) were underrepresented minority students. According to the U.S. Census Bureau, African Americans, Hispanics, Native Americans/Pacific Islanders, and Native Hawaiian/Pacific Islanders collectively accounted for approximately 31.2% of the U.S. population in 2012. If these students were graduating in the same proportion to their share of the population, there would be about 200,000 additional STEM graduates of color. The situation of minority students varies across degree type.

Degree Type	Associate's	Bachelor's	Master's	PhD
STEM Bachelor's Degrees by Race/Ethnicity	33.5%	27.3%	20.2%	13.2%
STEM Master's Degrees by Race/Ethnicity	31%	23%	16%	10%
STEM PhD Degrees by Race/Ethnicity	28%	20%	14%	10%

In the Geosciences
According to the same NSF statistics, of the roughly 525,000 students who graduated with Bachelor's degrees in STEM disciplines, just under 4,000 were geoscientists (0.7%). Of these geoscience degrees, only about 500 were students from underrepresented minorities (12.2%). With these communities constituting 31.2% of the U.S. population in 2012, the number of USM geoscience graduates lags far behind at only 13.9% of the Bachelor's level. While it is a marked improvement over the 7% it was in 2002 (Gale, 2003), it shows how far there is still to go.

Blending out to look at all degree levels, underrepresented minorities made up similar, low proportions of geoscience graduates in 2010.

Degree Type	Associate's	Bachelor's	Master's	PhD
Geoscience Bachelor's Degrees by Race/Ethnicity	11%	13%	7.4%	6.7%
Geoscience Master's Degrees by Race/Ethnicity	10%	12%	7%	5%
Geoscience PhD Degrees by Race/Ethnicity	9%	11%	6%	5%

Again, these numbers represent improvement over the numbers from a decade before (4%, 7%, 6%, and 6% respectively), but leave much room for growth.

Programs Supporting Minority Students

We have interviewed faculty from a number of institutions to learn how they approach diversity in matters of recruitment and retention and how their efforts are paying off. In these interviews faculty were asked to describe what they see as the keys to success for their programs. Successful strategies include extensive outreach programs, scholarship opportunities, clear articulation agreements between community colleges and universities, peer and faculty mentoring, access to tutoring or other academic support programs, and talking courses within the geoscience program to careers students can pursue with an undergraduate degree. These profiles can serve as models and inspiration for departments and programs that aspire to broaden participation in the geosciences.

Results 1 - 7 of 7 matches

University of New Orleans, Minority Awareness Program
Part of the Recruiting and supporting minority students in STEM disciplines Collection. Information for this profile comes from an interview with Dinah Maygarden, Director of the Minority Awareness Program for ...

University of Texas at El Paso
Part of the Recruiting and supporting minority students in the Geosciences Collection. Information for this profile comes from an interview with Diane Doser, Professor of Geology at the University of Texas at El Paso.

Fort Valley State University, CDEP
Part of the Recruiting and supporting minority students in STEM disciplines Collection. Information for this profile comes from an interview with program director Dr. Isaac Crumly on August 14, 2013.

North Carolina A&T University, NOAA/ISET Cooperative Science Center
Part of the Recruiting and supporting minority students in STEM disciplines Collection. Information for this profile comes from an interview with Solomon Bilgin, Professor of Physics at North Carolina A&T ...

El Paso Community College, SOLARIS
Part of the Recruiting and supporting minority students in STEM disciplines Collection. Information for this profile comes from an interview with the Geological Science Department website and an interview with Joshua ...

Salish Kootenai Tribal College
Part of the Recruiting and supporting minority students in STEM disciplines Collection. Information for this profile comes from an interview with Anthony Berheke, Professor of Geology at Salish Kootenai College ...

Jackson State University

Minority Serving Institutions have valuable expertise in helping minority students attain degrees and careers in STEM. Other types of institutions can benefit from their experience. To help showcase the successful strategies that MSIs have pioneered, InTeGrate has profiled a number of geoscience-related programs at MSIs.

Supporting Minority Students at EPCC

Part of the Recruiting and supporting minority students in STEM disciplines Collection. Information for this profile comes from the EPCC Geological Science Department website and an interview with Joshua Villalobos on August 14, 2013. You can get additional information about SOLARIS on the program website.

Jump down to: [Content](#) | [Keys to Success](#) | [Attracting New Students](#) | [Supporting Our Majors](#) | [Preparing Students for Careers](#) | [Additional Information](#)

SOLARIS Program
The SOLARIS (Student Opportunity for Learning Advanced Research in geoScience) program is aimed to increase participation, particularly for minority students, in the geosciences at El Paso Community College (EPCC). Funded by NSF's Opportunities in Enhancing Diversity in the Geosciences (OEDG) program, SOLARIS has two primary facets. First, workshops for local high school instructors and EPCC faculty provide educators with strategies to engage students with active learning techniques, information about geoscience careers, and possible degree paths through EPCC and the University of Texas at El Paso (UTEP). Secondly, as a bridge program, the program allows up to 10 EPCC geological science students to complete their undergraduate research using equipment and facilities at both EPCC and UTEP.

Geological Science, El Paso Community College
The Department of Geological Science at El Paso Community College (EPCC) provides a valuable educational path for students who are interested in geoscience careers. The department offers a Bachelor of Science degree in Geological Science and a Master of Science degree in Geological Science. The department also offers a variety of certificate and diploma programs in geoscience.

Keys to Success

- **Attracting new students** to the program through engaging students' interest.
- **Supporting majors** through research, mentoring and advising at the four-year institution.
- **Preparing students for careers** by giving them research experiences.

Attracting New Students

In partnership with the Building Strong Geoscience Departments project, each profiled school has a page with information about the strategies they use to attract, support, and prepare their minority students combined with one or more pages about the geoscience degree programs offered at the institution.

Supporting Minority Students at JSU

Part of the Recruiting and supporting minority students in STEM disciplines Collection. Information for this profile comes from the Jackson State University website and an interview with Quinton Williams, Professor of Physics and former Department Head, on July 24, 2013.

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Jackson State University

Content
Jackson State University is a Historically Black University with an enrollment of around 9000 students. About 95% of their enrollment is African American with almost all of the remainder being Caucasian. The Department of Physics, Atmospheric Science, and Geoscience offers BS degrees in Physics, Meteorology, and Earth System Science.

Keys to Success

- **Attracting new students** to the program through partnering with their alumni association as well as Penn State and utilizing outside traditional recruitment strategies.
- **Supporting** their students through research, mentoring and advising at the four-year institution.
- **Preparing and helping** their students through research, mentoring and advising at the four-year institution.

Attracting New Students
Partnership with Penn State and doctoral studies at Jackson State University.

Geoscience Departments, Jackson State University
The Department of Physics, Atmospheric Science, and Geoscience offers BS degrees in Physics, Meteorology, and Earth System Science. The department also offers a variety of certificate and diploma programs in geoscience.

Earth System Science, Jackson State University
The Earth System Science program is a new degree program that is designed to provide students with a broad-based education in geoscience and related fields. The program is based on the integration of geology, meteorology, and atmospheric science.

